The influence of conflict type on resolution mechanisms in innovation networks

Elodie GARDET
Assistante professor
Institut de Recherche en Sciences de Gestion – Université de Savoie
4, Chemin de Bellevue
BP 80439
74944 Annecy le Vieux CEDEX, France
Telephone: +33(0) 4 50 09 24 51
Fax: +33(0) 4 50 09 24 39
elodie.gardet@univ-savoie.fr

Romain GANDIA
Assistant professor
INSEEC Business School
France
rgandia@inseec.com

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Abstract

This research investigates the influence of the type of conflict on resolution mechanisms used by innovation network members. Qualitative analysis of six innovation networks highlights two main results: (1) affective conflicts related to cooperation imply rather radical modalities as the exclusion, and (2) cognitive conflicts related to technical aspects about the project can be resolved through discussion. In addition, the data show that the dependence of the hub firm influences how conflicts are resolved.

Keywords: conflict, resolution mechanisms, innovation network, hub firm.
Introduction

Organizations working with networks to develop their innovation projects often face conflicts due to differences in objectives between partners. The literature on conflict resolution is divided into two main streams. The first analyzes the emergence of conflicts in innovation partnerships or networks (Frechet, 2002; Mele, 2011; Munksgaard et al., 2012), as well as between investors and managers (Guéry-Stévenot, 2006). From a cognitive perspective, conflict arises from a lack of harmony in the relationship. Conflict also occurs when the partners perceive a shift in interests or incompatible needs (Jehn and Mannix, 2001). The second stream focuses on conflict resolution mechanisms and their impact on the success of the partnership (Mohr and Spekman, 1994; Tuten and Urban, 2001; Puthod and Thévenard-Puthod, 2006; Mele, 2011). Here, conflict is considered a negative element in the relationship because it leads to lower profits or a breakdown of the relationship (Mohr and Spekman, 1994). This research stream thus questions the influence of the type of conflict on the choice of mechanisms for solving it. Indeed, the literature provides few explanations for choosing conflict resolution mechanisms, particularly in innovation networks. This network type is specific because of its complexity—that is, innovations are particularly prone to conflicts because of the uncertainty surrounding them. Moreover, limited research has attempted to combine these two streams of literature. Thus, we posit that the choice of resolution mechanism depends on the type of conflict.

We divide the article into four parts. The first provides a summary of the literature on conflict resolution mechanisms and identifies the different types of conflicts that occur in innovation networks. The second part presents the six innovation networks studied, the data, and their treatment. The third part reports the results and shows that the choice of conflict resolution mechanism differs depending on whether the conflict pertains to project operation or to the relationship between partners. Other results highlight the role of the project bearer (hub firm in the innovation project) and the influence of the level of dependence on conflict resolution mechanisms used. The fourth part discusses the results and presents the contributions, limitations, and future research avenues.

1. CONFLICT RESOLUTION MECHANISMS AND TYPE OF CONFLICT

This article focuses on innovation networks, which refer to a set of vertical and horizontal relationships with all types of organizations (public/private, partners/providers), driven by a hub firm (the project bearer), with the main aim to value the invention of the hub firm.
Conflicts particularly affect the innovation network because partners tend to be heterogeneous (from different sectors and with different purposes for cooperation). These organizational forms are particularly favorable to the exchange of information and the transfer of knowledge, which in turn encourage opportunistic behavior (Goerzen, 2007). In addition, these innovation networks often contain tacit knowledge and a low degree of predictability of results, which generate high uncertainty and a significant risk of conflict emergence. Finally, innovation networks comprise multiple relationships, with varying levels of interdependence, and these characteristics can be a source of conflict. An innovation project is strategic, confidential, and uncertain. At the beginning of the project, the hub firm cannot predict all the risks (e.g. technical, financial, human), difficulties, and outcomes linked to the project. Thus, the rules of sharing responsibilities, resources, and the outcome must be defined. This incentive mechanism encourages partners to transfer key knowledge for the project and to maximize the chances of success. However, as the project evolves, a redefinition of the roles of each partner and, therefore, the rules for sharing the results may result. These changes can then be a source of disagreement and conflict emergence. The uncertainty of an innovation project stems from its intrinsic nature and also the exchange of knowledge between tacit and strategic partners. Therefore, conflict resolution mechanisms are more complex in the context of innovation networks than in other bilateral relationships because they are by nature uncertain, risky, and expensive. Thus, the type of conflict can affect the project bearer’s (hub firm’s) choice of resolution mechanisms. To understand this further, we detail the various conflict resolution mechanisms and the different types of conflicts that may arise in networks.

1.1. CONFLICT RESOLUTION MECHANISMS
Conflict arises when a company perceives that a partner negatively affects, or is about to negatively affect, something important thing for it (Thomas, 1992, p.653). The literature on conflict management (Mohr and Spekman, 1994; Mele, 2011) identifies several conflict resolution mechanisms and focuses on different levels of analysis (e.g. between individuals, between organizations) with little notable distinction between them. However, research is limited to a dyadic analysis, particularly inter-organizational cooperation, in which conflict is almost inevitable because of the interdependencies between the parties (Mohr and Spekman, 1994; Malhotra and Lumineau, 2011). However, in an innovation network (Dhanaraj and Parkhe, 2006), it is crucial to consider all the interactions between partners. If conflict arises
between technical partners, another network partner (e.g. the project bearer) might act to solve it. Therefore, the hub firm can occupy a prominent place in conflict resolution. However, this situation is not addressed in the conflict literature. Furthermore, conflict mechanisms can be highly complex in the context of innovation networks because they are not always defined at the beginning of the cooperation (an innovation project is inherently uncertain and has limited visibility of the future relationship) and the level of commitment between partners is heterogeneous. Mohr and Spekman’s (1994) typology includes five types of mechanisms to examine cooperation. Although their typology pertains to bilateral relationships, we use it with a few amendments to consider multilateral relationships (see Table 1).

**Table 1: Different types of conflict resolution mechanisms**

<table>
<thead>
<tr>
<th>Conflict resolution mechanisms</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint problem solving</td>
<td>All partners agree to work together to find a mutual solution.</td>
</tr>
<tr>
<td>Persuasion</td>
<td>When one of the parties (or group of organisms) tries to persuade the other partners that solution A or B is the best way to resolve the conflict.</td>
</tr>
<tr>
<td>Coercion</td>
<td>One or more partners force others to choose the solution they consider the best to resolve the conflict.</td>
</tr>
<tr>
<td>Sanction</td>
<td>Different types of sanction that can be soft (friendly reprimand a partner) or hard (exclusion of the collaboration).</td>
</tr>
<tr>
<td>Arbitration</td>
<td>Used to make a choice between the different stakeholders (arbitrator or court).</td>
</tr>
</tbody>
</table>

Source: Adapted from Mohr and Spekman (1994).

Mohr and Spekman (1994) argue that use of a third party can positively affect a partnership. However, an internal resolution (no intervention of an external party) leads to greater sustainability of the relationship. Conflict resolution is therefore not a linear dimension. Conflict resolution evolves over time, but little research has explicated how it does so or how the type of conflict can affect the choice of mechanisms used. It is in this context that we position this research.

### 1.2. TYPES OF CONFLICT

Conflicts are inevitable in innovation networks (Fréchet, 2002). Although some conflicts can be constructive for innovation (Song *et al*., 2006; Mele, 2011), others can destroy it. Some
conflicts are negative because they affect coordination within a group, cooperation between partners, and team objectives or performance (Peterson and Behfar, 2003; Munksgaard et al., 2012; Klerkx and Aarts, 2013). To counter these effects, conflicts must be understood and resolved by analyzing the problems (Dyer and Song, 1998). Therefore, conflict resolution mechanisms differ and may depend more logically on the origin (type) of the conflict. Problem analysis involves identifying the different types of conflicts that may arise in an innovation network. Table 2 summarizes the main research that distinguishes conflict according to its nature.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Types of conflict</th>
</tr>
</thead>
</table>
| Amason (1996)            | ▪ **Cognitive conflict**: Differences of opinion on how to operate to achieve common goals. This type of conflict is perceived as positive for cooperation because it allows for the expression and integration of divergent opinions.  
▪ **Affective conflict**: Personal attacks and hostile opposition between organizations. |
| Moore (1996)             | ▪ **Relational conflict**: Personal attacks and hostile opposition between organizations.  
▪ **Informational conflict**: Stems from a lack of information, misinformation, different interpretations of information, and so on.  
▪ **Structural conflict**: Stems from the scarcity of resources, inequality between the parties, and geographical, physical, or financial barriers to cooperation.  
▪ **Conflict of values**: Stems from differences in assessment criteria, culture.  
▪ **Conflict of interest**: Stems from disagreements on the interest of each member. |
| Jehn and Mannix (2001)   | ▪ **Relational conflict**: Emotional stress (e.g. embarrassment, frustration, irritation) resulting from interpersonal incompatibilities.  
▪ **Conflict on the work to do**: Different ideas or opinions about the work to be done.  
▪ **Conflict on the process**: Opposition from members on how to perform the work planned. |
| Simons et al., (1999)    | ▪ **Cognitive conflict**: Different evaluation criteria among members.  
▪ **Conflict of interests**: Differences in actual or perceived material interests between members. |

In general, although some of these typologies are more detailed (Moore, 1996), the majority split the conflict into two categories: affective or cognitive (Amason, 1996, Simons et al.,...
1999; Jehn and Mannix, 2001; Mele, 2011). In this research, we also use this distinction to facilitate the discussion of the results.

1.3. CONCEPTUEL FRAMEWORK
In an innovation network, the project bearer can focus on certain mechanisms to resolve the conflict. Figure 1 summarizes our conceptual framework.

**Figure 1: Conceptual framework of the relationship between the type of conflict and its resolution mechanisms**

![Diagram showing the relationship between types of conflict and resolution mechanisms]

2. METHODOLOGY
We conducted six case studies to better understand how firms adopt conflict resolution mechanisms. We chose this methodology because the phenomenon under study is large, complex, and largely unexplored. Therefore, this research is exploratory, in that the literature has not yet developed precise hypotheses regarding the relationship between the types of conflict and conflict resolution mechanisms (Miles and Huberman, 2003). Thus, we began the interviews with an in-depth questionnaire to account for the different dimensions of potential conflict resolution mechanisms. We conducted 53 interviews and tape-recorded 33. We did not audio-record the remaining 20 interviews for confidentiality reasons.
2.1. A CASE STUDY APPROACH

Each of the six case studies relies on three information collection tools to ensure data triangulation (Yin, 1994): interviews, direct observation, and secondary data analysis. We chose these six innovation networks because each was in the process of developing a technological innovation in collaboration with at least three other organizations (see Table 3). We conducted 53 interviews with different partners of the innovation networks: the project bearer and the financial, technical, and industrial members. By carrying out semi-structured interviews over an average of one and a half hours each, we hoped to gain a better understanding of the innovation networks’ history, the different conflict resolution mechanisms implemented, the difficulties experienced, and their consequential repercussions on the innovation project. We also collected secondary data (internal: e-mails exchanged between different project members, the project bearers’ internal notes during project advancement presentations, business plans and contracts between members; external: Internet, press releases, articles and newspaper clippings). Last, we used passive observation (visited the project bearers’ offices one day every two months over 6 to 12 months) to capture the actual environment and working atmosphere (both tensions and relaxation periods linked with the innovation project).

2.2. CASE PRESENTATION AND DATA TREATMENT

The case studies involved multi-site development of a theoretical sample. Thus, we took care to select networks of different sizes and those operating in sectors with heterogeneous activity, though all were developing a technological innovation project. We selected cases that shared common features (e.g. technological innovation, networks with at least three partners) but strongly differed in several respects. Table 3 lists the characteristics of the six case studies.
### Table 3: The characteristics of the innovation networks studied

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Motorisation Projet A</th>
<th>Pince &amp; Pile Projet B</th>
<th>Télescopique Projet C</th>
<th>Pieces Trans Projet D</th>
<th>Protect Projet E</th>
<th>Jump Projet F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of members</td>
<td>The six networks comprise at least three organizations and are directed by a hub firm</td>
<td>55</td>
<td>4</td>
<td>13</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Size of hub firm (numbers of employees)</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Share of workforce invested in the project</td>
<td>100%</td>
<td>50%</td>
<td>100%</td>
<td>33%</td>
<td>72%</td>
<td>33%</td>
</tr>
<tr>
<td>Geographic Scope</td>
<td>Majority of national members (38/55)</td>
<td>Majority of local members (3/4)</td>
<td>Majority of international members (7/13)</td>
<td>Majority of national members (4/8)</td>
<td>Majority of national members (4/19)</td>
<td>Majority of local members (4/6)</td>
</tr>
<tr>
<td>Previous experience driving innovation projects</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 successful experiences of cooperation</td>
<td>6 previous experiences with one failure</td>
<td>-</td>
</tr>
<tr>
<td>Resources and expertise of the hub firm</td>
<td>Science - technology</td>
<td>Market-user</td>
<td>Science - technology</td>
<td>Science - technology</td>
<td>Science - technology</td>
<td>Market-user</td>
</tr>
<tr>
<td>Number of projects managed by the hub firm</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Nature of the innovation</td>
<td><strong>Technological innovation</strong>: production and marketing of a new product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry project</td>
<td>Automobile</td>
<td>Plastic</td>
<td>Paper mill</td>
<td>Electronic</td>
<td>Sports and leisure</td>
<td>Sports and leisure</td>
</tr>
<tr>
<td>Innovation object</td>
<td>Component for car manufacturers</td>
<td>Products for beauticians</td>
<td>Basic consumable products</td>
<td>Machine to improve the manufacturing process</td>
<td>Sports protection product</td>
<td>Product specialized in sliding sports</td>
</tr>
<tr>
<td>Number of interviews</td>
<td>13</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Passive observation</td>
<td>Repeatedly 7j</td>
<td>Often 3j</td>
<td>Infrequently 1j</td>
<td>Infrequently 1j</td>
<td>Repeatedly 5j</td>
<td>Infrequently 2j</td>
</tr>
<tr>
<td>Internal data</td>
<td>Contracts (7) + financial report (2)</td>
<td>Contracts (3) + project report (1)</td>
<td>Report meetings (8) + mails (50)</td>
<td>Mails (25) + mails lawyers</td>
<td>Contracts (16) + mails (10)</td>
<td>Contracts (3) + mails (20)</td>
</tr>
</tbody>
</table>

1 This low number of contracts, proportional to the network size, can be explained by the use of an identical contractual frame for several members.
3. KEY ROLE OF TYPE OF CONFLICT AND HUB FIRM DEPENDENCE

Analysis of conflicts within the six innovation networks shows the influence of two dimensions on resolution mechanisms: the type of conflict and the hub firm’s level of dependence.

3.1. NECESSITY TO CONSIDER THE TYPE OF CONFLICT

Cognitive conflict refers to disagreements on the project operation. Emotional conflict results from considerable stress linked to cooperation. Both types of conflict pit the strategic interests (e.g. quasi-rent distribution, opportunistic behavior) of one member against another:

Don't believe that amicable resolution is always the most suitable. You know, it's like when you go to the doctor, he does not prescribe you a cold medicine if you have gastroenteritis. For conflict it's the same, every problem has a solution. (hub firm, project B)

Conflict resolution mechanisms are heterogeneous and depend on the type of conflict between members. If conflict pertains to the innovation project operation (cognitive conflict), discussion or persuasion are often used. A tense situation makes any agreement more difficult and can self-feed the conflict, giving rise to a never-ending spiral (Fréchet, 2002), in which discussions over time are never resolved (Mosterd and Rutte, 2000) and impede the progress of the innovation project. To avoid creating such a vicious circle (generated by the degradation of discussions), persuasion is preferred to end the debate. In this case, one member convinces the other that his or her solution is better and pushes to execute the tasks expected:

Negotiation is always important, especially with its technical partners because even if they have only a fragmented view of the project, they are less engrossed in their work and may have more relevant technical solutions than us. So, with these people, the discussion to find the good technical solution is very rewarding and it's never a waste of time, even if we do not retain it. (hub firm, project A)

Conversely, when conflict arises in a cooperative relationship (affective conflict), the use of coercion, sanctions, or a third party (court or arbitrator) is more widely used. Resolution modes then refer to sanctions if the member does not adopt exemplary behavior:

If a partner has betrayed you once, it's likely that it starts again at the next opportunity. So, in this case, it's best to separate to avoid the risk of the coming betrayal. Unfortunately, this is possible only with companies that can easily be replaced. For others, we must be vigilant. (hub firm, project E)
3.2. THE ROLE OF THE HUB FIRM’S DEPENDENCE

Case studies show that the nature of the conflict influences resolution mechanisms. However, this alone is insufficient to fully understand the hub firm’s choice. Rather, the hub firm’s degree of dependence also has a strong influence on resolution mechanisms. Dependence refers to the concept of power (Emerson, 1962) and therefore captures the relationship between a dominant and a dominated actor. A high degree of hub firm dependence means that it is under the influence of a partner with greater higher power. Conversely, a low degree of hub firm dependence or no dependence means that it has more power than or the same level as the partner. Sources of dependence are multiple (Tinlot and Mothe, 2005): the resources and skills of partners, the size of a partner relative the size of the hub firm, the strategic importance of the interorganizational relationship, and the urgency of cooperation. Four situations arise from the role of dependence (see also Figure 2):

- **Conflict is cognitive and the hub firm is not dependent.** Six hub firms explained the need to communicate with their partners to resolve conflicts ("resolve calmly through dialogue," hub firm of Jump project F). A new idea can arise from such discussions and thus facilitate advancement of the innovation project. Such joint resolution is a workable solution. The hub firm can also use persuasion; with its role as conductor, which gives it an overview of the project, it is the only party to have interactions with all members. It collects the solutions proposed by all members, and if differences cannot be resolved through discussion (joint resolution), the hub firm tries to persuade members to align with the choice:

  *With Mr. X [industrial partner], we do not always agree on the number of parts to be produced, but it's normal because it's difficult to agree on everything. This shows that my partner is really interested, and we try together to find a solution to our disagreement. (hub firm, project B)*

- **Conflict is cognitive and the hub firm is dependent.** Patenting by the hub firm is not a sufficient guarantee to ensure bargaining power over members of its network. When dependency exists, the members can use persuasion to convince the hub firm. Members persuade the hub firm to adopt a solution such that the investments are more favorable for them. For example, in the Jump project (F), the technical partner chose the material according to its own interest:
When you invest in an innovation project, we know that risks of failure are high. So, one of the objectives is to minimize the risks, and this necessitates choosing technologies or machines already known in our business. Innovation yes, but that doesn't mean reinventing the wheel. (technical partner, project F)

- **Conflict is affective and the hub firm is not dependent.** If members demonstrate minimal commitment in the project and act opportunistically, the hub firm then prefers that members leave the network, and because the hub firm is not dependent on any one member, it can easily select a replacement. In this case, the hub firm uses sanctions, which is a faster way than discussion (which can lead to delays in the project). Forming a relationship with a new member is not more expensive than rebuilding a relationship destroyed by betrayal:

  *In my situation, I was lucky to stop my relationship with these companies. If I had waited eight months, the production phase would have begun and I would have had to adopt their conditions. (hub firm, project B)*

- **Conflict is affective and the hub firm is dependent.** In this situation, the hub firm uses coercion or a third party (arbitrator or court) to resolve the conflict. In the case of conflict, the level of dependence forces the hub firm to surround itself with members in order to lobby on the defaulting member. In addition to the coercion mechanism, the hub firm can appeal to an arbitrator\(^2\), but only if it has been designated *ex ante*, in the cooperation agreement. Unlike the court, this provision ensures confidentiality, which is important, especially if the project is not completed. All six cases viewed the court as the most "hard" mode (Mohr and Spekman, 1994) to resolve the conflict, such that in the confrontation, a third actor (the judge) rules. Such a method leaves little hope of reviving cooperation between members. Pince & Pile and Parts Transfer went to court, and in both cases, cooperation resulted in the exclusion of the member. The court has two main drawbacks: it is a long process (legal proceedings may exceed the duration of the project) and expensive (each party must pay a lawyer to represent it in court). Therefore, hub firms use this mode only if the contract does not contain an arbitration clause or if the conflict is due to betrayal. For Pince & Pile, the conflict arose because a legal partner wanted to appropriate the results of cooperation. In the case of Parts Transfer, the conflict was caused by an additional patenting of the hub firm.

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\(^2\) Arbitration is a method of non-state dispute settlement. It is a conflict resolution mechanism through an arbitration tribunal comprising one or more arbitrators (usually three). The referee is a real judge, and his or her decision is imposed on the litigants (http://www.legalis.net/ata/html/cours.html, accessed 02/06/2008).
Recourse to the courts, I don't recommend, but we don't always have a choice. Here, we were blocked, and each was focused on his opinion. So, the court was the only solution. (hub firm, project B)

These four situations establish a relationship between the type of conflict and the resolution mechanism implemented by the hub firm, according its degree of dependence. Figure 2 displays these relationships in the form of a decision tree.

**Figure 2: Decision tree on conflict resolution mechanisms in an innovation network**

<table>
<thead>
<tr>
<th>Existence of a conflict</th>
<th>No</th>
<th>No resolution mechanism observed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yes</strong></td>
<td>Cognitive conflict</td>
<td>No resolution mechanism observed</td>
</tr>
<tr>
<td>(linked to project)</td>
<td>Affective conflict</td>
<td>No resolution mechanism observed</td>
</tr>
<tr>
<td>(linked to the cooperation)</td>
<td>Hub-firm dependency</td>
<td>No</td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>Discussion or persuasion of the hub-firm</td>
<td>Hub-firm dependency</td>
</tr>
<tr>
<td>Common choice of the most suitable solution for the project</td>
<td><strong>Yes</strong></td>
<td>Sanction: exclusion</td>
</tr>
<tr>
<td>Persuasion by the member</td>
<td></td>
<td>To avoid wasting time for the rest of the project and minimize the risk of future conflicts</td>
</tr>
<tr>
<td>The member imposes the technical solution avoiding him to create specific assets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. DISCUSSION OF RESULTS AND MANAGERIAL IMPLICATIONS

The following discussion highlights the complexity of conflict resolution mechanisms in the context of innovation networks. The uncertain nature of the innovation project and the heterogeneity of the level of member commitment do not facilitate the establishment of *ex ante* resolution mechanisms. This discussion is based on four elements: the heterogeneity of
resolution mechanisms, the intensity of resolution mechanisms, the impact of resolution mechanisms on satisfaction, and the role of the hub firm’s dependence in conflict resolution.

4.1. THE HETEROGENEITY OF RESOLUTION MECHANISMS

Conflict is a complex and emotionally charged phenomenon that is difficult to understand with only contractual theories (Fréchet, 2002). These theories propose two main modes of conflict resolution: revocation (exclusion of the member) or the use of court. This vision is too simplistic compared with resolution mechanisms observed in our case studies. Joint resolution resulting from discussions may also be conducive to the advancement of the innovation project, provided that each party agrees to engage in dialogue (Munksgaard et al., 2012). Joint resolution is mainly used in the upstream phases of projects because patenting by the hub firm does not provide sufficient legitimacy in the industry (high dependency on other members). Thus, in some cases, the hub firm must convince members to participate in the project (see Pince & Pile). The joint resolution is only useful if the outcome of the conflict is good for the members involved. Otherwise, it is unnecessary and even detrimental to the project, because it results in lost time and induces frustration among members (Mele, 2011).

In innovation networks, other resolution mechanisms are used, such as persuasion or coercion (Fréchet, 2002). In the six cases studied, there are many members, and their relationships are not necessarily dyadic. If a conflict arises between the hub firm and its technical partner, the hub firm can appeal to other technical members of its network to lead the partner in the expected direction (e.g. Motorisation). This type of situation does not appear in the literature on conflict resolution mechanisms; rather, researches are focused on the analysis of bilateral relationships (Mohr and Spekman, 1994; Tuten and Urban, 2001; Puthod and Thévenard-Puthod, 2006). However, coercion and persuasion must be used with caution because both types may worsen the cooperation relationship. For example, in the Jump project, the hub firm regretted having been convinced by the technical partner (specializing in aluminum), when it could have chosen a more efficient solution. Bitterness of the hub firm toward the partner made cooperation difficult and resulted in the exclusion of the member.

4.2. THE INTENSITY OF RESOLUTION MECHANISMS

The literature has specified five modalities to resolve conflicts gradually (joint resolution, persuasion, coercion, sanction, and use a third party). Members begin with negotiation. It is
only in the case of failure that they use harsher mechanisms (Mohr and Spekman, 1994), such as coercion or sanctions. This result is partially observed in the cases studied, typically when the conflict is related to the project (cognitive conflict; e.g. Motorisation) but not when it is linked to cooperation (affective conflict; e.g. Pince & Pile). In this second situation, the hub firm directly uses harsher mechanisms, such as sanctions or the court (e.g. Parts Transfer).

4.3. THE IMPACT OF RESOLUTION MECHANISMS ON MEMBER SATISFACTION

Mohr and Spekman (1994) argue that the success of a partnership depends on three variables: the attributes of the organization (e.g. trust, coordination, interdependence), the communication between partners (e.g. quality, frequency), and conflict resolution mechanisms. Their model does not include moderating variables, and they emphasize the need, for example, to consider the frequency of past relationships or the duration of the relationship.

As such, Tuten and Urban (2001) propose an extension of Mohr and Spekman's model by including previous relationships as a moderator variable. According to them, the resolution mechanisms are “softer” (joint resolution and persuasion) when the relationship between partners is long term and “harder” (exclusion and court) when the relationship between partners is episodic. In the innovation networks studied, past relationships had no real influence on the conflict resolution mechanisms. For example, in both cases in which the court (hard resolution mechanisms) has been used, the hub firm had a long-term relationship with the member. The type of conflict and the dependence of the hub firm seem to have more influence on the type of resolution mechanism the hub firm implements.

Conflicts in innovation networks arise from a disagreement between the members. To avoid these situations, members should ensure their mutual commitment. This commitment may eventually lead to the signing of a cooperation agreement.

4.4 THE ROLE OF THE HUB FIRM'S DEPENDENCE IN THE CONFLICT RESOLUTION

The dependency between two actors is based primarily on an imbalance of power (Pfeffer and Salancik, 1978). This imbalance is due, among other things, to the level of resources held by each actor. When actor "A" needs resources held by actor "B" to conduct business, dependence results (Pfeffer and Salancik, 1978). An actor that is dependent possesses less power than its resource provider. Under these conditions, it may undergo some form of lock-in, which can affect (1) its environment (relationships with resource provider are dictated by
the type of missing resources), (2) its autonomy and freedom to act in its ongoing operations (if the resource provider disagrees with the decisions or actions performed), (3) its innovation activity (requests and requirements of the resource provider can be a barrier to innovation), and (4) its level of income related to the sale of the innovation (more or less income to the resource provider). In the cases studied, we noted that the choice of mode of conflict resolution depends on the dependence of the hub firm (observed in binary: yes/no). This choice depends more on the nature of the conflict. In Table 4, we represent the relationship between the dependence of the hub firm (yes/no) and the type of conflict (cognitive/affective) in matrix form. We identify four situations of conflict resolution, involving one or more mechanisms of resolution.

<table>
<thead>
<tr>
<th>Dependence of the hub firm</th>
<th>Type of conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persuasion by the member</td>
</tr>
<tr>
<td>Yes</td>
<td>- Dependence requires compliance with choices of resources providers.</td>
</tr>
<tr>
<td></td>
<td>- Cognitive nature of the conflict spurs discussion and negotiation to find a compromise on project.</td>
</tr>
<tr>
<td>No</td>
<td>Discussion or persuasion of the hub-firm</td>
</tr>
<tr>
<td></td>
<td>- No dependence allows greater freedom in decision making.</td>
</tr>
<tr>
<td></td>
<td>- Cognitive nature of the conflict spurs discussion and negotiation to find a compromise on project.</td>
</tr>
</tbody>
</table>

Table 4: Situation of conflict resolution based on the hub firm's dependence and the type of conflict
5. CONCLUSION

Conflict resolution mechanisms are influenced by both the type of conflict and the degree of the hub firm’s dependence. Our framework helps identify more clearly the main conflict resolution mechanisms that can be used in inter-organizational relationships and, more specifically, in innovation networks. Resolving potential conflicts (e.g., resolution mechanisms may be subject to specific clauses in the partnership contract) can reduce uncertainty and opportunistic behavior and thus promote the progress of the innovation project. Analysis of six innovation networks also reveals the following:

- Use of a third party, including the courts, is rarely used. The conflict resolution process is often long and costly and can adversely affect the project’s progress and, thus, its potential success;
- The hub firm often uses partner exclusion, considered a "hard" mode by Mohr and Spekman (1994), when it is not in a dependent situation and when the nature of the conflict is affective. In an affective conflict, the hub firm often considers the bad behavior of the partner a betrayal. Thus, continuation of the relationship would be more troublesome than the benefits provided and would require the establishment of monitoring mechanisms;
- Hub firms seem to favor "softer" resolution mechanisms (i.e., discussion and persuasion) in the case of cognitive conflicts. These mechanisms pertain directly to the innovation project, in which the confrontation between different points of view can be beneficial.

This research has several limitations that future work could overcome. First, the contributions of the research must be contextualized and should be considered only for innovation networks centered. Thus, further research could attempt to apply our grid to networks whose coordination is not assigned by a single player (e.g., research-and-development consortia, local production systems). Second, the innovation networks studied are those of small to medium-sized enterprises. These types of firms have more difficulty (given their size) in being self-sufficient in terms of critical resources and project skills (Park et al., 2002). In return, the hub-firm becomes dependent on the other members. Thus, research could also include other types of hub firms (e.g., large hub firms) to determine if conflict resolution mechanisms differ. Third, we also did not distinguish the degree of intensity of the innovation—that is, incremental/radical or exploitation/exploration. Given the increasing level of uncertainty about the degree of novelty, conflict resolution mechanisms likely depend
on the type of innovation. Finally, this research proposes a relatively static analysis of conflict resolution mechanisms in an innovation network. However, innovation networks are constantly shaped and modified by the actions and interpretations of partners. It would be worthwhile to examine the dynamics of the innovation project to understand the evolution of conflict resolution mechanisms.

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