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Abstract:

Purpose –

This paper aims to investigate how the implementation of the inter-cooperation principle among Spanish machine-tool cooperatives helps them to coopete–collaborate with competitors, in their innovation and internationalization processes and achieve collaborative advantages.

Design/methodology/approach – The paper uses a multi-case approach based on interviews with 15 CEOs and research and development (R&D) managers, representing 14 Spanish machine tool firms and institutions. Eight of these organizations are worker-cooperatives..

Findings – Worker -cooperatives achieve advantages on innovation and internationalization via inter-cooperation (shared R&D units, joint sales offices, joint after-sale services, knowledge exchange and relocation of key R&D technicians and managers). Several mutual bonds and ties among cooperatives help to overcome the risk of opportunistic behaviour and knowledge leakage associated to coopetition. The obtained results give some clues explaining to what extent and under which conditions coopetitive strategies of cooperatives are transferable to other types of ownership arrangements across sectors.

Practical implications – Firms seeking cooperation with competitors in their R&D and internationalization processes can learn from the coopetitive arrangements analyzed in the paper.

Social implications – Findings can be valuable for sectoral associations and public bodies trying to promote coopetition and alliances between competitors as a means to benefit from collaborative advantages.

Originality/value – Focusing on an “ideal type” of co-operation -cooperative organisations- and having access to primary sources, the paper shows to what extent (and how) strong coopetitive structures and processes foster innovation and internationalization.

Keywords: Coopetition, Cooperation, Competition, Cooperatives, Innovation, Internationalization.

1.- Introduction

Coopetition can be briefly defined as simultaneous cooperation and competition at multiple levels, be these dyadic, triadic, network levels or even at an intra-organizational level (Raza-Ullah et al. 2014, Bentsson and Raza-Ullah 2016). Coined by Ray Noorda, former CEO of Novell, and popularized by Brandenburger and Nalebuff (1996), coopetition has seen increased academic attention in recent decades.

Coopetition is more critical in high technology and knowledge intensive and dynamic industries, given their short product life-cycles, need of high R&D investments, convergence of multiple technologies and importance of technological standards (Garud, 1994; Gnyawali and Park, 2009, 2011). As a consequence, empirical quantitative research has focused on industries as biotechnology (Quintana and Benavides, 2004), IT (Boucken and Kraus, 2013), wireless communication (Yami and Nemeh, 2014) or medical devices and machinery (Boucken et al. 2017). Similarly, seminal qualitative case studies also focus on firms operating in those industries, normally big multinationals that have been successful at developing cooperative arrangements, as Samsung and Sony (Gnyawali and Park, 2011), Amazon (Ritala et al. 2014), Toyota and GM; Renault and Nissan (Segrestin, 2005); Toyota, Peugeot and Citroen (Gwyne, 2009); Apple and Nike; HP, IBM and Seagate; big airline alliances such as “Star Alliance” or “One World” (Boucken et al. 2015, Gast et al. 2015).

Inspired by these successes, firms in many industries have launched cooperative initiatives and structures –strategic alliances, networks, clusters and other associations–. Actors promoting such cooperative initiatives consider that cooperating competitors can obtain advantages sharing technological resources, innovative capabilities and risks (Bengtsson and Kock, 2000; Paluda and Dagnino, 2007). An increasing number of scholars have found a positive relationship between coopetition and innovation outcomes (Tether, 2002; Quintana and Benavides, 2004; Nieto and Santamaría, 2007; Gnyawali and Park, 2009; Boucken and Kraus, 2013; Park et al. 2014; Ritala 2012; Ritala and Huerlinga-Laukkanen, 2009, 2013; Yami and Nemeh, 2014; Wu, 2014). However, despite its potential advantages, coopetition also creates incentives for firms to behave opportunistically. The risks of opportunism and knowledge leakage inhibit many firms from engaging in cooperative innovation and threatens the success of ongoing cooperative projects (Baumard, 2009; Boucken and Kraus, 2013; Boucken and Friedrich, 2016). As a result, coopetition is described as a “double-edged sword” (Boucken and Friedrich, 2012).

Regardless of worldwide known cooperative examples and the rapidly growing number of scientific publications (Bengtsson and Kock, 2014), scholars agree on the fact that coopetition as a research field is still in its infancy. Some research avenues, such as the relationship between coopetition and innovation, have not been explored enough yet (Ritala et al. 2016). The success of cooperative arrangements for innovation depends highly on the type of innovation and the kind of firms being considered. Thus, research has been increasingly focused on finding how factors as firm size affect the adoption and effectiveness of cooperative innovation. Yet, many other factors as differences in ownership and legal form have not been studied.

This paper will focus on the long-standing and rich cooperation experience between cooperative firms. “Co-operation among Co-operatives” is one of the seven principles of the International Co-operative Alliance. According to it, “Co-operatives serve their members most effectively and strengthen the co-operative movement by working together through local, national, regional and international structures” (United Nations 2012, 6th Principle, International Cooperative Alliance 2015). To the best of our knowledge no academic research has been conducted to know how worker-cooperatives implement this principle in practice to innovate through coopetition and overcome the risk of opportunistic behaviour.

Understanding cooperative innovation practices and structures of worker-cooperatives can be useful for other firms willing to improve their innovation and competitive capabilities through cooperation.

The study on cooperation comparing worker-cooperatives and investor owned firms in the case of the Spanish machine tool (MT) industry offers an interesting context for two main reasons. Firstly, cooperative strategies have been largely fostered by both the European and the Spanish Association of Manufacturers of Machine Tools and by different public bodies. Precisely, some of the insight gained from our research questions tests the strength of these policies and arrangements against the risks and disadvantages, as perceived by firms. Secondly, within the MT industry there is a significant number of worker-cooperatives (13%) that are very prominent on innovation (they concentrate 38% of patents in the industry), something that distinguishes the Spanish setting from other countries (Otero 2010). Most Spanish MT worker-cooperatives belong to the Mondragon group, a secondary cooperative (International Co-operative Alliance, 2015), with strong inter-cooperation arrangements. If cooperation may offer “a broader, more complex view of cooperation that acknowledges the intrusion of competitive issues in the effort to reach a collaborative advantage” (Padula and Dagnino 2007:33), then it is our expectation that the set of positive and negative conditioning factors, pushing agents towards collaboration or competition, will be particularly noticeable under the context of the here studied sample.

In the present research, we investigate how the implementation of the inter-cooperation principle among Spanish MT worker-cooperatives helps them to achieve advantages in their innovation and internationalization processes. What benefits do worker-cooperatives obtain from cooperation? How do worker-cooperatives materialize cooperation? How do they avoid the risks of opportunistic behaviour associated to cooperation? Are cooperative practices of worker-cooperatives transferable to other types of organizations? These are the questions this paper tries to answer.

To answer these questions, this study, in addition to a rigorous revision of the literature, collects evidence from fifteen in-depth semi-structured interviews with CEOs and Research and Development (R&D) managers of Spanish machine-tool producing firms, eight of which were worker cooperatives.

The paper is organised as follows. The next section reviews the literatures on cooperative innovation and intercooperation. This is followed by an outline of the research method used in the project reported here, including a brief profile of the cases. The subsequent section summarizes the results of the field-work. The final section is devoted to discussion and conclusions.

2.- Cooperation, inter-cooperation and innovation

Cooperation poses a paradox in the form of a simultaneous pursuit of cooperation and competition between firms, and tensions developing at individual, organizational and inter-organizational levels (Raza-Ullah et al. 2014). Past research recognizes a vast array of drivers of cooperation. These can be grouped in three broad types: internal or agent-based, external or environment-based, and relationship-based (Bengtsson and Raza-Ullah 2016). We discuss each in detail.

2.1.- Internal drivers pushing towards or against cooperation

The combination of quantitative research focused on industries with great potential for positive outcomes of cooperation and purposefully-selected success stories has the consequence of a literature framework with a “collaborative bias” (Padula and Dagnino,

2007). As Tether (2002) suggests, cooperative arrangements with competitors are far from the norm and much less common in the general population of firms than in the samples of many research studies on coopetition.

While many researchers stress the positive effects of coopetition, it is also “fraught with difficulties in the sense that opportunism, misunderstandings and spillovers can hamper the positive impact of coopetition on performance and innovation” (Bouncken et al, 2015, 590). Formal means to protect prior knowledge, such as patents, exist (Teece 2000), although monitoring and enforcing tends to be expensive, and thus more difficult for SMEs (Schiessler 2015). In some cases, the concurrence of both trust and non-disclosure agreements help to balance the dilemma between knowledge sharing and knowledge protection (Nguyen and Nafula 2016). On the side of factors playing against knowledge sharing is perceived risk of opportunism from other agents or merely the prospect of losing control of specific knowledge when this was externally produced for the firm. Thus, based on these ideas, we pose two research propositions:

RP1: Participation by a firm in cooperative initiatives is reduced due to risk aversion to: (a) the opportunistic transmission of own knowledge and (b) The diffusion to competitors of valuable knowledge externally produced on behalf of it.

Coopetition provides a means for successful knowledge exchange, absorption and integration and, as a result, supports the generation of innovation, new knowledge and products (Bouncken and Kraus, 2013; Bouncken et al. 2015; Quintana and Benavides, 2004; Ritala and Hurmelinna-Laukkanen, 2009, 2013). However, proneness from competing agents to cooperate might differ depending on their knowledge absorptive and appropriability capacities. Firms with greater abilities to acquire knowledge from external sources and to protect their knowledge against imitation obtain greater innovation outcomes from coopetition (Ritala and Hurmelinna-Laukkanen, 2013). However, if the company perceives that it alone is capable of individually generating the knowledge it needs, it will be more reluctant to cooperate. Thus, our following research propositions are:

RP2: An agent’s propensity to cooperate in a joint-development of knowledge will: (a) increase if it perceives that it can absorb knowledge from external sources, (b) increase if it perceives that it can protect its own knowledge from competitors and (c) decrease if it perceives that it can concentrate on its own capabilities to generate relevant knowledge individually.

However, given the threats of opportunistic behaviour, the degree of collaboration and competition in cooperative arrangements differs over time in the production process. It has been argued that firms are more likely to cooperate in activities residing far from the customer, and compete in activities that are closer (Bergtsson and Kock, 1999, 2000; Osarenkhoe, 2010). However, the coopetition picture is more complex, as firms tend to simultaneously compete in some activities and collaborate in others (Bergtsson and Raza-Ullah 2016).

Additionally to the relevance of the activities subject to collaborative efforts between competitors, compared sizes of the firms coming into play, may also account for a relevant aspect. Despite the prevalence of case studies in large firms (Gnyawali, He & Madhavan, 2006; Gnyawali and Park, 2011; Ritala et al. 2014), most researchers consider that positive outcomes of coopetition are potentially greater among small and medium-sized enterprises (SMEs). SMEs lack resources to pursue large-scale, risky R&D and innovation projects

(Gnyawaly and Park, 2009; Gomes-Casseres, 1997). A growing number of researchers suggest that SMEs collaborating with competitors can leverage resources together, achieve economies of scale, mitigate risks and reduce duplications (Bouncken and Kraus, 2013; Gomes-Casseres, 1997; Gnyawaly and Park, 2009; Morris, Koçak and Özer, 2007). SMEs can compete more effectively against larger players if they collaborate with other competitors and acquire and use knowledge and other relevant resources held by each other (Gnyawaly and Park, 2009). Competitors have high market commonality and resource similarity, are likely to face similar challenges, have common interests in developing certain technologies and possess resources and capabilities that are directly relevant or applicable for each other (Gnyawaly and Park 2009). Additionally, a mutual understanding of each party's interrelated position can give rise to harmony between them (Bengtsson and Koch 1999). In this situation of firms of similar size and culture, sharing the same 'industry recipe', operating in a same industry, and even closely located, there will be a better understanding of the other agents' *dominant logic* (as defined from Prahalad and Betis 1986). Hence, drawing on these ideas, and particularly, subscribing a research proposition original from Padula and Dagnino (2007), we pose:

RP3: The higher the distance in the dominant logic between the competing agents, the higher the intrusion of the competitive issues into a cooperative relationship.

2.2.- External drivers pushing towards competition in the MT industry

Not only agents' characteristics, but very markedly, factors from the environment heavily condition their decisions towards collaboration or competition. Past research analyzed the effects such as industry structure and growth level (Chen, 2009) or uncertainty and instability in the industry (Padula and Dagnino 2007, Ritala 2012).

Some peculiarities of the MT industry markedly illustrate these conditioning effects:

First, customers are the main source of innovation in the MT industry (Carlsson, 1995; Charterina et al. 2016, 2017; Chen, 2009; Lissoni, 2001, Lissoni and Pagani, 2003; Mazzoleni, 1997, 1999; Otero, 2010). A growing problem for many SMEs in the European MT industry is that an increasing share of the customers that purchase MTs is in far, distant markets. As a consequence, small and medium MT firms face problems to directly interact with buyers, exchange information and knowledge with them and provide them a proper innovative product and good after-sale service all over the world.

Second, following the trend of Western European MT firms (Larsson and Malmberg, 1999; Wengel and Shapira, 2004), nowadays Spanish MT firms are producers of highly-customized equipment, that sell on demand, and adapt their production to the specifications requested by each customer (Charterina et al. 2017). Besides being the source of innovative ideas, user-producer interactions are a fundamental aspect of business transactions for European MT firms, as engineering services are bundled with the sale of the equipment (Mazzoleni, 1999). Buying a MT involves a high degree of uncertainty and requires a lengthy buyer-supplier interaction (Larsson and Malmberg, 1999). As a consequence, sales and after-sale processes often require direct and time-consuming interaction of highly qualified salespeople, engineers and technicians with the buyers. Again, this direct interaction is more problematic for SMEs when buyers are geographically further and more globally dispersed. The European Association of Machine Tool Industries is concerned that European SMEs lack the capacity to expand to the growing Asian markets (CECIMO, 2011, 42). In order to make access to foreign and distant customers easier for SMEs and enhance their competitiveness, a cooperative approach for European SMEs in the sense of forming alliances and going on the

international market together has been proposed (CECIMO, 2011, 45). Sadly, the same association observes “a low propensity of small-sized machine tool builders to cooperate and build partnerships” (CECIMO, 2011, 26), mainly because of Intellectual Property Right (IPR) concerns.

From the account on these environmental effects, we pose:

RP4a: The more vulnerable a firm is in terms of size or limited resources, the more it is willing to collaborate with a competitor.

RP4b: Non-vulnerable or capable firms do not tend to take part in collaboration schemes with competitors.

2.3.- Relational drivers among competing firms in the case of Mondragon’s MT co-operative firms

Most relevant Spanish MT worker-cooperatives voluntarily belong to the Mondragon Corporation, a highly diversified business group conformed in 2017 by 98 cooperatives, 143 subsidiaries, 80818 employees and a turnover of €1936 million. Mondragon differs from ordinary corporations since power, authority and ownership is not centralized. Instead, the corporation has a “federal” or “inverted pyramid” organizational structure. A consequence of this is that “any co-op that does not find that the Mondragon corporate offices are adding value to their operations may secede at any time” (Smith 2001, 13, 46).

In such an inverted pyramidal structure, the principle of “Co-operation among Co-operatives”, named as “inter-cooperation” in Mondragon cooperatives, is key to understand the long-term survival of Mondragon cooperatives. The freedom of each individual cooperative to leave the group means that the shared R&D, educational, financial and commercial services generate added value to the individual cooperatives. Otherwise, the constituent companies might leave, as happened in 2008 with Irizar and Ampo cooperatives, voting in their general assemblies to leave Mondragon Corporation (Basterretxea, 2011). The fact that the bulk of its cooperatives remained in the group for decades is a clear evidence that the incentives achieved through inter-cooperation do add important value (Smith 2001; Basterretxea, 2011)

The manifestations of the Mondragon inter-cooperation principle bring both sacrifices and advantages to participants that go beyond the sharing of information at low implication or cost, as theorized for indirect ties in a network (Ahuja 2001). These include: (1) the establishment of a homogenous social and occupational system; (2) the shared restructuring of part of the profits (or losses) at sectoral division level and corporate level; (3) the regulation of the transference of worker members from cooperatives in crisis to those in need of workers; (4) the search for potential technological or commercial synergies; (5) benefits from many joint support institutions aimed to achieve collaborative advantages that include a credit union (Laboral Kutxa), corporate training centers (like Mondragon University), and corporate shared R&D units, or (6) the formation into intermediary-level networks of cooperatives, with agreements of strategic and economic cooperation that may be stronger than the general ones in Mondragon Corporation. Still, each cooperative retains freedom to abandon the group.

In relation with the corporate shared technology centers and R&D units, in 2017 fifteen member firms from the Mondragon cooperatives were active, employing a total of 1,928 researchers. Shared R&D units are second order cooperatives, namely, a modality of cooperative holding with two types of owners: its employees and cooperatives acting as joint

founders, and which are owners and customers of it (Irizar and McLeod, 2008). Most of those shared R&D units are specialized in specific industries and technologies and are the fruit of cooperation for innovation of cooperatives sharing similar or complementary products and frequently oriented to the same customers. In essence, fruit of coopeitition.

The study of coopeititive R&D through shared R&D units in Mondragon MT firms can be useful for other firms aiming to share R&D efforts with competitors. The Mondragon MT worker-cooperatives have created their own shared R&D units: Ideko and Koniker. Ideko is a research center specialized in industrial production and manufacturing technology. It was created in 1986. It employs 102 researchers and the largest part of its R&D activity consists in providing R&D to the metal cutting MT worker-cooperatives of Mondragon. In 2016 it had total sales of 9.5 million € in 2016, 48% of them coming from local, Spanish or European research funds.

Koniker is a shared R&D unit specialized in the field of forming and assembly created in 2002. It employed 26 researchers in 2016 and its services are shared by a group of worker-cooperatives producing mainly stamping dies and automotive systems for big car manufacturers.

In the area of internationalization, attempts to achieve synergies through joint marketing and sales efforts have also been much more successful among Mondragon cooperative MT firms (Otero, 2010, 136). Thus, the study of coopeititive internationalization experiences of cooperatives can be valuable for other firms willing to jointly interact with new customers of distant markets.

Often, a decision into cooperation despite competition comes as result of the influencing demands from a common customer, actively creating interdependencies between two competing suppliers in a sort of triad (Dubois and Fredrikson 2008), a common outcome in supply chain management.

These advantages can make us conjecture that benefits stemming from network membership may outweigh the potential risks derived from closeness to a direct competitor that is also a member of the same network. In addition, these advantages can be combined with the fact of sharing vision, values and, ultimately, trust. However, there is still research to do in the study of bottom-up processes of a firm's aspiration for coopeitition, affecting higher (namely, network) levels of coopeitition, or conversely, of top-down processes, for which a proper contextual environment, containing a larger network and inter-network levels, aimed at propitiating cooperation among some of its constituent firms, exists (Bengtsson and Raza-Ullah 2016). These contexts correspond more particularly to the case of the above described reality from Mondragon MT firms. Hence, our last research proposition:

RP5: Common membership to a network should be perceived as favourable feature for a coopeititive relationship by competing firm members.

3.- Methodology

In this study we have used a qualitative approach by means of a cross-case analysis (Miles & Huberman, 1994; Patton, 2002), involving 14 organizations in the Spanish MT industry. In the literature reviews on coopeitition, Bouncken et al. (2015) highlight that given the complex nature of coopeitition and its nascent theoretical understanding, many researchers have opted for qualitative approaches, as it allows an in-depth understanding of the research objectives. The need to explore and describe one field- in our case, coopeitition- makes in-depth qualitative analysis adequate (Eisenhardt, 1989).

A first interview was completed with the CEO of the Spanish Association of Machine-Tool Producers. Besides providing an overview of open innovation practices in the MT industry, he also offered valuable information on some of the most innovative firms in the industry and the names of two key informants per firm. Eleven interviews were conducted with CEOs and Research and Development (R&D) managers of Spanish machine-tool producing SMEs, eight of which were worker-cooperatives. Two additional interviews were conducted with the heads of R&D of two research units shared among a number of worker-cooperatives, some of whom we study here. There are three interviews with managers of investor-owned MT firms.

Table 1. Summary data of interviewed managers and firms.

	Unit No	Kind of firm	Member of Mondragon Group	Sales turnover 31/12/2015(€)	Employees 2015	Interviewee
Cooperatives	1	Co-Op	Y	188,441,826	569	CEO(**)(1)
	2	Co-Op	Y	140,654,000	436	Head of R&D
	3	Co-Op	Y	66,736,853	230	CEO
	4	Co-Op	Y	47,709,013	370	Member of R&D
	5	Co-Op	N	38,073,000	160	CEO
	6	Co-Op	Y	Merged with another coop in 2013	50	CEO
	7	Co-Op	Y	65,000,000	400	Head of R&D(*)
	8	Co-Op	Y	230,000,000	1,500	Former Head of R&D(*)
	9	Co-op Shared R&D unit	Y	8,769,742	92	CEO
	10	Co-op Shared R&D Unit	Y	1,473,752	30	CEO CEO(*) (1)
	11	MT Producers' Association	--	---	170 corporations	CEO
Investor owned firms	12	Public Limited Company	N	72,342,000	146	Head of Innovation
	13	Public Limited Company	N	46,064,000	233	Sales Director
	14	Public Limited Company	N	35,773,518	118	CEO

(*)Interviewed in June-July 2018; (**) Re-interviewed in June-July 2018

(1)Both positions correspond to the same person

Interviews focused on the open innovation processes and practices by the firms, with special emphasis on their collaborative innovation with customers and competitors. We followed a common interview guide, with few additional questions asked in the cooperative firms in

order to know how the inter-cooperation principle was implemented and to evaluate if it generated a more effective coopetition. Nevertheless, the interview process was flexible. As Bryman and Bell (2015) suggest, going off at tangents was often encouraged and many of our findings do not respond to questions that were prepared in advance by the interviewers. Significant non predicted issues emerged in the course of the interviews –as the coopective internationalization strategy of worker-cooperatives- and the emphases in the research was adjusted as a result of what interviewees saw as relevant and important.

In order to gain the participants' trust and avoid organizational silence and social desirability bias, respondents' anonymity and the confidentiality of all information obtained were guaranteed.

The interviews were recorded and transcribed, and subsequently analyzed by the three researchers, grouping and coding the transcriptions by themes and nodes of analysis. The three authors conducted the iterative process of data categorization and interpretation. This process applied to the semi-structured interviews made it possible to identify passages that illustrate the main themes emerging from the category analysis.

As table 1 shows, cooperatives of our sample are on average larger than investor owned firms. The sample reflects the reality of the Spanish MT industry (see Otero, 2010). Initial interviews took place in 2013 and 2014. Between 2013 and 2017 the interviewed managers have been contacted in different moments to provide them feed-back of partial research findings. In order to increase the credibility of our analysis through respondent validation (Bryman and Bell, 2015), a review of drafts of the paper was also offered to and made by interviewees between November and December 2017.

Finally, during June and July 2018, three more interviews were added in order to trace the outcome of cooperative R&D and shared R&D units, as important changes took place in some of the organizations initially studied in 2013 and 2014.

4.- Results

The obtained results from the interviewed managers are here disposed in a decreasing order of benefits relative to the collaborative efforts or difficulty, as perceived from interviewees. Accordingly, there are four realms: (1) shared R&D units, (2) coopective sales and after-sale services; (3) coopective efforts on behalf of common customers or with investor-owned firms, and (4) mergers and other organizational changes. In each of these four sections, we will expose the apparent relationship between the responses of the interviewees and the research propositions formulated.

4.1.- Benefits from shared R&D units

Cooperatives pool their resources and capabilities to pursue common long term research projects, mainly through the creation and co-funding of shared R&D units. Small worker-cooperatives consider that it could be impossible to take part in ambitious and uncertain R&D activities if it were not for joint R&D budgets and shared R&D units:

We are a small cooperative, with only fifty people, and we could not do many great things only relying on our own means. But with the sum of all the cooperatives, we can have a very decent R&D budget. "(Unit #6)

Collaborating with the same partners over time may provide mainly redundant information and could result in inertia (Nieto and Santamaria 2007). Given that most of the innovation in the MT industry is incremental, repetitive collaboration with the same competitors was not seen as a problem. For more demanding innovation and R&D projects, firms should search novel ideas also outside the coopetition partners' organizations (Ritala and

Hurmelinna-Laukkanen, 2013), something MT worker-cooperatives do collaborating occasionally with other knowledge providers outside the cooperative network.

Shared R&D units also take part as bridges to contact other bigger international R&D units, and help to complement R&D budgets of the worker-cooperatives with public R&D funding through European or local research funds and projects that are synergic with research needs of the MT worker-cooperatives.

"Unit #9 works in certain lines of research in accordance with the businesses of the firms that co-own Unit #9, which are mainly cooperatives. We define the lines of research and we launch R&D projects that are led by Unit #9, but in which people from the cooperatives also take part. The idea is that these projects get public funding, from European funds, from the Spanish Ministry of Science, from the Basque Government, or from whatever. Besides, Unit #9 also provides us with applied research under contract. That is, tailored R&D services paid by the companies and conducted by Unit #9". (Unit #3)

Researchers of the shared R&D units often work in inter-organizational teams, with technicians and researchers of each individual cooperative. Evidence from our interviews suggests that knowledge exchange and creation are favoured by temporary and permanent relocations of researchers of the shared R&D units in the MT worker-cooperatives, and vice versa. Relocations of researchers are of particular importance when those employees and the cooperatives they come from have complementary skills and expertise. This allows to combine the strengths of the different cooperatives, create synergies and engage in co-development of new products.

"When we are developing new products, it is a good thing to have both people from the firms and from the shared R&D unit intervening. Both have their input. I think it's good that they are not isolated. Then, there are also several technical directors in the cooperatives that are former researchers of the shared R&D unit #9." (Unit #2)

RP4a evidenced: working cooperatives with limitations for R&D (size or limited resources) have a strong incentive to collaborate with a competitor, sharing R&D and resources.

Some MT worker-cooperatives follow a prospective strategy, striving to be first movers in their market niches. Thus, they see co-opetition as a way to create, maintain and enhance their competitive advantage. Shared R&D units get specialized in long term R&D, allowing worker-cooperatives pursuing a prospective strategy to be ready when radical innovations or technological leaps occur in the industry (or in the industries of their main users) and get first mover advantages.

"We think that within five or six years our users will replace metal parts with composites or reinforced plastics, and that this will affect the manufacture of our presses. Thus, we ask our shared R&D unit, Unit #10, to do research in this field, so when that technology is a reality, we are prepared. We did something similar a few years ago with the Press Hardening process and we were prepared when that process was incorporated into automobile manufacturing. When a technological leap occurs, being the first implementing the new technology is very important." (Unit #6)

RP2a evidenced: Working cooperatives, which perceive that they can absorb knowledge from external sources, tend to have a greater propensity to cooperate.

Besides relying on shared R&D units for the long-term research and development activities, cooperative MT builders also have a large part of their own working force and budgets devoted to short term development in their internal R&D units and Technical Development Offices.

"We are 230 people. In 2000 we had 26 people in the technical office, 47 in 2008, and 55 in 2012. We also have an internal R&D team consisting of 9 people. Innovation in specific short-term projects is made with internal R&D. For long-term innovation and basic research, we rely in our shared R&D Unit #9. "(Unit #3)

RP4b evidenced in an opposite way: No retrieval from shared R&D as consequence of being strong. Rather, many strong cooperatives participate in shared R&D activities, as a plus in their overall R&D activity.

Knowledge transfer is also favoured through the assistance of managers of some cooperatives to the boards of directors of other cooperatives (Otero 2010). In our interviews, we found that management knowledge is also shared via relocations of managers. In fact, some of our interviewees told us that even if they were occupying management positions in one cooperative of the group, they were really members of another cooperative who had been temporarily relocated.

Regular inter-cooperative ties, as relocations of technicians and managers, and the routinized creation of joint R&D teams, are measures allowing cooperatives to exchange complex tacit knowledge through direct person-to-person interactions, something that is of key importance (Hansen et. al., 1999).

Interviewed managers in cooperatives identify the cooperative model as one that provides the potential for gaining competitive advantages through inter-cooperation, yet they stress that this potential is only converted into real advantages if managers actively promote it. According to our respondents, the increasing numbers of joint research teams, relocation of technicians, and knowledge transfer responds to a deliberate institutionalized strategy:

"Now there is a trend (of joint R&D, knowledge exchange, transference of technicians...), because inter-cooperation is one of the most important cooperative strategies. What advantage do we, cooperatives, have to compete in the world? Well, we have more labour flexibility to face crisis, if we need to lower our salaries, we have flexibility. But what other value do we have? That we collaborate with other cooperatives, and this collaboration can give us a certain strength, right? And through inter-cooperation many opportunities may arise. Inter-cooperation is something that is being promoted. We want to structure it even more and do things of greater scope. " (Unit #1)

RP5 evidenced: Common membership to a network (Mondragon Corporation) is perceived as favourable for competition.

Notwithstanding these advantages, some working cooperatives who are members to Mondragon Corporation and to the R&D cooperative may perceive the need to ponder the decision to continue commissioning R&D services against developing research on their own.

“We have a [member] co-op that had only a technical development office serving directly its customer orders, and between a technical office and us, there is a clear difference in the roles. But, as they started to see us a bit far from their needs, they have been developing a R&D department on their own...and I...don’t see it [right] ‘cause it’s not in the terms we initially defined” (Unit #10)

RP2c evidenced: An agent’s propensity to coopete will decrease if it perceives that it can concentrate its own capabilities to generate relevant knowledge individually.

Some cooperatives and many investor-owned firms are reluctant to collaborate with sectoral R&D created by the cooperatives, since they fear that some knowledge will spill over through the R&D center.

“[On the imagined fears from some cooperative member of the R&D unit, whose name was not revealed to us:]’The knowledge these people are gaining from us, they may use it...not even with a competitor, but with any of those cooperatives that may at some time enter the Tool sector’” (Unit #10)

RP1b evidenced: Risk aversion to the diffusion of an externally produced knowledge restrains firms from taking part in cooperative initiatives.

There is, therefore, an “invisible division” between cooperatives and investor-owned firms regarding collaboration with R&D centers, according to Otero (2010). Our findings also support the existence of this “invisible division”. Even if cooperatives have tried to open the services of their shared R&D center to other MT firms, results have been modest.

“We try to set the next goal to our shared R&D unit: conduct 50% of your R&D activity for us, and 50% for other firms not belonging to Mondragon Corporation. But there’s no way.” (Unit #3)

While investor owned firms rely on sectoral R&D platforms just as providers of tailored R&D services, the kind of collaboration of MT worker-cooperatives with these platforms is much more intense. Besides providing R&D services, they provide technological surveillance and collaborate in the long-term innovation and technology planning and in the strategic planning of worker-cooperatives.

“We have a strategic innovation unit. We not only provide technology, but also support in the identification of the most strategic part[...] That is, we provide three packages: competitive intelligence, strategy support and technological support. ” (Unit #9)

RP3 evidenced:The higher distance in the dominant logic between competing agents, the higher the intrusion of the competitive issues into a cooperative relationship.

4.2.- Benefits of cooperative sales and after-sale services in new markets

As other European MT firms, the biggest MT builders in our sample have created subsidiaries in Asia to produce high volumes of low/mid-range machines at low costs but with high quality enabled by European expertise.

As mentioned in the literature framework, European MT SMEs are facing significant challenges due to the growing importance of Asian and BRIC markets, where most of the MTs are now sold. Some interviewees highlighted that some of their European competitors have gone bankrupt despite having good products, just because they were not able to provide proper sales and after-sale services to users in a growing number of distant countries. Again,

coopetition has been the way Mondragon MT worker-cooperatives have used to solve this problem, through the creation of joint sales and after-sale services in distant growing markets. Sharing sales and after-sale services allow worker-cooperatives to have a direct contact with customers all over the world. Given that customers are the main source of innovation in the MT industry, this direct contact is highly valued by the interviewees from an innovation point of view. Besides, interviewed managers highlight that shared sales and after-sale services allow a better adaptation to different geographic and sectoral requirements, and also make it possible to achieve competitive advantages due to a better, faster and more flexible after-sale service.

"We are a small cooperative, with 50 employees and we have 1,400 machines working all over the world. If we worked as an isolated company, it would be total madness to provide post-sale, repair and launch assistance services all over the world. We can do it because we have the support of the corporation and because we work together with the XXXX cooperative, which is a company that has a factory in China and has many commercial branches, and we share those services" (Unit #6)

RP4a evidenced: Working cooperatives with limitations for sales and after-sales (size or limited resources) have a strong incentive to collaborate with a competitor, sharing sales services.

RP5 evidenced: Common membership to a network (Mondragon Corporation) is perceived as favourable for coopetition.

4.3 Coopetition on behalf of common customers or with investor-owned firms

One of the studied cooperatives (Unit #5) does not belong to the Mondragon corporation, and according to our informant in this firm, coopetition with Mondragon firms in R&D has not been possible despite repeated efforts. As in other divisions of Mondragon, cooperatives in the MT division have to share between 15% and 40% of their profits (or losses) with other cooperatives of the division. The shared restructuring of profits at the level of sectoral division, the shared investments made during many years in joint R&D units and joint inter-cooperation structures, and the internal regulation of relocations of members, are all factors that increase mutual trust and reduce the risk of opportunistic behaviour associated to coopetition. Investor-owned firms willing to imitate the cooperative strategy of cooperatives, should previously generate mutual bonds that mitigate the threat of opportunistic behaviour (creating joint ventures, as opposed to non-equity alliances, with detailed collaboration contracts, for example). In fact, in Spain only four small investor-owned firms in the MT industry, not competing in the same product range and employing 270 people in total, have managed to create a joint venture to jointly market and promote their products (Otero, 2010, 136). In the absence of those mutual bonds, cooperative strategies are hard to imitate by other firms, according to our interviewees.

"If firms do not have other kinds of previous relationship, if they do not share other things as we do [in relation to the sharing of profits and losses of Mondragon cooperatives, shared structures, shared culture and values...], creating joint sales and after-sale services is very difficult. In order to provide after-sale services of each machine, you need to devote time and efforts to learn and acquire knowledge, and firms are very jealous of their product and don't want to show their knowledge to competitors. If you open the maintenance service of your machine to your competitors, you open everything to them. And of course, it is very complicated to reach a joint service agreement with a competing firm. It is

very difficult to compete in products and at the same time cooperate in the provision of sales or after-sale services." (Unit #9)

Supporting the findings of the literature on co-opetition, the investor-owned firms that engage in co-opetition limit it mainly to activities that are far away from the customer. Cooperation takes place up to certain point, in which it is confronted to fierce competition. According to our interviewees in investor owned firms, co-opetition is not possible on activities that are close to the customer, as the joint sales and after-sale services provided by the cooperatives.

"We have taken part in joint projects with competitors. The change [towards higher cooperation with competitors] is a change that has to be made if we want to get larger projects from clients. I think it will be determinant that at least we are able to talk to our competitors [to explore joint offers].[...] I'm competing fiercely against those firms to get customers, but at the same time I have the mobile phone of the technical director of X, Y and Z firms and when there is a project that theoretically does not affect an ongoing project or deal with a customer, we talk. When we're in a project or deal with a customer, we do not talk. That is obvious, every firm here takes care of its business." (Unit #14)

When asked about other international successful co-opetition experiences in the MT industry, interviewed managers did not mention cases of small and medium-sized family-owned firms, but cases of large corporations, in which achieving mutually beneficial arrangements can be perhaps easier and less influenced by passions than in rival family firms.

RP1a evidenced: Risk aversion to the opportunistic transmission of own knowledge restrains from taking part in cooperative initiatives.

RP5 evidenced: Common membership to a network (Mondragon Corporation) is perceived as favourable for co-opetition.

However, some of the interviewees in investor owned MT firms consider that environmental changes make it increasingly necessary to engage in co-opetition and affirm that they are gradually intensifying their collaboration with competitors. Those increasing industry co-opetition experiences include both cooperatives and investor-owned firms at the cutting edge in innovation and technology. Those firms have a positive perception of their own lead time, and are less afraid of imitation and of co-opetition.

"We recently went to visit the factory of one investor owned competitor, Z, and we had a meeting there and we saw their technology. Later on, Z technicians came here to visit us. We have also conducted open-door days with other investor owned competitors as W. The difference doesn't rest on hiding our capabilities; the difference is in having more capabilities than the others." (Unit #2)

Also, some of the interviewed cooperatives have been able to replicate their experience with investor owned competing firms. In those cases, cooperation has been achieved at the expense of strict competition, taking measures to avoid direct competition and possible opportunistic behavior of other competitors.

Currently we have a process of cooperation with three Italian competitors in the line of machinery and installations for appliance companies. None of the 4 companies is able to individually meet the requirements of large appliance manufacturers such as Bosch or Whirlpool. In order to create this alliance, previously each company has had to carry out a cleaning of products of its range so that there is no internal competition between the four companies and to generate trust between them. We are building a shared joint commercial network" (Unit #1)

RP2b evidenced: An agent's propensity to coopete will increase if it perceives that it can protect its own knowledge from competitors.

RP4a evidenced: Vulnerable a firm is in terms of size or limited resources, tend to be more willing to collaborate with a competitor.

4.4.- Mergers and other organizational changes generated from coopetition

Since the first MT worker cooperatives of the Mondragon group were created (Danobat in 1954, Goiti in 1961 and Soraluce in 1962), they have experienced periods of intense competition, followed by periods of competition and cooperation. During the first decades, different MT manufacturers competed among them offering the same products to the same clients, without sharing any knowledge, and developing similar products and technologies in parallel.

Since the mid-1980s, and more clearly since 1991, the year in which the Mondragon cooperatives were grouped into sectoral divisions, there was a process of increasing cooperation at the expense of competition. These competing MT cooperatives initiated a redistribution of the products manufactured by each, towards a greater specialization. In this way, companies that had been competitors gradually became complementary, reducing competitive tensions and facilitating cooperation. In some cases, the solution was the division of markets. Thus, the competition that occurred between Danobat (included in this sample) and Lealde (not included) in the case of lathes was resolved by assigning the automotive market to Danobat and the equipment goods market to Lealde. In some cases cooperatives competing frontally in some project, for example Danobat and Soraluce (included) in special machines and transfer lines, chose to create a joint company (named D + S) onto which to assign these.

RP2b evidenced: An agent's propensity to coopete will increase if it perceives that it can protect its own knowledge from competitors.

RP5 evidenced: Common membership to a network (Mondragon Corporation) is perceived as favourable for coopetition.

Nevertheless, this process of converting competing firms in complementary firms that cooperate is not always followed, since market forces and customers sometimes make it impossible.

“Unit #7 and Unit #8 are cooperatives for which specializing into a product and dividing products up theoretically is easy, but the market does not respond to this and forces you to expand your products and to compete. Product positioning is not a business decision, because if you position yourself in a product, the market does not respond... Our option to offer more products is to survive; it is pure survival.” (Unit #7).

Consequently, some directly competing Mondragon MT worker-cooperatives have opted for not strong ties or bonds for cooperation, maintaining their own autonomy. Some of these structures created for inter-cooperation are the “mutual interest groups”:

“There are some teamwork practices of technicians from different cooperatives that are even regulated and that we call "Mutual interest groups". In order to create a mutual interest group with, let's say, two cooperatives, there has to be a prior interest in both cooperatives. Each cooperative has to gain something from that collaboration, otherwise there is no agreement. Nevertheless, what I do want to stress is that all those mutual interest groups are facilitated by the fact of

belonging to Mondragon Corporation. Mondragon boosts and helps inter-cooperation without any doubt." (Unit #9)

Mutual interest groups, often involve simultaneous cooperation and direct competition. In those cases cooperation can be highly heterogeneous in time, activities, markets and products. Despite an official discourse that stresses cooperation and defines the cooperatives as “cousin firms”, direct competition often creates many difficulties to cooperation in sales, buys, joint R&D, knowledge exchange, or transference of technicians. Thus, those cooperatives can be sharing R&D units and projects during some periods if they consider that the advantages of cooperating with competitors are higher than the downsides; and change their mind in other periods.

"Since 2006 Unit #7 and Unit #8 cooperate in joint purchases achieving lower prices from providers. In R & D they began to jointly conduct technological and market prospection. They started doing joint R&D projects together that were going very well, but ... frictions began when the joint R&D projects concluded. There was a business and market opportunity and it was necessary to decide how to divide up the business, who was present in them and who was leading them.

In 2009, the collaboration in R & D broke, with each one tired of the other for different reasons, so a distribution was decided, and some products, technologies and sectors were separated, and each one followed its own R&D and technological surveillance, in the same way as with new projects. Both Unit #7 and Unit #8 reached to the conclusion that R & D projects have to be led by each company alone." (Unit #7)

In another example of shared R&D units, seven worker cooperatives (Fagor Arrasate, Ona-Press, Mondragon Assembly, Batz, Matrici, Loramendi and Aurrenak), producing mainly stamping systems and special machines for big car manufacturers, shared the same R&D unit for more than ten years. Our first interviews, in 2013, showed that some of those firms with high levels of complementarity valued highly the shared R&D unit and sharing knowledge among them. On the contrary, worker cooperatives with high levels of direct competition had a much variable and cautious approach to cooperation in R&D and sharing the same R&D unit with their competitors. In fact, in 2015 four of those cooperatives (Batz, Matrici, Loramendi and Aurrenak) decided to leave the shared R&D unit (Unit #10). Tensions created by direct competition, and changes in key management and R&D units were mentioned as causes to give up the cooperative R&D approach:

"There are companies that think they can go off the rails of innovation with the shared R & D center, and that fear of knowledge this R&D center acquires from them reverting to the cooperative with which they compete" (Unit # 10)

According to interviewees, co-competition is easier when cooperatives are facing extreme market environments. During the years where the crisis affected the industry more severely (2007, 2008, 2009) competing firms cooperated strongly in R&D in order to survive. Cooperation also gains momentum when market conditions are very good and individual worker cooperatives are not able to attend market needs individually. In these cases, cooperatives can be fiercely competing for some customers, while cooperating to get big contracts with other customers that could not be achieved in a *solo* way (Dubois and Fredrikson 2008). The case of Unit #7 and Unit #8 serves to add light to the cooperation-competition see-saw. In 2017, while they were directly competing for many car manufacturers with similar products, Unit #7 achieved its biggest historical contract with a multinational trucks company in cooperation

with Unit #8. In any case, despite tensions created by direct competition, cooperating worker cooperatives highlight that cooperation is much easier among them than with other competing firms.

“The greatest cooperation [efforts] I’ve seen between Unit #7 and Unit #8 take place when there is a need. When there has been no work or when there is a lot. A scenario is when there is a lot of work and a cooperative can not attend to all that work alone and asks for the cooperation of the other. Another scenario is when there is no work for anyone, as between 2006 and 2008; at that time they collaborated a lot. It was the moment in which much work was done in collaboration with R&D and purchases. When you are in intermediate market situations, cooperation is more complex, because you get work, but you need more, then you compete in what is out there.” (Unit #7)

RP1b evidenced: Risk aversion to the diffusion of an externally produced knowledge restrains firms from taking part in cooperative initiatives.

RP3 evidenced: The higher distance in the dominant logic between competing agents, the higher the intrusion of the competitive issues into an cooperative relationship.

RP4a evidenced: Working cooperatives vulnerable in terms of size or limited resources have a strong incentive to collaborate with a competitor.

RP4b evidenced: Working cooperatives non-vulnerable in terms of size or limited resources do not tend to take part in collaboration schemes with competitors.

RP5 evidenced: Common membership to a network (Mondragon Corporation) is perceived as favourable for cooperation.

Some worker-cooperatives with strong and long-lasting dyadic cooperation paths, offering similar or complementary products and targeting similar or even the same customers, have made the final decision of merging. Different major merges have taken place among Spanish MT worker-cooperatives in the last decade. In 2008 Danobat and Lealde merged to provide complete turning solutions. In 2011 the cooperative Estarta was integrated into the Danobat cooperative group. Before the integration, both firms had been directly competitors producing grinding machines and at the same time cooperating in the Danobat Group; in 2013 Fagor Arrasate and Onapres (both included in our sample) also merged after 15 years of cooperation in the commercialization of their forming machine-tools; the same year Doiki and Goimek (not included) already cooperating in the offer of precision machining merged; and in 2017 Soralue and Danobat Railway also merged.

The reasons for these mergers were that they improve competitiveness in the global market and help to transmit a unified vision to the clients and the market, moving away from being a group made up of several brands. To a great extent, those worker-cooperatives renounce to overcome their smallness through cooperation, eliminating the competitive side of the equation through mergers and integrations.

“We have gone from thirteen companies to nine in three years. We have reabsorbed and integrated, because in a globalized world you need a certain dimension. In fact, we are going to continue this process, and we want to go from being nine companies to five.” (Unit #2)

RP4a evidenced: Working cooperatives vulnerable in terms of size or limited resources have a strong incentive collaborate with a competitor.

RP3 evidenced: The higher distance in the dominant logic between competing agents, the higher the intrusion of the competitive issues into an cooperative relationship.

A summary of the main findings from our research is presented in table 2.

Table 2.-Main categories and findings of the research.

	Benefits	Research Propositions involved
Benefits of cooperative R&D and shared R&D units	Synergies, economies of scale and reduced R&D risks and costs First mover advantages Obtaining public funding for R&D Shared R&D units as bridges to international R&D providers Knowledge exchange through relocations of researchers and joint R&D teams Collaboration in Strategic Planning	RP1b RP2a RP2c RP3 RP4a RP4b (evidenced in an opposite way) RP5
Benefits of cooperative sales and after-sale services in new markets	Synergies, economies of scale and reduced internationalization risks and costs Direct contact and knowledge exchange with customers in distant countries Faster and more flexible sales and after-sale services	RP4a RP5
Cooperation on behalf of common customers or with investor-owned firms	Barriers to replicate cooperative cooperation in activities close to the customer Cooperative initiatives in investor owned firms easier in activities far from the customer	RP1a RP2b RP3 RP5
Mergers and other organizational changes	Mergers Mutual Interest Groups	RP1b RP2b RP3 RP4a RP4b (partly) RP4b (partly) RP5

5.- Conclusions

The main benefits that MT cooperatives obtain from the implementation of cooperative initiatives are oriented towards sharing costs, increasing capacity, reaching economies of scale, reducing certain risks and obtaining access to knowledge and other resources. These resources turn out to be necessary to create, maintain and enhance their competitive edge and get first mover advantages.

Cooperation among these organizations takes place mainly in the R & D areas (shared R & D units, projects and budgets, joint R & D teams, and regular relocations of technicians and managers), in sales (joint sales and after-sale services, to overcome their size limitations and

have access to users in growing distant markets), and in purchases (mostly joint purchases, to benefit from better prices).

This cooperation is initiated and materialized through collaboration agreements between cooperatives, which may evolve towards mutual interest groups, and may become formalized in the form of second level cooperatives (i.e., cooperatives made from cooperatives) and, ultimately, in the form of mergers of cooperatives.

In the beginning of a collaborative relationship, the main condition is the occurrence of a common need, such as the following: (1) limited resources to deal with innovation projects individually, (2) the need to reach new clients, or (3) to form a solid after-sale service network, (4) a reorientation of the target market strategy, (5) a reorientation of the strategic management, or (6) the need to attend strong increases from the demand-side in terms of size, terms or complexity, among other. Additionally, other important conditions that are necessary for cooperation to succeed are that the involved organizations must perceive they are capable of absorbing the new knowledge they will access. Secondly, they must have confidence on their capabilities for protecting their competitive knowledge. Finally, they have to become aware that generating the needed knowledge is out of reach, or that, in spite of being leading companies, they can produce better knowledge through collaborative agreements.

The support and leadership of a favorable supraorganization, as is the case of Mondragon Corporation, together with the proximity in the competitive logic and dominant values existing among the cooperatives, are elements that facilitate, in turn, collaboration among competitors.

Notably, the same as it happens with other types of organizations by juridical form, the main obstacle for collaborative agreements among cooperatives is their risk aversion to the opportunist transmission of own knowledge and to the diffusion to third parties of an externally produced knowledge.

The cooperatives from the MT sector participating in coepetition initiatives have dealt with risk aversion by means of the following mechanisms:

- Concrete measures to reduce the risk of opportunistic behavior, such as the prior redistribution of products and markets among competitors, or initiate cooperative activities in phases of the value chain that are away from the client.
- Progressive generation of trust, through previous cooperative relations in activities less sensitive to opportunism.
- Integration into a group (a second level cooperative group, or an interest group) within which collaborative behavior is assumed and engendered, in the form of sharing of profits and losses among cooperative member firms, movement of managers and intra-group workers, and the adoption of cooperative values, among other. In this environment, ethical and strategical leadership permeates the entire network.

Additionally, our research findings suggest that replicating the coepetition strategy of cooperatives in other firms is only feasible in the presence of strong ties and bonds linking competing firms. Investor owned firms that have been successful replicating coepetitive strategies with worker cooperatives have also followed the path of changing their product offer, gradually becoming complementary firms. In highly innovative firms, each one being a leader of its respective market niche, and being confident in their possibilities of differentiation, coepetition can help them to accelerate this process.

Notwithstanding these benefits, keeping intellectual property or any other key knowledge protected by means of patents or contracts, for example, or coepeting only in the case of projects that do not put distinctive key capabilities of the organization at risk, are also

conditions facilitating cooperation. Knowledge of these conditions evidenced from our research constitutes a guide to facilitate cooperation outside from the cooperative firms. However, difficulty of compliance limits our capability to generalize in theoretical terms.

Finally, the main contributions of this work are that firstly, it enhances our understanding of cooperation, investigating cross-level interactions between cooperation in large networks (division, corporation, shared R&D units) and cooperation in a dyadic level. As Morris et al. (2007, 51) highlight, in order to achieve successful cooperative relationships, “trust and commitment must be coupled with a clear sense that both parts actually benefit from the relationship”

Secondly, our findings suggest that bottom-up cooperation processes shape the nature of higher levels more effectively than viceversa. Also, it enriches the existing literature analyzing some organizational changes that take place when competing firms decide to cooperate in the long term. Lastly, our empirical study enriches the literature underlining how dyadic cooperation evolves depending on economic cycles. Cooperation gains momentum when market conditions are either extremely good (because firms are unable to respond to big customer needs in a solo way) or extremely bad (because firms have a higher chance of surviving cooperating in the search of new products and markets). During these good and bad periods, competing firms experiment a higher need of cooperation. On the contrary, in intermediate ordinary situations, competition is more powerful than cooperation.

Our findings can also be valuable for regional policy makers trying to promote cooperation among key industries. Efforts to support cooperation should not be driven to a whole industry, but to those players with higher chances of benefiting from cooperation. Firms that are leading their market niches and are more confident in their possibilities of differentiating and protecting their innovation against imitation are the most favorable to take further steps on cooperation. These findings are coherent with previous research (Ritala and Hurmelinna-Laukkanen, 2009). Trying to promote cooperation among follower firms that feel very vulnerable to imitation can be much less effective, since those firms do not buy the need and benefits of cooperation. Regional bodies supporting cooperation should also be aware of its risks, and primarily promote cooperation in activities that are far away from the customer. If public bodies want to support cooperation in activities close to the customer –as the shared sales and after-sale services of worker-cooperatives analyzed in the paper–, prior efforts will have to be done in order to increase mutual trust and commitment, promoting cross holding and equity based alliances, for instance.

Finally, we must be aware of the main limitations of our research, derived from the use of a qualitative study focused on a single industry, as it happens with most previous research on cooperation. Given that our research focuses on the MT industry in Spain, obtained results are at least partly biased towards the characteristics of that industry. Extending this research into other industries, other geographical areas, or into the analysis of cooperation behaviour from other types of entities, - such as family-owned versus public limited companies, as Bouncken et al. 2015 suggest-, can be of interest to contrast and complete the conclusions obtained from this research.

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