R&D MANAGEMENT

To join or not to join? Insights from coopetitive RD&I projects

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Multipartner research, development and innovation (RD&I) projects are increasingly used to achieve complex innovation goals and keep pace with today's technological imperatives. The involvement of both competing and noncompeting partners increases the complexity of the relationships and poses a challenge to the outcomes of such projects. Therefore, the right choice of partners is particularly important in this context. Although previous research has mainly examined how focal firms deliberately select collaborative partners, this study demonstrates how non-focal firms evaluate invitations to participate in RD&I projects with multiple partners and direct competitors. Going beyond the coopetitive dyad, we qualitatively examine six multipartner RD&I projects in mature industries involving competitors and noncompetitors. The findings suggest that the evaluation process differs between exploration and exploitation projects. We identify critical factors that guide direct competitors' process of deciding whether to participate in both types of projects, and we provide new insights into the attractiveness of coopetitive RD&I collaborations for firms in mature industries. The study's propositions advance theory and can be tested in future empirical studies. This study also provides valuable guidance for practitioners considering embarking on a coopetitive journey.

1. Introduction

In response to customer, regulatory, technological and digitalisation pressures multipartner research, development and innovation (RD&I) projects involving both competitive and noncompetitive partners are increasingly used to achieve complex innovation goals (Cassiman et al., 2010; Czakon, 2018; Yang, 2020; Mortara et al., 2022) and keep pace with today's technological imperatives (Jakobsen, 2020). On one hand, the simultaneous involvement of competitors, research institutions, suppliers and customers in RD&I projects significantly increases the collective value-creation potential (Yami and Nemeh, 2014). On the other hand, managing relationships between competing companies in this environment is more complex and challenging than in dyadic coopetitive relationships (Henttonen

et al., 2016). For example, partners in multipartner coopetitive relationships may be less familiar with each other and may consequently find it more difficult to predict and control each other's behaviour, which hampers information sharing and knowledge creation (Czakon, 2018). Therefore, scholars have argued that findings about dyadic coopetitive RD&I partnerships are not fully transferable to a multipartner setting, and that more research focusing on multipartner coopetitive RD&I projects is needed (Ritala et al., 2017; Yang et al., 2020).

Scholars have found that the way collaborative RD&I projects are formed, and the initial value-creation and value-capture aspirations of the potential partners (Pedersen et al., 2022), exert a stronger influence on the relationships and outcomes of the collaborations than their subsequent organisation (Doz et al., 2000; Solesvik, 2018). Most previous research on the formation of coopetitive RD&I projects has focused on how focal firms proactively plan such collaborations, and purposively selects and invites other partners with the aim to achieve its strategic goals (Gnyawali and Park, 2009). However, how the firms receiving these invitations reactively evaluate them has so far been left unexamined in the literature (Czakon and Czernek, 2016; Czakon, 2018).

To develop a comprehensive understanding of the establishment of multipartner coopetitive collaborations, we need to understand the rationales for entering into partnerships, from the perspective not only of the focal, inviting partners but also of the reactive partners (Czakon and Rogalski, 2014). A better understanding of how these reactive partners evaluate invitations is a prerequisite for realising the potential benefits of coopetition and will be beneficial both for managers of firms receiving invitations as well as for the managers of the proactive firms sending inviting.

While coopetitive collaborations have been studied most frequently in emerging industries[1] (Zakrzewska-Bielawska, 2015), the question of how firms evaluate invitations to participate in multipartner coopetitive RD&I collaborations is an unexplored question in both emerging and mature industries. Scholars have contrasted the innovation processes, the forms of knowledge and the means and goals that characterise collaborations in mature industries with those that characterise such collaborations in emerging industries (Bodas Freitas et al., 2013). It has been suggested that firms in mature industries often have more closed innovation strategies, and that collaboration for innovation in these industries often require the adaptation of organisational structures, roles and processes and carries greater risks of eroding companies' knowledge (Ciravegna and Maielli, 2011; Dąbrowska et al., 2019). Therefore, the benefits of participation in multipartner RD&I projects in mature industries may not be clear from the outset (Borch and Solesvik, 2016; Jakobsen and Steinmo, 2016). Thus, the evaluation of invitations to collaborate in multipartner coopetitive RD&I projects may be particularly challenging for managers of firms in mature industries, and the context of mature industries may therefore be particularly relevant if we want to understand in depth how such invitations are evaluated.

In view of the complexity and uncertainty of coopetitive RD&I collaborations with multiple partners and the peculiarities of mature industries, this study therefore aims to identify the evaluation process of firms in the reactive position of being invited to engage in such collaborations with their direct competitors. Moreover, our study goes beyond the competitor–competitor dyad to explore the possibility – often neglected – that noncompeting actors can influence competitors' decisions. The following research question (RQ) is raised: *How do firms in mature industries evaluate invitations to participate in multipartner coopetitive RD&I projects with direct competitors?*

We use a case-research methodology and analyse six RD&I projects in mature industries involving directly competing and noncompeting firms, research partners and at least one other partner (a supplier, customer or cluster) to address the RQ. Our findings suggest that invited firms engage in a two-step process and that this process differs between two project types. Each step is based on a specific set of criteria, and different degrees of compliance with such criteria can lead to different outcomes. This study provides valuable theoretical insights into R&D, innovation management and coopetition research and has important practical implications for companies, project managers and other collaborative actors involved in these types of projects.

2. Literature review

2.1. Partner selection for RD&I projects

Firms typically innovate through RD&I projects (Cassiman et al., 2010), which are defined as 'temporary entities that conduct a series of complex and interrelated activities with predefined goals' (Du et al., 2014, p. 829). The increased costs and risks of intensified technological innovation, as well as the greater knowledge and resources needed for such innovation, now compel companies to engage in RD&I collaboration with external partners (Ritala and Sainio, 2014; Cho and Lee, 2019).

The literature distinguishes between RD&I collaboration with research partners and RD&I collaboration with market partners, such as suppliers, customers or competitors (Du et al., 2014), which play important but different roles in RD&I projects and provide different types of knowledge (Hoang and Rothaermel, 2005; Hamadi et al., 2018). Collaboration with research partners carries lower risks and costs, and results in scientific and technological knowledge (Tether, 2002). Collaboration with market-based partners is accompanied by higher risks, provides market knowledge and enables firms to enter new markets and satisfy customers' needs (Du et al., 2014). However, not all RD&I projects are dyadic; some include science partners, suppliers, customers or competitors (Cassiman et al., 2010). The involvement of multiple partners can enhance a project's benefits. The presence of noncompetitors can improve synergies and the integration of competing firms' knowledge and technology (Yang, 2020). At the same time, the increased relational complexity in multipartner collaborations reinforces knowledge sharing and protection as well as organisational and management issues (Henttonen et al., 2016; Du et al., 2020).

The success of RD&I collaborations depends on knowledge sharing among partners (Geum et al., 2013). The RD&I literature has identified a secure governance structure, a limited scope of collaboration, and appropriate partner selection as critical ways to improve knowledge sharing (Li et al., 2008). In developing guidelines for partner selection, researchers have primarily examined dyadic relationships (Lee et al., 2016). Studies have proposed various criteria for evaluating potential partners, including compatibility of resources, knowledge and skills (Reuer and Devarakonda, 2017); technological strength and RD&I openness (Geum et al., 2013; Lee et al., 2016); value-creation abilities (Diestre and Rajagopalan, 2012); and strategic, organisational and cultural compatibility (Chen et al., 2010; Solesvik and Gulbrandsen, 2013).

2.2. *Partner selection in the coopetition literature*

The concept of coopetition was first broadly defined by Brandenburger and Nalebuff (1996) as a 'value net' process that occurs between suppliers, customers, competitors and complementors. Bengtsson and Kock later defined coopetition as simultaneous competition and cooperation between two or more competitors (2000, 2014). The extant coopetition research has focused mainly on deliberately established dyadic relationships between competitors (Le Roy and Czakon, 2016). More recently, scholars have turned their attention to multipartner coopetition (Rouyre and Fernandez, 2019; Le Roy et al., 2021), which often emerges in response to current technological, customer or regulatory pressures (Czakon, 2018). This emerging nature of partnerships, which even when deliberately planned by some partners appear as an unintended opportunity for the others, is the central argument of this study.

To achieve joint value creation, coopetition paradoxically requires competitors to share knowledge and resources, which at the same time exposes them to a high risk of knowledge loss, technology imitation and a weakening of market position (Le Roy and Fernandez, 2015; Bengtsson et al., 2016). The decision to engage in coopetition can have long-term consequences for companies (Gnyawali and Park, 2011), and appropriate partner selection has been identified as one of the most important means of mitigating these risks (Kraus et al., 2018).

The criteria for partner selection discussed in the coopetition literature broadly determine the preferred partner characteristics. Firms selecting partners for coopetitive collaborations recognise that complementarity between technological, financial and managerial capabilities and skills (Gnyawali and Park, 2009; Ritala and Hurmelinna-Laukkanen, 2013; Dorn et al., 2016; Kraus et al., 2018) and compatibility between organisational cultures and structures (Bouncken and Fredrich, 2012; Alves and Meneses, 2015; Klimas, 2016) are preferred partner characteristics. However, there are divergent opinions in the literature about the size of a compatible partner. Some of the findings are industry specific. For example, Zakrzewska-Bielawska (2015) found that firms in emerging industries choose either similar-sized coopetitive partners or demonstrably larger firms. Chiambaretto et al. (2020), however, linked this decision to motivation: small firms motivated to reduce costs and increase learning opportunities choose cooperation with larger competitors; large firms motivated to reduce time to market choose smaller competitors. Similarly, Zakrzewska-Bielawska (2015) found that firms in emerging industries are more likely to collaborate with direct competitors. However, Chiambaretto et al. (2019) found that experienced firms are more prone to collaborate with direct competitors than inexperienced firms. Moreover, Lascaux (2020) pointed out that companies belonging to the same cultural and institutional environment have higher chances of establishing symbiotic and enduring relationships.

Although Le Roy et al. (2016) analysed the suitability of competing and noncompeting partners for incremental or radical product innovation, the possibility of simultaneous involvement of competing and noncompeting partners in multipartner RD&I partnerships has often been overlooked. Moreover, few studies have examined how nonfocal companies, which are invited to 'join the party' and have limited ability to influence the choice of other partners, evaluate the opportunity to participate in such collaborations. For example, it has been found that whereas extensive prior experience with coopetitive RD&I is important for a firm's decision to participate in cross-network coopetition, limited prior experience leads firms to participate in RD&I collaborations within their own coopetitive networks (Schiavone and Simoni, 2011). Czakon and Czernek (2016) found that third-party legitimacy and reputation influence the reactions of competing firms invited to participate in network coopetition. Similarly, public institutions (Freel, 2003) and incubators (Blanka and Traunmüller, 2020) can play a facilitating role in a multipartner coopetitive environment. Finally, it has been reported that the involvement of third parties is conductive to coopetitive relationships (Fernandez et al., 2014).

The criteria for deliberate partner selection in RD&I projects and in coopetitive collaborations identified by the literature reviewed above are associated mainly with emerging industries. Technological upheavals now frequently lead to the emergence of coopetitive RD&I collaborations with multiple partners, in which nonfocal competing companies must first evaluate the invitation to join. This study aims to explain the evaluation process that underlies both the acceptance and rejection of such opportunities in the context of mature industries.

2.3. *Trust as a relational criterion for partner selection in coopetitive partnerships*

While partner characteristics are often considered as a stable partner selection criteria, trust as a relational criterion is mainly considered as highly changeable (Ritala and Tidström, 2014; Bouncken et al., 2017). Some of the trust-building mechanisms identified in coopetition literature are previous collaboration experience and commitment, reputation and alignment of partners' intentions and interests (Alves and Meneses, 2015; de Araujo and Franco, 2017; Kostis and Näsholm, 2020).

Previous experience in collaborating with the same partner, which is often touted as a means of ensuring trust and mitigating opportunistic risks (Solesvik and Gulbrandsen, 2013; Vaez-Alaei et al., 2022) is a highly controversial criterion. On the one hand, the preference for collaborating with known partners may reflect a high degree of external rigidity, typical of mature industries, where it is resource intensive for firms to overcome their own structural and capability rigidity and gradually become willing to collaborate with unknown partners (Dąbrowska et al., 2019). Arvidsson and Melander (2020) attributed this to the higher importance of interorganisational trust compared to interpersonal trust in mature industries. On the other hand, scholars have warned that repeated collaborations may give rise to excessive trust and enable knowledgeable, opportunistic partners to misuse partners' assets (Li et al., 2008; Kostis and Näsholm, 2020). Similarly, in reviewing the literature on the evolution of trust in coopetitive relationships, Lascaux (2020) found that coopetitive relationships with high levels of cooperative and low levels of competitive intentions entail high levels of trust between partners (Bengtsson et al., 2010), while the strength of cooperative and competitive dynamics may be industry specific (Pellegrin-Boucher et al., 2013). Interestingly, geographical distance between the partners has been found to be both beneficial (Le Roy et al., 2016) and detrimental to mutual trust (Von Friedrichs Grängsjö and Gummesson, 2006).

3. Research methodology

3.1. *Research design and case selection*

Like many previous coopetition studies, we used a case research methodology (Yin, 2009) to examine coopetition as a complex phenomenon in a specific, real-life setting. The chosen unit of analysis was the project, and we strategically selected coopetitive RD&I projects involving both competing and noncompeting partners.

The starting point for the sampling was consultations with managers of a highly innovation- and collaboration-oriented business cluster in Norway, whose members belonged to the world's best-performing providers of equipment to the oil and maritime industries. The consultations provided information about coopetitive RD&I projects involving at least one cluster firm. Publicly available information confirmed that all the projects were RD&I oriented and included research partners (universities or research institutions), firms in mature industries that were direct competitors and at least one other

partner (a supplier, customer or business cluster). All six of the identified projects were selected as the sample for our study.

The projects were at different stages. One project was in the initiation phase which related to the time before the 'kick-off' meeting in which firms are negotiating whether to participate. Five projects had already reached the implementation phase which starts with the 'kick-off' meeting (*PMBOK* Guide; Project Management Institute 2013). Five projects were initiated by research or cluster partners, and one was initiated by a competing business partner. In two projects, one competitor decided to leave the project, either early (during the initiation phase) or later (during the implementation phase). Table 1 presents the characteristics of the selected projects.

3.2. Data collection

The selection of key informants began with the interview of the manager of each case project. Other informants were subsequently identified through snowballing. This procedure proved valuable, because informants' willingness to participate was based on trust, due to the sensitive nature of coopetition and some of the informants' participation in elite groups (Atkinson and Flint, 2004). In total, there were 30 informants, some of whom participated in multiple projects and were therefore interviewed about each of them. We conducted 42 semistructured, in-depth interviews with decision-makers from high- and mid-level management in competing firms, project managers, cluster managers and employees from research institutions. These interviews included six follow-up interviews conducted to clarify and deepen the findings. The ability to complement as well as contrast the information obtained from diverse informants and to conduct follow-up interviews at different times clearly enhanced the credibility and trustworthiness of the data (Denzin, 1978; Shenton, 2004). Table 1 provides detailed information about the informants.

Thirty-two interviews were conducted in person, and ten were conducted with informants in other countries *via* conference calls. The interviews lasted between 60 and 90 minutes. An interview guide (see Appendix A) was developed to ensure a shared understanding of the phenomenon and the purpose of the questions. The guide consisted of several themes that were addressed through open-ended and follow-up questions:

- the firm's collaborative innovation strategy and policy,
- partner evaluation criteria and
- decision-making process for innovation partnerships.

During the interviews, we took notes on the informants' reactions and explanations. All the interviews were audio recorded and transcribed promptly to avoid interpretation bias.

3.3. Data analysis

Inductive data analysis was performed in accordance with Miles et al.'s (2014) two-cycle coding logic. In the first coding cycle, data segments were descriptively summarised to identify all the activities, participants and criteria used by competing firms when evaluating invitations to participate in a sampled project. During this process, all the insights that emerged from the data were noted. In the second coding cycle, we identified themes that helped us group the identified codes into explanatory categories. The iterative process of creating and revising codes continued until a sufficient understanding of the data was achieved. Appendix B presents an example set of the codes and the themes that emerged during the coding process. Triangulation of investigators (Denzin, 1978) was achieved in the following way: coding was done by the first author and then presented to and analysed with all the coauthors until a consensus on the most relevant findings was reached. To complement and contextualise the information from the interviews, we also examined firms' presentations and reports, annual project reports and publicly available information (from websites and press releases) about projects and firms.

4. Findings

Our data revealed two main steps in the evaluation process by which competing firms in mature industries decide whether to participate in coopetitive R&D projects with direct competitors: (1) evaluation of project characteristics and (2) evaluation of risks.

However, the data indicated differences in the evaluation process between two groups of projects present in our sample. The classification into exploration and exploitation projects has been made based on a broad categorisation of motives introduced in the alliance literature (Koza and Lewin, 1998, 2000). Exploration projects are the projects that aim to create new, innovative business opportunities through technology and business model innovation (Projects A, B and C) while exploitation projects are the projects that aim at internal processes improvements and higher

Table 1. The sample

Project	Participants	Description	Funding	Type of informants	Number of interviews
A	Two competing companies, four noncompeting companies, two customers, one university and one research institute. The project was initiated by one of the competing companies.	The aim was to develop new business models and services for autonomous equipment (exploration). The project was still in the early negotiation phase during the first round of interviews. It was decided that one competitor would not participate in the project just before our investigation began. Follow-up interviews were conducted because another competitor later joined the project.	The project was funded by the Research Council of Norway and the companies.	PM, HLM, Ue, RIe	5
B	Four competing companies, one customer, six noncompeting companies, four universities, two research institutes and a business cluster. The project was initiated by a university.	The aim was to develop and implement new, advanced technology (exploration). At the time of the investigation, the project had reached its mid-term evaluation.	The project was funded by the companies and the Research Council of Norway.	PM, HLM, MLM, CM, Ue	13
C	Two competing companies, three noncompeting companies, one university, one research institute and one business cluster. The project was initiated by the business cluster and the university.	The aim was to develop new service-oriented business models for manufacturing firms (exploration). The project was in the implementation phase, and one of the competing companies decided to leave the project just before our investigation began.	The project was funded by the companies and the Research Council of Norway.	PM, HLM, MLM, CM, RIe	6
D	Four competing companies, a few other noncompeting companies, one business cluster and one university. The project was initiated by the university and the business cluster.	The aim was to develop and implement a new test laboratory for pilot testing and technology qualification of the equipment (exploitation). The project was in a later implementation phase at the time of our investigation.	The establishment of the laboratory was funded by the government; the companies committed to using the laboratory. The laboratory needed to function according to market principles and be self-sufficient.	PM, HLM, MLM, CM, RIe, Ue	9
E	40 member companies of the business cluster (four of which were competing companies), one customer, a few noncompeting companies, one cluster and one university. The project was initiated by the cluster and companies.	The aim was to develop a new analysis methodology and software to assess the environmental impacts of products (exploitation). At the time of our investigation, the project was in a later implementation phase.	The project was funded by the companies and Innovation Norway.	PM, CM, HLM, MLM, Ue	5
F	Two competing companies, one customer, nine noncompeting companies, seven universities and two research institutes. The project was initiated by the innovation hub.	The aim was to develop a new model for data sharing and to enable better use of data in manufacturing firms (exploitation). The project was in the early negotiation phase at the time of the investigation.	The project was funded by the companies and government organisation.	PM, HLM, MLM	3

Abbreviations: CM, cluster manager; HLM, high-level manager (CEO, vice president, R&D director); MLM, mid-level manager; PM, project manager; RIe, Research institute employee; Ue, University employee.

productivity of own assets and capital (Projects D, E and F).

4.1. The first step – evaluation of project characteristics

The projects in our sample were initiated by research partners, business clusters or firms. In many projects, the initial idea came from a firm but the initiation process was conducted by a cluster or university that selected the partners to be invited. The firm employees involved in the evaluation process were senior managers responsible for the final decision and middle and technical managers with technical expertise and knowledge relevant to the projects.

The evaluation of the project characteristics was based on three criteria: strategic fit, perceived complexity and perceived benefit for the end customer. These criteria were usually evaluated in parallel. If all three criteria were met, the companies would proceed to the second step.

When firms were invited to join, they first evaluated the project's fit with their strategy and goals. This evaluation was quite straightforward in the case of exploitation projects, whereas opinions differed across managerial levels in the case of exploration projects: 'Often you see that the technical personnel have one perspective and would like to join, but the management says, "No, for strategic reasons we don't want to join", so that causes tensions within the company' (high-level company manager, Project B).

The project's complexity, assessed in terms of necessary resources and skills, was another motivation to accept the invitation. Interestingly, the findings revealed differences in the evaluation of complexity between exploration and exploitation projects. In the case of exploitation projects, the projects were perceived as a means to achieve shared benefits for the whole region: 'The innovation lab is good for all of us, and that was a good example of how to build something together, because it's a benefit for the whole region' (high-level company manager, Project D). Alternatively, the projects were viewed as a means to ensure industry compliance with new regulations:

> These regulations are coming. They're starting to ask us about carbon footprint, sustainability, the life cycle costs. But nobody really knows how to comply with that. … What is extremely important for our industry is building reputation and taking the sustainability and the environment challenges seriously. (high-level company manager, Project E)

In exploration projects, by contrast, the firms evaluated private benefits that could be derived, for example, from the jointly created technology: 'Those projects are about developing technology, enabling technology … then you can start using it for your own product development afterwards' (high-level company manager, Project B). The firms involved in exploration projects also evaluated the possibility of obtaining new knowledge that could later be used within the company: 'If we contribute with people doing actual work, and get people engaged, then all the knowledge we develop in these research projects is more easily pulled back into the company' (high-level company manager, Project C).

When evaluating project characteristics, firms also analysed the perceived benefit for the end customers: 'As soon as you have a customer on board, all the companies are immediately much more interested. I think that was the key' (project manager, Project E);

> If you do such a project, it's more or less a push from the customers, like oil companies, because they see the problem and they demand that we work together. … We see that our customers really don't want us to be the only owner of that technology; our customers want an open marketplace. (mid-level company manager, Project B)

To proceed to the second step, the firms required a positive evaluation of all three criteria. As these criteria were met, none of the firms declined invitations to participate in the projects.

4.2. The second step – evaluation of risks

Even though the firms were invited to participate in the projects with direct competitors –manufacturers of the same equipment operating in the same market – the data indicated that exploration and exploitation projects exhibited differences in the evaluation of market and opportunistic risks.

4.2.1. Evaluation of market risks

The data revealed that market risks were not evaluated in exploitation projects. These projects were seen as an opportunity to better understand the market: 'We are not developing concrete products; we are developing an understanding of the market and understanding the needs of the market' (high-level company manager, Project F). Cooperation with direct competitors from the same region was also beneficial to mitigate the market risks associated with competitors from another country:

> We had competition from [other country]. And they were very active in attracting the companies to move their research and development facilities there. Development of laboratory was important for that, to

make sure they do it here, not in [another country]. (project manager, Project E)

In exploration projects, however, market risk was perceived as exceptionally high, and three reaction types were identified: (1) unwillingness to collaborate, (2) evaluation of trust in research partners and (3) deciding to collaborate based on fear of missing out. The first type of reaction was evident in Project A, which was initiated by a firm that decided not to let direct competitors participate in the project:

We were looking into how they are placed in the markets we are operating in, if those companies are not directly competing with us, because we would like to enter into other markets and learn from that. We don't have that much to gain from companies working as direct competitors within this project. (high-level company manager, Project A)

The second type of response was found in Project C, in which firms faced with direct competitors evaluated their own trust in the research partners. Some firms decided to participate because they viewed the research partners as neutral and trustworthy partners who could protect their interests:

The big challenge is that we really compete on the same projects, all the time. It's not that we have a different share of the market; we are in the same market. … But we have decided to join because of the trust that researchers, if we share something with them that we feel is very confidential, will protect that. (high-level company manager, Project C)

However, our data suggested that trust in research partners varies, reflecting companies' knowledge and understanding of R&D projects and previous experience with collaboration with research partners. As a result, other companies had concerns about both direct-competitor and research-partner involvement: 'It's related to other companies, of course, but also, there was some concern about publishing by researchers' (high-level company manager, Project C). On this basis, the competing company decided not to participate in Project C.

The third type of response was evident in Project B, in which some companies discussed their fear of missing out and losing part of their market in the future. This fear led to their decision to accept the invitation:

What drives company to join is a fear: *the fear of missing out, fear of giving something away to competitors. So, the fear of losing a market edge is what makes your company come into project. (high-level company manager, Project B)*

In summary, in exploration projects, the evaluation of risks as exceptionally high led to three types of decisions: no participation, participation based on trust in the research partners and participation based on fear of missing out.

4.2.2. Evaluation of opportunistic risks

Opportunistic risks were evaluated as high in all the projects due to the presence of direct competitors. However, our data revealed some differences in this evaluation between exploration and exploitation projects. For both project types, the scope of the project and previous experience with coopetitive collaboration deemed to play critical roles in mitigating opportunistic risks. Firms first evaluated whether the scope of the work fell outside their core knowledge zone and whether it related to 'generic, common knowledge, that we can share and that we can develop, that is not changing competition between our companies … a huge area of common knowledge that we need to improve' (high-level company manager, Project D);

We are open to this collaboration in certain areas, but in other areas we will not cooperate at all. … I would say that in areas where we have very specific markets or specific products and competencies we tend to stay out of cooperation. (high-level company manager, Project B)

All the firms involved in the projects were members of a cluster, and several had been involved in previous projects. This record of coopetitive collaboration seemed to positively influence the evaluation of opportunistic risks in both project types: 'This type of collaboration is something that has been there for several years. It has evolved and developed in a way, so the rules of the game are already familiar to everybody' (mid-level company manager, Project F); 'The companies have been representing themselves together in the cluster for a long time, so we didn't start from scratch; they all knew each other, and I think they knew how far they could go' (member of project management team, Project B).

The two additional criteria, potential for long-term collaboration and size of the competing firms, seemed to be important only for the evaluation of opportunistic risks in exploration projects. The possibility of long-term cooperation was identified as important for the decision to participate in projects with direct competitors:

I would say that their strategic fit for the long term is important. We see that this competitor might be our partner for a long time, at least three to five years. It's

hard to see more than three years ahead, but then at least we need to see more than one project. (high-level company manager, Project C)

Finally, in most exploration projects, firms preferred to collaborate with similar-sized partners, which was seen as a guarantee that all partners would be able to contribute and that the results would be distributed fairly: 'If you are pretty much equal in size, you can have an equal amount of resources, financing, and time' (high-level company manager, Project B);

The smaller company would learn faster from us. I would assume that the smaller player would actually learn quite a lot from that in a fast manner, but if it's about the same size, I think we both know the same things and have experience. (high-level company manager, Project F)

In summary, for competing firms to decide to participate in exploitation projects, the first two criteria had to be met. In the case of exploration projects, the first two criteria and at least one of the additional criteria had to be met.

5. Discussion

Whereas previous studies of R&D, innovation and coopetition examined how focal firms in emerging industries select collaborative partners, this study identifies the evaluation processes by which nonfocal firms in mature industries decide whether to accept invitations to participate in RD&I projects with direct competitors, research partners, suppliers and customers. The revealed two-step evaluation process differs between exploration and exploitation projects (Figures 1 and 2, respectively).

5.1. Evaluation of project characteristics

The evaluation of project characteristics seems to differ slightly between exploration and exploitation projects. Our findings resonate with those of the project management literature, which indicate that alignment with corporate strategy is a major determinant of the emergence of coopetitive RD&I projects (Nemeh and Yami, 2016), as well as the importance of strategic clarity and mutual collaboration between management levels for decisions in innovation portfolio management (Unger et al., 2012; Martinsuo and Killen, 2014; Kock and Gemünden, 2016). Our findings concerning the internal tensions within companies' during evaluation of a project's strategic fit complement previous studies' claims that in mature industries, the benefits of multipartner RD&I collaborations are not always clearly visible (Borch and Solesvik, 2016). Our findings indicate that although this phenomenon is evident in exploitation projects, it is even more relevant to exploration projects. The issues identified may also reflect the challenges of balancing collaborative and closed innovation in mature industries (Chiaroni et al., 2010). Thus, we propose:

P1: *Direct competitors invited to participate in coopetitive RD&I projects in mature industries are more prone to internal tensions when evaluating the*

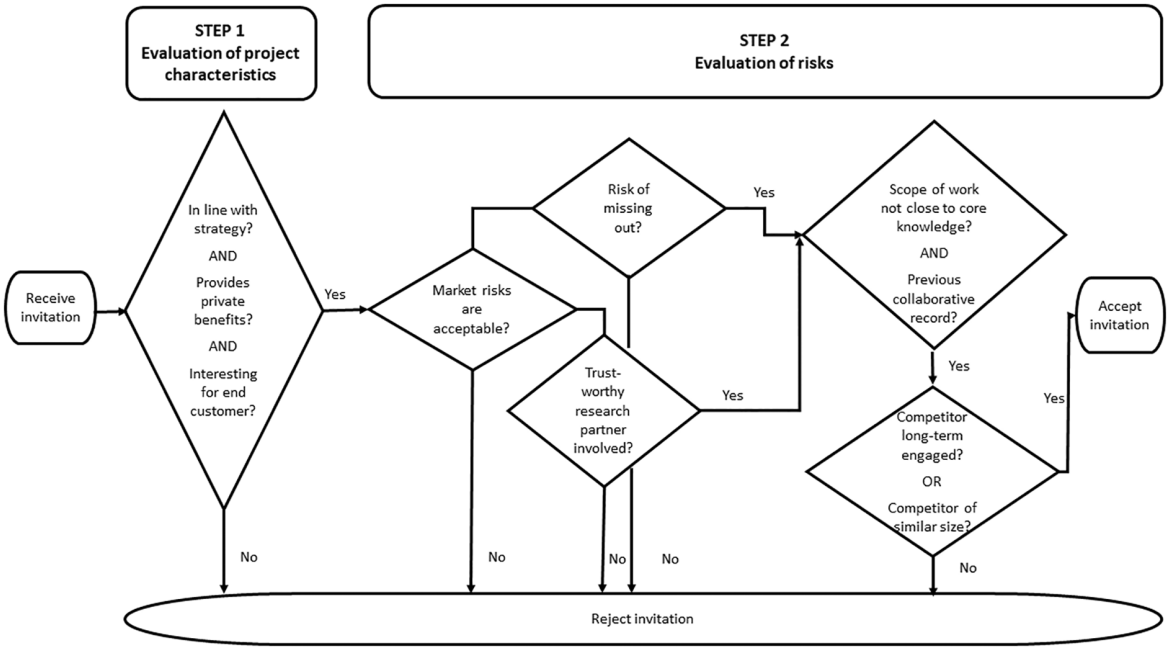

Figure 1. The evaluation process for exploration projects.

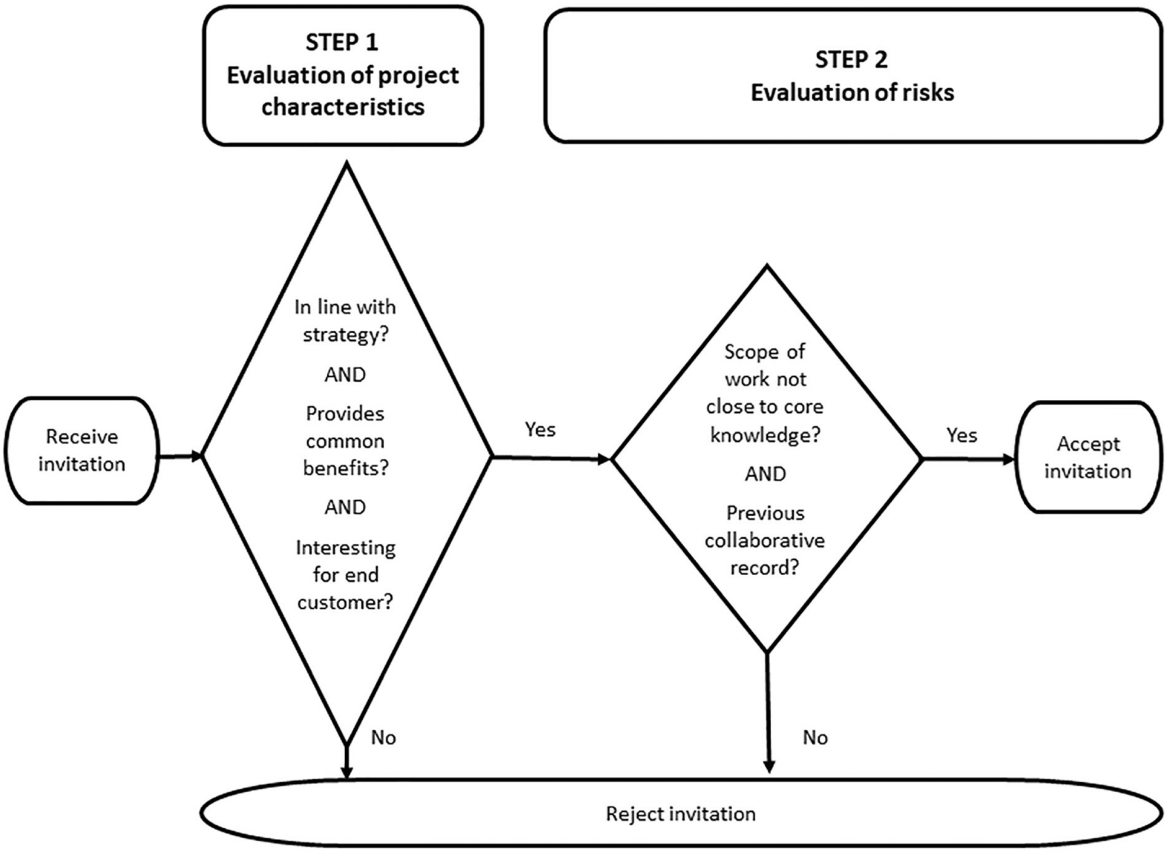

Figure 2. The evaluation process for exploitation projects.

strategic fit of exploration projects than when evaluating the strategic fit of exploitation projects.

In both project types, the perceived benefit to the end customer or to customer involvement has a strong motivating effect. It is recognised as an opportunity to better understand customer needs and convince customers of the company's ability to provide desirable services or products. This finding is consistent with the lead-user approach (von Hippel, 1986) and extends the findings of previous studies of the customer's influence on coopetitive relationships in the satellite (Fernandez et al., 2014), software (Pellegrin-Boucher et al., 2013), luxury (Depeyre et al., 2018) and tourism (Czakon and Czernek, 2016) industries. It also accords with the claims of Nemeh and Yami (2016) and Ho and Ganesan (2013) that in mature industries, the presence of customers may mitigate the risks of developing inappropriate technologies and may enhance knowledge sharing among competitors. Therefore, we propose:

P2: *The perceived benefit of a project to the customer or to the customer's involvement in a project has a positive influence on the decision of direct competitors in mature industries to engage in coopetitive RD&I projects.*

Interestingly, our findings indicated when firms were invited to participate in exploitation projects, they were motivated by the potential for shared benefits resulting from joint value creation, which may indicate that cooperative intentions are stronger than competitive intentions in this context. In contrast, the perceived opportunities for private capture of the jointly created value represent a primary motivation for firms to participate in exploration projects, which may indicate that competitive intentions between firms are stronger than cooperative intentions between firms. These findings contradict Czakon and Czernek's (2016) claim that when entering into a multipartner coopetition, assessing the benefits is not an important criterion due to the information asymmetry and increased relational complexity. Reuer and Devarakonda (2017) found that firms select partners that have the resources they need, but our findings reveal that, instead, direct competitors evaluate the potential of the project to generate research-based knowledge. This leads to the following propositions:

P3a: *Perceived shared benefit from jointly created value positively influences the willingness of direct competitors in mature industries to engage in exploitation RD&I projects.*

P3b: *Perceived private benefit from jointly created value positively influences the willingness of direct competitors in mature industries to engage in exploration RD&I projects.*

5.2. *Evaluation of project risks*

Complementing the coopetition literature, which has identified indirect competitors as more attractive partners than direct competitors for coopetitive collaborations (Kraus et al., 2018), our data reveal the factors that determine the willingness of firms in mature industries to join collaborations with direct competitors. Chiambaretto et al. (2019) indicated that a firm's experience determines its willingness to collaborate with direct competitors, such that experienced firms are more willing to collaborate than inexperienced firms. Furthermore, the literature has suggested that the strength of competitive and cooperative intentions influences the risks and trust between competitors (Bengtsson et al., 2010). Our findings concerning the first step of evaluation indicate that cooperative intentions are stronger than competitive intentions in exploitation projects and that competitive intentions are stronger in exploration projects. This difference clearly influences the divergent evaluations of market and opportunistic risks in these project types. Although market risks for exploitation projects were not evaluated, the acceptance of market risk for exploration projects is determined by (1) the perception that missing the opportunity to participate in a project may give direct competitors a better market position and (2) trust in research partners. Trust between partners has been identified as the most important criterion for partner selection in coopetition (Akdoğan et al., 2015; de Resende et al., 2018), in strategic innovation alliances (Gattringer et al., 2017) and in the context of mature industries (Solesvik and Westhead, 2010). Similarly as identified importance of third-party reputation and legitimacy for joining coopetitive networks in the tourism sector (Czakon and Czernek, 2016), our findings suggest that in mature industries, trust in research partners plays a crucial role in the decision to collaborate with direct competitors in RD&I projects. Therefore, we extend the insights of the limited research on the influence of third parties – such as public institutions (Freel, 2003), incubators (Blanka and Traunmüller, 2020), research partners or business clusters (Smiljic, 2020) – on the establishment of coopetitive collaborations and propose the following:

P4a: *Trust in research partners mitigates perceived market risks and positively influences the willingness of direct competitors in mature industries to engage in exploration RD&I projects.*

P4b: *The perceived risk that missing an opportunity for project participation will give direct competitors a better market position positively influences the willingness of direct competitors in mature industries to engage in exploration RD&I projects.*

As criteria for evaluating opportunistic risks, the scope of the project and previous collaborative experience with the same partners and with similar projects appear to be shared by exploration and exploitation projects. Studies warned that some firms are willing to engage in projects with direct competitors only when the scope of the project falls outside the firm's core competencies (Dorn et al., 2016; Tidström and Rajala, 2016; Kraus et al., 2018). However, researchers have divergent opinions about the relevance of a firm's collaboration record. Firms associated with both project types viewed collaboration record as beneficial in mitigating opportunistic risks, contradicting Li et al.'s (2008) claim that frequent collaboration with specific partners renders a firm's core knowledge vulnerable to opportunistic behaviour and increases the willingness of firms to collaborate with strangers. However, our findings are in line with Love et al.'s (2014) and Dietrich et al.'s (2010) findings regarding the learning effect and the positive impact of previous collaboration on the choice of partners for future collaborative relationships, and they are aligned with Solesvik and Gulbrandsen's (2013) findings that firms in mature industries follow effectuation logic and prefer to collaborate with known partners.

The two additional criteria of the potential for long-term collaboration and the size of the competitors are relevant only for exploration projects. Competing firms are more willing to engage in long-term RD&I partnerships, which they view as a way to increase the likelihood of greater collaboration benefits. This finding aligns with previous findings of higher innovation benefits and lower costs (Cygler et al., 2018) and lower opportunism and greater trust (Das and Teng, 2000; Dietrich et al., 2010) in long-term partnerships; short-term-oriented partners, by contrast, have been described as opportunistic, risk averse and unwilling to invest in projects (Borch and Solesvik, 2016). This leads to the fifth proposition:

P5: *The potential for long-term collaboration positively influences the willingness of direct competitors in mature industries to engage in exploration RD&I projects.*

Finally, regarding the choice between large and small firms as RD&I partners, scholars have pointed to different motivations for collaboration,

such as market considerations for smaller firms and technological improvements for larger ones (Lee et al., 2016). However, Chiambaretto et al. (2020) pointed out that small firms collaborate with larger competitors for cost reduction and learning reasons whereas large firms select smaller competitors to reduce time to market. Our data indicate that firms in mature industries prefer to collaborate with similar-sized competitors to ensure mutual benefits and similar levels of commitment and to mitigate the risk of asymmetry in the relationship. These findings echo those of studies on coopetition in emerging industries (Akdoğan et al., 2015; Zakrzewska-Bielawska, 2015). Therefore, we offer a final proposition:

P6: *The presence of similar-sized competitors positively influences the willingness of direct competitors in mature industries to engage in exploration RD&I projects.*

6. Conclusions and implications

This paper explores the evaluation process that directly competing firms in mature industries undertake when invited to join multipartner RD&I projects. Our findings reveal two slightly different evaluation processes for exploration and exploitation project types (Figures 1 and 2, respectively). Therefore, our study contributes to the R&D, innovation and coopetition literature in several ways. First, we offer new insights from the perspective of nonfocal companies that advance the research on partner selection for collaborative innovation (Geum et al., 2013; Guertler and Lindemann, 2016; Kraus et al., 2018). In particular, our study contributes to debates on the attractiveness of multipartner RD&I collaborations (Borch and Solesvik, 2016; Ritala et al., 2017; Yang, 2020; Yang et al., 2020) by identifying factors that encourage or discourage direct competitors' engagement in two distinct project types. Second, it departs from a focus on coopetitive dyads (Rouyre and Fernandez, 2019; Yang, 2020) to highlight the peculiarities of projects involving several directly competing firms and noncompeting partners. The paper presents a new perspective on the role of trust in the establishment of exploration projects by conceptualising trust in research partners as a way to mitigate coopetitive risks, which has received limited recognition in previous studies on coopetition (e.g., Czakon and Czernek, 2016). Third, this paper examines coopetition in the underresearched context of mature industries (Solesvik and Encheva, 2010; Borch and Solesvik, 2016; Jakobsen, 2020) and reveals that in such industries, the decision to engage in exploitation projects is more straightforward than the decision to engage in exploration projects. Our study also reveals that potential for long-term collaboration and collaboration with similar-sized partners may mitigate opportunistic risks in exploration projects in mature industries. Finally, the derived propositions can inform and lead to future empirical studies in the R&D, innovation and coopetition research streams.

Our study may also guide the actions of project managers, competing firms, research partners and all other actors who initiate or consider joining coopetitive RD&I projects. Coopetitive RD&I projects with multiple partners inherit greater relational complexity and uncertainty (Fang et al., 2011; Yang et al., 2020). In mature industries, inviting direct competitors to participate in such projects may be particularly challenging and critically affect knowledge sharing and the project outcomes (Geum et al., 2013; Borch and Solesvik, 2016). This study's identification of specific evaluation processes and the criteria used in each step can guide the negotiations, enabling project managers and partners to avoid critical points that can jeopardise a project. According to our findings, the attractiveness of exploitation projects is determined mainly by potentially achievable shared benefits, such as jointly mitigating market risks, solving certain problems, adapting to new legislation and even jointly competing against other competitors. In exploration projects, the involvement of trusted research partners is crucial to mitigating market risks, and potential for long-term collaboration and the involvement of similar-sized competing firms have a powerful influence on the final step towards a positive decision.

6.1. *Limitations and avenues for future research*

This study has certain limitations. Because of our interest in coopetition, we focused on the evaluation process conducted by competing firms. We interviewed project managers and members of project management teams, who have high-level views and a sound understanding of the interrelationships between participating parties. However, given the complex structure of multipartner RD&I projects, interviews with other partners (e.g., suppliers or customers) would have enriched our insights. Future research could quantitatively examine a larger number of exploration and exploitation projects or compare the evaluation processes undertaken in mature

and emerging industries. Another area of future research that emerge from our findings is the role of other actors in multipartner coopetitive RD&I projects and their influence on competitor–competitor relationships. From the perspective of university–industry collaboration, scholars could compare the outcomes of multipartner coopetitive RD&I projects with the outcomes of RD&I projects without coopetitive elements. The initiators of the projects had to follow certain regulations when deciding which firms they could invite to participate in the projects. The assessment of regulations preceded the evaluation process, and therefore it was outside the scope of this study. The regulatory perspective could be explored more deeply in future studies.

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Data availability statement

The qualitative nature of this research, privacy and ethical restrictions, limit data sharing to those that can be publicly available within the article.

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Note

[1]Newly established industries driven by new customer needs, technological, economic or social changes (Calori, 1985).

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APPENDIX A

Interview Guide

- Short presentation outlining the purpose of the study
- Declaration of confidentiality and use of the interview

Informant	*Personal details*	
	Background	Can you tell me about yourself: Education, seniority and roles?
	Function in the project	Can you tell me about your position in the company? What is your role with regard to research development and innovation projects and the one in which we are specifically interested?

Dimension	Questions
Innovation strategy and policy of the company	Does your company have a specific innovation strategy? Can you please explain?
	Does your company have a specific organisational unit for R&D, technological collaboration, etc.?
	How open is your company to innovative collaboration with others and with competitors? Answer on a scale from 1 (not open) to 5 (completely open).
	What do you see as the benefits and disadvantages of collaboration with competitors for innovation?
Decision-making process for a specific project	How often does your company participate in this type of R, D & I projects with direct competitors involved?
	Who was the initiator of the project? Who invited your company to join the project?
	What was the overarching goal of the project?
	Who from your company was involved in negotiations? Who were the other participants in the negotiations?
	What was the mandate of the person from your company?
	What does the decision-making process look like in terms of actors, role, time frame and issues?
Partner-selection criteria and process	What was the motive for your company to join this project?
	Does your company have specific requirements in the initiation phase?
	How did your company evaluate directly competing companies on the same project in terms of criteria and process?
	What was the most important factor in the evaluation?
	What were the shared interests between competitors? Were there any potentially conflicting interests?
	When would your company decline collaboration with competitors for innovation?
Outcome	What was the main reason for your company to accept the invitation to join the project?
	Who made the final decision?
	Were there any direct competitors who did not accept the invitation?
Current status of the project	What is the current status of the project?

APPENDIX B
Example of coding

First step in coding	Second step in coding	Emergent themes
Fit with company's plans and business goals		
Optimal use of resources	*Strategic fit*	
Internal tensions		
The role of high-level managers		
Customer involvement	*Benefit for customers*	
Understanding of the market		*Evaluation of project characteristics*
Research knowledge		
Development of new technology	*Project complexity*	
Access to resources		
Learning goals		