Locked-in resources, coopetitive relationship stability and innovation

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Abstract

Purpose – This conceptual paper uses the resource-based theory (RBT) of the firm to argue that for competitors to improve their innovation through a cooperative relationship – coopetitive relationship – they need to work on building a stable relationship with each other by investing a special type of resources, namely locked-in resources.

Design/methodology/approach – The authors draw on RBT criteria to argue that when the antecedent – the locked-in resources – and the mediator – the relationship stability – are valuable, rare, inimitable and organized (VRIO), they will help the parties involved achieve sustained competitive advantage from the coopetitive relationship.

Findings – This paper argues that locked-in resources lead to higher coopetitive relationship stability by reducing the impact of opportunistic behavior from any of the partners. More stable relationship leads to more innovations especially radical innovations. In addition, the nature of the industry plays a moderating role. The industry's competitive intensity affects the relationship between locked-in resources and relationship stability. The industry's age affects the relationship between stability and innovation quantity and type.

Research limitations/implications – This conceptual paper anchors its arguments within the RBT related to the firm's strategic resources (VRIO) characteristics and applies the same arguments (VRIO) beyond the firm level to the coopetitive relationship level. The model invites researchers and practitioners to consider two new constructs namely locked-in resources and coopetitive relationship stability in order to build successful coopetitive relationships.

Practical implications – This paper contributes considerably and in a practical manner to managers as it draws their attention to the importance of investing a special type of resources, namely locked-in resources and ensuring the relationship stability with their coopetitors to achieve the desired outcome. It also draws the managers' attention to the impact industry's competitive intensity and industry's age have on the quality of the relationship and on the innovation outcomes.

Originality/value – A distinct contribution of this conceptual paper is the introduction of two new constructs: locked-in resources and coopetitive relationship stability. Locked-in resources are valuable within the coopetitive relationship and they improve the second construct or relationship stability. Relationship stability is different from relationship strength as it leads to more trust between partners over longer periods of time.

Keywords Coopetition, Locked-in resources, Coopetitive relationship stability, Industry competitive intensity, Industry age, Innovation

Paper type Conceptual paper

1. Introduction

Collaboration between organizations is rising in the business world and is continuing to attract the interest of many researchers. Recently researchers have been intensively studying the paradoxical phenomenon of collaborating with competitors (Bouncken *et al.*, 2015; Fernandez *et al.*, 2019; Köseoğlu *et al.*, 2019), a phenomenon Brandenburger and Nalebuff (1996) named *coopetition*. Coopetitive relationships involve substantial risk, yet they are increasingly becoming a common occurrence in the business world, as concerned parties aim

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to share research and development costs while improving their innovation output. For more than 30 years, more than 50% of alliances have been formed between competitors (Crick and Crick, 2020; Czakon *et al.*, 2020b; Harbison and Pekar, 1998; Kraus *et al.*, 2019).

However, starting a coopetitive relationship to improve a firm's financial or innovation performance raises an additional level of complexity, namely innovation appropriation (Bouncken *et al.*, 2018b) or issues related to ownership of the innovation output. Innovation appropriation becomes an issue when coopetitive parties, who are simultaneously competitors and partners, seek to individually appropriate the jointly created innovation(s) (Gnyawali and Park, 2011; Park *et al.*, 2014, Ritala and Hurmelinna-Laukkanen, 2009), knowing that figuratively speaking the output's DNA was possible due to the fusion of the partners' DNAs. Prior researchers studying coopetition focused on one or more partners in the coopetitive relationship (Bouncken *et al.*, 2018a, 2020; Chiambaretto *et al.*, 2020; Crick, 2018). Concentrating on the players in the coopetitive relationship usually gives rise to questions regarding input, output, balance, etc. (please refer to Table I in Köseoğlu *et al.*, 2019, p. 5) and consequently leads to disputes in this coopetitive relationship. Focusing on the interest of any of the players in a coopetitive partnership leads to suspicion of opportunistic behavior and could jeopardize the future of a noncompetitive partnership (Chaudhry, 2020), let alone a coopetitive partnership (Czakon *et al.*, 2020b). As an example, focusing on friendship rather than what each friend can extract from the friendship may extend the life of this friendship and benefit the friends involved.

Previously cited studies have focused on the *partners* and what these partners can benefit from the arrangement taking the coopetitive relationship as an important resource in achieving innovation for granted (Chai *et al.*, 2020), yet studies that focused on the coopetitive relationship itself are scarce. This paper focuses on the coopetitive *relationship* in and of itself as it becomes important on its own. Many studies In other fields, especially recently, relationships have taken center stage such as customer-firm relationships in marketing (Chuang, 2020), buyer-supplier relationships in noncompetitive agreements (Rungsithong and Meyer, 2020), or workplace relations in academia (Gersick *et al.*, 2000), amongst others, hence our focus on the relationship as our unit of study. For a coopetitive relationship to be successful it should become independent from the players, that is, it should take a life of its own while creating rents to benefit all the players. While independent, these coopetitive relationships demand high levels of involvement to maintain stability and extract value. By shifting the focus to the *relationship* itself rather than the *partners* in the relationship, this paper builds on and extends the resource-based theory (RBT) – by considering the *relationship* among the partners as the valuable, rare, inimitable and exploitable resource – to explain the process from resources investment to innovation performance.

Bouncken *et al.* (2015, p. 591) define coopetition as "*a strategic and dynamic process in which economic actors jointly create value through cooperative interaction, while they simultaneously compete to capture part of that value*". This paper attempts to explain the dynamics of coopetitive interaction and to provide a theoretical answer to the following research questions: (1) What are the essential components of a sustainable coopetitive relationship and (2) how would a coopetitive relationship lead to expected innovation performance and (3) under which boundary conditions? The answers to these questions provide a theoretical framework that helps in starting the discussion about the antecedents and mediators to create successful coopetitive relationships in the design and formation stages, answering a recent call by Czakon *et al.* (2020b).

The remainder of the paper is organized as follows. The next section reviews the existing literature on coopetitive behavior and its implication on company's innovation outcome. In this section, we also explain the rationale behind using the RBT of the firm to build our theoretical framework. The third section presents the theoretical framework that aims at answering the research questions raised earlier, namely the suggestion of locked-in resources as a necessary

ingredient in building sustainable coopetitive relationships and discusses the boundary conditions imposed by the industry competitive intensity and industry age on the proposed relationships. The last section details the theoretical and managerial contributions of the paper.

2. Theoretical implications of the rise of coopetitive behavior

Recently, the research interest in coopetition has increased rapidly as coopetition became an integral part of many companies' daily agendas (Bengtsson and Kock, 2014). Cassiman *et al.* (2009) argue that, in today's world, the largest and most technologically self-sufficient organizations require knowledge from beyond their boundaries to improve their innovation capability (Kumar and Dutta, 2017). Sony worked with Samsung to develop their TV screen (Gnyawali and Park, 2011). Air France and Delta Airlines together offer more flights and more destinations at more competitive prices (Chiambaretto and Fernandez, 2016). These are few of many other coopetitive relationships that can improve the outcome(s) for coopetitive parties (cf. Fernandez *et al.*, 2019). Perhaps with the pace of innovation, customers' expectations are becoming higher, putting companies more than ever under the pressure to innovate not imitate. Even Apple, once known to be the innovator in the mobile phone industry is perceived to be falling behind on the innovation promise. Amongst others, Shelly Palmer, CEO of The Palmer Group, and loyal customer to iPhone, accused Apple, with its new iPhone X, of imitating Samsung phones (Palmer, 2017).

Following current conceptual papers (Chaudhry, 2020; Ng, 2020), we draw on the literature relevant to our constructs and arguments. In what follows, we concentrate on the concepts relevant to our study rather than provide a literature review, systematic or otherwise, of coopetition, RBT, or the innovation fields. For a recent review on coopetition please refer to Czakon *et al.* (2020a).

2.1 Coopetition and innovation

Chesbrough (2006) suggested that the way firms are innovating and bringing new ideas to market is undergoing fundamental changes and that the world is witnessing a "paradigm shift." The old paradigm, "closed innovation", favors control and firms that are strongly self-reliant. Firms take measures to guard their intellectual property to prevent their competitors from accessing their novel ideas. Under the new paradigm, "open innovation", firms use internal and external ideas and paths to market in order to advance their technology. Though adopting open innovation necessitates changes at the heart of the organization (Deslée and Ammar, 2016), this paradigm is gaining traction because firms can no longer bear the cost of all the required tangible or intangible resources needed for innovation (Secundo *et al.*, 2019), not even universities (Yeo, 2018). For example, in 1999, Procter and Gamble decided to change its approach to innovation. The firm extended its internal R&D to the outside world through an initiative they called "Connect and Develop" (Chesbrough, 2006).

The exponentially growing R&D budgets force firms to pool their research, making innovation one of the most studied contexts of coopetition (Bouncken *et al.*, 2018b). Innovation and technological breakthroughs result from complex processes in which the contributions of various individual parties build upon each other rather than from firm specific creations (Bougrain and Haudeville, 2002). Coopetition helps firms in high-tech industries to share R&D costs and benefit from economies of scale (Miotti and Sachwald, 2003), use synergistic effects through the pooling of resources (Mariani, 2009), look for complementary resources (Ancarani and Costabile, 2010) and increase tacit knowledge transfer leading to higher innovation capability (Kumar and Dutta, 2017). However, the absence of governing rules to decrease counterproductive behaviors such as opportunism in non-competing relationships can be costly (Chaudhry, 2020) and more so in coopetitive relationships (Biondi and Giannoccolo, 2012; Yan *et al.*, 2020). These counterproductive behaviors create the risk of technology leakage, may lead to the firm's loss of control over its strategic resources (human,

knowledge, etc.) (Yan *et al.*, 2020) and add management challenges unique to coopetitive relationships (Gnyawali and Park, 2009).

2.2 The coopetitive relationship as the level of analysis

Despite the risks attached to entering in a coopetitive relationship, managers make this strategic decision consciously and intentionally in order to create win-win outcomes for all parties involved (Czakon *et al.*, 2020a). According to the up-to-date reviews (Czakon *et al.*, 2020a, b; Devece *et al.*, 2019), numerous theories have been used to study the relationship between coopetition and innovation including but not limited to game theory, transaction costs economics and RBT. In this paper, we concentrate on the relationship itself as a resource, rather than the transaction involved in the partnership. Though our paper studies the coopetitive relationship, which includes a social component, we consider the relationship as a resource rather than as a social component. We focus on the resources namely the locked-in resources and the coopetitive relationship stability. Hence, we chose to follow previous studies and use the RBT, rather than the social exchange theory, to study the impact of resources on the success of the coopetitive activities (Crick, 2018; Lavie, 2006; Rusko *et al.*, 2013; Zakrzewska-Bielawska, 2013). We use RBT to argue for the conditions under which these resources can provide a sustainable competitive advantage for the coopeting parties.

Barney (1991) developed a comprehensive theory, widely known as the resource-based theory or RBT, to identify the firm's resource characteristics needed to generate sustainable competitive advantage or to allow the firm to outperform its competitors. Sustainable competitive advantage is achieved when resources are *valuable*, *rare* and *inimitable*, and the firm is *organized* to capture value from these resources, hereafter referred to as the VRIO framework (Barney, 2002).

RBT's traditional assumptions are in favor of strategic asset idiosyncrasy and resource immobility, hence RBT confirms that value-creating resources are owned and controlled by the focal firm (Amit and Schoemaker, 1993). However, this is not necessarily the case for interfirm alliances, in which control and mobility factors change. Lavie (2006) introduces the concept of shared resources and argues that the competitive advantage of a focal firm participating in an alliance includes four elements: (1) internal rent resulting from the focal firm's resources; (2) appropriated relational rent resulting from the shared resources; (3) inbound spillover rent resulting from the partner's resources and (4) outbound spillover rent resulting from the focal firm's own resources.

The proposed model by Lavie (2006) incorporates the notion of network resources that play a role not only in the evolution of alliance networks but also in shaping the competitive advantage of interconnected firms. However, in Lavie's model, firms with higher levels of control extract higher rents, a concept that is in a way more aligned with transaction cost economics than with RBT.

2.3 Locked-in resources

According to RBT, strategic resources help the firm gain and sustain competitive advantage in its industry (Barney, 1991, 2002) and enable it to leverage its investments in order to improve its effectiveness (Chatzoglou *et al.*, 2018). Strategic resources shared between interconnected firms can help both firms or either firm achieve and maintain competitive advantage against competitor(s) (Lavie, 2006; Zhao, 2014). However, the concept of shared resources in the extant literature is not very clear. The assumption is that shared resources are the property of one of the firms and available for the use of both firms to produce rents for both (Lavie, 2006; Madhok, 2006).

Lavie (2006) argues that firms build isolating mechanisms to protect their non-shared resources from others in the alliance. He suggests, within the relationship, firms with stronger

opportunistic behavior, bargaining power, absorptive capacity and isolating mechanisms benefit the most from the other firms' shared and non-shared resources. This proposition becomes more salient in coopetitive relationships than in other types of alliances.

This paper introduces the concept of locked-in resources. One of the definitions of "locked-in" in the Oxford English Dictionary that is relevant to the current conceptualization is "to join (two or more things) by interlocking or by fitting of parts firmly together." Hence, locked-in resources are not just shared, they are locked-in together and their value comes from their interlocking. The defining characteristics of locked-in resources are the following: (1) they belong to the coopetitive relationship rather than to any of the partners in the relationship; (2) they are initially invested when the coopetitive relationship is created and may be increased over time and (3) once invested, these resources are more valuable in the coopetitive relationship than to any of the individual partners (Rusko *et al.*, 2013).

Because the locked-in resources invested in the coopetitive relationship are interlocked, they become rare, valuable to the relationship, difficult to imitate and beneficial to the relationship. By extrapolation, any threat to the locked-in resources' strategic characteristics is a threat to the competitive advantage of the coopetitive relationship and ultimately to all partners involved in the coopetitive relationship. The concept of locked-in resources serves the purpose of this paper better than the concept of shared resources. The concept of locked-in resources helps reduce the potential benefits any partner in the coopetitive relationship tries to extract at the expense of the other partners irrespective of the strength of this partner's opportunistic behavior, bargaining power, absorptive capacity and isolating mechanisms. Table 1 provides an illustrative example comparing two coopetitive relationships, namely Renault and Nissan [1] on one hand and Hero and Honda on the other hand, to show the difference between what we consider locked-in resources versus what the extant literature considers shared resources.

2.4 Coopetitive relationship stability

Despite the established link between interorganizational relationships and profits, more than half of these relationships fail (Prashant and Harbir, 2009). Hosseini *et al.* (2017) found that, while academic open innovation experts ranked the importance of relationship management between two parties relatively high (4.5/6), industry open innovation experts ranked it much higher (5.8/6). Kumar and Dutta (2017) found that coopetitive relationship strength improved innovation capability through improving tacit knowledge transfer. Similarly, Bacon *et al.* (2020) found that explicit knowledge transfer, learning intent and tie strength fostered by trust are necessary conditions for the success of coopetitive partnerships. We argue that while strength is a necessary condition for the success of coopetitive relationship, it is not sufficient. The relationship needs to be stable as well. If we use the analogy from orthopedic studies, strong muscles achieve performance, but for muscles to sustainably achieve high performance, they need also stability (Gibbons and Comerford, 2001a, b). Therefore, stability in the relationship becomes an important requirement to achieve sustained benefits from interorganizational cooperation (Weitz and Jap, 1995). Stability has been defined in terms of time, such as longer relationships mean more stable relationships (Lai *et al.*, 2005), and in terms of attitude toward the relationship, in which active involvement of partners lead to a more stable relationship (Leana and Barry, 2000).

According to Gulati *et al.* (2012), interorganizational relationships survive, if they are well coordinated and yield cooperation benefits to the parties involved. Risks to relationship stability arise from failures in either coordination and/or cooperation. Inaccurate planning of activities and timelines, misallocation of resources and unclear feedback guidelines represent failures in the coordination processes and may result in partners' frustrations and loss of belief in the benefits of the relationship. Dissatisfactions in the cooperation perspective, when one of the partners perceives unjust distribution of input to output ratio between the partners

Renault-nissan (Locked-In resources)		Hero-honda motors Ltd. (shared resources)	
Information	Comments	Information	Comments
Agreement (1) "Renault-Nissan B.V. (Besloten vennootschap is a closed limited liability company under Dutch law), the common strategic management structure of the Renault-Nissan group, was founded on March 28, 2002. Incorporated under Dutch law, Renault-Nissan B.V. is equally owned by Renault and Nissan. Renault-Nissan B.V. is the registered office of the Alliance Board, which meets regularly in Paris and Tokyo." (Nissan Motor Company, 2003) (2) *One* manufacturing, *one* purchasing, *one* R&D departments *servicing both companies*. (Ramsey, 2012)	The aspect of unity can be clearly seen; Renault-Nissan BV (the coopetitive relationship) took over the name of either players alone. Both players locked-in their resources together in the relationship to serve both players	*Agreement* (1) "Both partners held 26% of the equity with another 26% sold to the public and the rest held by financial institutions (2) Honda had four key appointees including the joint Managing Director, a particularly powerful position in Indian companies (3) The Hero group was represented by four family members and appointed the chairman of the company. Honda brought in its staff of technical experts to run the engineering and quality support functions. Hero brought in local talent to manage all other functions including marketing, finance, and HR". (Ramaswamy and Sankhe, 2003, pp. 4–5)	What both companies offered to the relationship are shared resources. These resources remained for each partner, but the partners shared them for this relationship
Purpose The main purpose of the alliance (in this case, the coopetitive relationship) is to increase economies of scale for both companies while each company keeps its independent identity (Szalbo White, 2013)	Common goal while respecting the individuality of each company This sounds more like a long-term partnership	*Purpose* "Honda agreed to provide technical know-how to HHM and assist in setting up manufacturing facilities. This included providing the design specifications and responsibility for future R&D efforts relating to the product lines that the company would offer. For these services, HHM agreed to pay Honda a lump-sum fee of $500,000 and a 4% royalty on the net ex-factory sale price of the product." (Ramaswamy and Sankhe, 2003, p. 4)	Moreover, some of the shared resources of one partner (Honda) are paid for by the other partner This sounds more like a short-term transaction

Table 1.
Examples of locked-in resources versus shared resources

(Gulati *et al.*, 1994), threaten the stability of the relationship. The partners perceiving the injustice may decide to reduce their contributions to the relationship leading eventually to the failure of the relationship (see description of the relationship between Honda and Hero in Table 2).

Renault-nissan (coopetitive relationship stability)		Hero-honda (coopetitive relationship instability)	
Information	Comments	Information	Comments
Renault benefited from manufacturing and purchasing efficiency, while Nissan, for its part, identified cost management and factory ergonomics as areas where it could learn from Renault. Nissan had adopted Renault's cost-management system and it had become a part of Nissan's annual budgetary system. (Yoshino and Fagan, 2003, p. 10)	While still separate, the partners are integrating each other's strengths into their own separate practices	"The rising differences between the two partners gradually emerged as an irritant Differences had been brewing for a few years. Honda's reluctance to fully and freely share technology with Hero (despite a 10-years technology tie-up that expires in 2014) The Indian partner's uneasiness over high royalty payouts to the Japanese company The refusal of Hero-Honda (mainly managed by the Munjal family) to merge the company's spare parts business with Honda's new fully owned subsidiary Honda Motorcycle and Scooter India (HMSI) Hero bought Honda's share." (ET Autolytics, 2011)	The partners perceived injustice, namely Hero, and decided to reduce their contributions to the relationship leading eventually to ending the relationship and Hero buying Honda out in India

Table 2.
Examples of coopetitive relationship stability and instability

Coopetitive relationship *stability* becomes in itself a strategic resource to the coopetitive relationship. Stability of any alliance relationship is difficult to maintain (Inkpen and Beamish, 1997), and it is more difficult in a coopetitive relationship, which makes it a valuable, rare and difficult to imitate resource. Partners involved in the relationship may utilize the stability of this coopetitive relationship to benefit and improve their innovation performance.

3. The conceptual model

This paper builds on the previous literature review discussions to argue that for a coopetitive relationship to be successful, whether in the short and/or long term, none of the parties should be able to extract more than their fair share from the relationship (Figure 1).

3.1 Locked-in resources and coopetitive relationship stability

Many scholars have studied the antecedents that lead to a strong relationship including but not limited to trust (Bacon *et al.*, 2020; Bouncken *et al.*, 2016), we focus in this paper on relationship stability. For a coopetitive relationship to be stable it needs to satisfy two conditions: active engagement in the relationship (Leana and Barry, 2000) and durability of the relationship (Lai *et al.*, 2005). Madhok (2006) argues that the social component (engagement in the relationship) or structural component (durability) taken separately are necessary but not sufficient conditions to build a stable interfirm relationship.

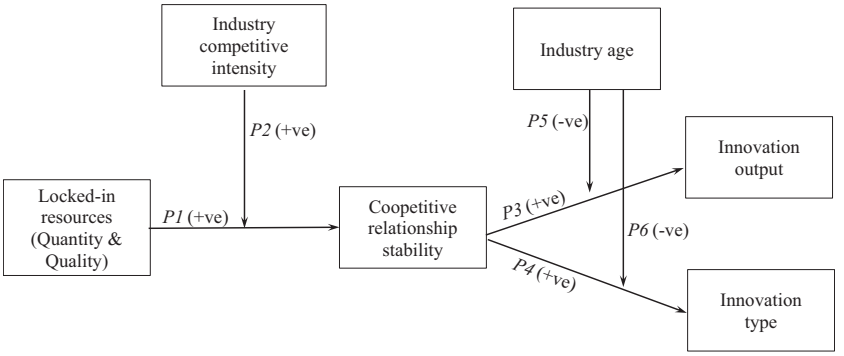

Figure 1. Coopetition and innovation conceptual model

These components should be taken together to ensure a sustained stable interfirm relationship. For a partner to invest its private strategic resources in the locked-in resources of the coopetitive relationship, this partner is signaling two things: its structural fit (i.e. structural component) with and its trust (i.e. social component) in the relationship. Increased investments in locked-in resources such as information technology may reverse a firm's profitability from negative to positive, hence improving the performance of the coopetitive relationship (Estrada and Dong, 2020; Zakrzewska-Bielawska, 2013), however, if the partners' are not organized to take advantage of these investments, more resources may lead to more competitive than cooperative activities (Zakrzewska-Bielawska, 2013). Referring again to the Renault-Nissan versus Honda–Hero coopetitive relationships, Table 2 shows how the nature of the locked-in resources might have affected the stability of these relationships.

The weak nature of the locked-in resources invested in the Honda–Hero relationship allowed problems and lack of trust between the two parties to affect the stability of the relationship and destroy the coopetition. On the other hand, the arrest of Carlos Ghosn, the head of the Renault-Nissan alliance, on November 2018 left the analysts questioning the future of this alliance (Hope, 2018; Inoue and Ma, 2018). Some analysts were pessimistic about the future of the alliance (Levin, 2018; Zhang, 2018). Whereas others remained optimistic about the future of the alliance because "companies will likely try to maintain their current relationships since they cannot afford to scrap established joint cost reductions and development initiatives amid rising competition" (Nagata, 2018). As time passed and analysts looked at the locked-in resources between the two companies, the discourse in the business news outlets turned into optimistic. The survival and growth of the alliance is in the best interest of both players (Fickling, 2019; Nussey and Shiraki, 2019; Tajitsu *et al.*, 2019; Tsang, 2019) and delivers win-win results for both companies (Szymkowski, 2020).

While locked-in resources may be valuable, rare and inimitable (VRI), for both partners and the coopetitive relationship, both partners need to be actively involved in managing the resources and the relationship (O) to benefit from these strategic locked-in resources. Therefore, the act of investing locked-in resources in a coopetitive relationship contributes to both conditions of coopetitive relationship stability: active involvement and durability. Hence, proposition 1 provides an answer to our first research question as follows:

P1. The higher the quantity and the quality of locked-in resources invested by the coopetitors, the stronger will be the coopetitive relationship stability.

3.2 Industry competitive intensity as a moderator

Industry competitive intensity is likely to affect the positive impact of locked-in resources on coopetitive relationship stability. There are two dimensions for an industry's competitive

intensity, one related to the market for outputs or products and one related to the market for inputs or resources. First, the higher the number of firms offering similar products to the same/similar consumers, the higher the competitive intensity of this industry (Baum and Korn, 1996). Second, the higher the number of firms requiring similar input materials from the same/similar suppliers, the higher the competitive intensity of this industry (Russo, 2003).

A high level of industry competitive intensity may be harmful to individual firms' performance (Porter, 1980). Ritala (2012) argues for two competing sets of hypotheses. First, the author argues that coopetition alignment is more beneficial to a firm's innovation and market performance under conditions of low competition intensity. Then the author argues for the opposite, where coopetition alignment is more beneficial to a firm's innovation and market performance under conditions of high competition intensity. The data of this research provide support to the first set of hypotheses, i.e. under conditions of low competition intensity. Ritala (2012) concludes that, in line with prior research, in a highly competitive industry, coopetition may be more challenging.

While this finding may be relevant in a specific context where individual companies are competing for resources and markets in a specific country, competing globally may change this game (Arslanagic-Kalajdzic *et al.*, 2017). With lower communication and transportation costs and with greater breakthroughs in technology, companies are increasingly competing globally (Stiglitz, 2002). Partners in global coopetitive relationships, though competing among each other, are also competing for resources and markets against domestic firms relatively established in their industries in host countries.

Ford and General Motors (as presented in Sedgwick, 1997), when faced with the highly competitive automotive industry in China, they joined forces. To have a better chance competing with well-established competitors in the Chinese market, such as Toyota and Honda, Ford and General Motors collaborated, sharing both their suppliers and distributors in this market. In line with Ford and General Motors example, Yu *et al.* (2013) show empirical evidence that the higher the industry competitive intensity in a host country, the stronger the impact of the partners' competitive intensity on the likelihood of engaging in a coopetitive relationship.

Along the same lines, Perks and Easton (2000) and Meng and Layton (2011) argue that there will be less tension among coopetitors when they compete together against third parties (e.g. new entrants to the industry). In highly competitive industries, established firms have an advantage in access to markets and suppliers. It is in the best interest of coopetitive partners to face together the common threat coming from established firms (Kraus *et al.*, 2019). In fact, according to analysts, the intensity of rivalry in the automotive industry is currently strengthening the impact of locked-in resources on the stability of the alliances between competing companies (Tsang, 2019). Therefore, a partial answer to research question 3 is:

P2. Industry competitive intensity positively moderates the relationship between locked-in resources and coopetitive relationship stability; such that, as industry competitive intensity increases, the positive relationship between locked-in resources and coopetitive relationship stability strengthens.

3.3 Coopetitive relationship stability and innovation output/innovation type

As mentioned above, coopetitive relationship stability refers to the level of durability (Lai *et al.*, 2005) and engagement (Leana and Barry, 2000) in the relationship between the cooperating competitors. This paper argues that in addition to coopetitive relationship strength (Kumar and Dutta, 2017), coopetitive relationship stability is necessary to sustain higher firm innovation level. An unstable coopetitive relationship leads typically to a suboptimal joint innovation performance (Park *et al.*, 2014).

The literature suggests that coopetition may lead to innovation for several reasons. First, compared to collaboration between non-competitors, coopetition facilitates the creation of more new products (Quintana-Garcia and Benavides-Velasco, 2004; Tether, 2002) because it enables the use of joint market and technological knowledge (Kumar and Dutta, 2017), or competitive intelligence (Chevallier *et al.*, 2016), leading to more effective innovation generation and diffusion (Ritala and Hurmelinna-Laukkanen, 2009). Second, from an RBT perspective, the resources and capabilities of competitors are more likely to be directly relevant to the objective of innovation than those of non-competitors because competitors confront common challenges and have a better understanding of the industry. Third, coopetition drives innovation because firms' converging targets (Le Roy and Czakon, 2016) allow for increased resource complementarity and effective combination of market specific or industry-specific knowledge and market power (Bouncken *et al.*, 2018a; Gnyawali and Park, 2011).

This paper argues that a coopetitive relationship's stability is very important in facilitating innovation for the following reasons. First, from an RBT perspective, coopetition itself is not necessarily a VRIO resource, as it may be neither rare nor costly to imitate. Whereas a coopetitive relationship's stability is more a VRIO resource that has the potential to give a firm or a partnership among firms a competitive advantage that can become sustainable if the partners succeed in maintaining this relationship stability. Coopetitive relationship stability is valuable because it improves the partnership's innovation performance and value creation and the partnership's ability to face problems that arise during the life of the relationship. It is rare because it is challenging to maintain and thus fewer firms or partnerships are endowed with such a resource. Orientation to cooperation (Crick, 2018), trust and experience in coopetitive behaviors are necessary to maintain a successful stability (Czakon *et al.*, 2020a). It is costly to imitate because it requires time, effort, money and patience to be developed and maintained. The partners need to be organized to capture the value of this coopetitive relationship's stability, since if they do not have the necessary policies, structures and procedures, they will most likely be unable to maintain this relationship stability. Their top management team members' knowledge and experience are necessary to build coopetition ability (Bengtsson *et al.*, 2020) necessary to maintain the relationship stability.

Second, coopetitive relationship stability gives competing partners the time and capabilities to develop more innovations and to develop more radical, versus incremental, ones. As firms with stable coopetitive relationships would have achieved this stability by (1) locking-in resources; (2) developing capabilities for identifying potential sensitive and conflicting situations among them before they arise, reducing the occurrences of such situations and skillfully handling them when they arise and (3) identifying managers who can handle the tensions arising from the coopetitive paradoxical relationships. Stability allows firms to spend more of their time and capabilities on developing innovations, whereas firms in unstable coopetitive relationships would end up spending more of their time and capabilities on resolving coopetitive conflicts (Biondi and Giannoccolo, 2012).

Third, a coopetitive relationship's stability suggests the following. It suggests long-term access to complementary resources and capabilities of competitors (Pellegrin-Boucher *et al.*, 2013). It also proposes long-term access to diverse knowledge from competitors and other actors in these competitors' networks (Bouncken *et al.*, 2018a). In addition, it suggests a long-term capability to manage coopetition (Biondi and Giannoccolo, 2012) and its multilevel tensions (Le Roy and Czakon, 2016). These long-term characteristics of coopetitive relationship stability increase the opportunities to combine, discover and create new knowledge that may lead to more innovations (Bouncken *et al.*, 2018a).

P3. The stronger the coopetitive relationship stability, the higher will be the innovation output.

Moreover, coopetitive relationship stability leads to more radical, versus incremental, innovations for the following reasons. Radical innovations typically involve a major departure from existing technologies and products, whereas incremental innovations generally entail small changes to an existing product concept or technology (Bouncken *et al.*, 2018a). Previous research suggests that coopetition, as a particular type of R&D relationship and knowledge source, helps firms to generate both incremental and radical innovations (Ritala, 2012). However, coopeting for radical innovation creates more ambiguities, market uncertainties and investment requirements than coopeting for incremental innovation (Bouncken *et al.*, 2018a). Firms with stable coopetitive relationships are more likely to manage these ambiguities, uncertainties and requirements than are their counterparts with unstable coopetitive relationships. Thus, although firms with unstable coopetitive relationships may be able to facilitate incremental innovations, firms would need stable coopetitive relationships to deal with the usually greater challenges required for radical innovations.

P4. The stronger the coopetitive relationship stability, the more radical (versus incremental) will be the innovation type.

Propositions 3 and 4 provide a theoretical answer to our second research question.

3.4 Industry age as a moderator

Industry age refers to the length of time since an industry's emergence. An industry's age may reflect an industry's stage in the industry life cycle (ILC) theory (Jovanovic and MacDonald, 1994; Klepper, 1996). The ILC theory argues that as an industry evolves over time it tends to follow five stages: introduction, growth, shakeout, maturity and decline (Peltoniemi, 2011).

This paper argues that industry age moderates the relationship between coopetitive relationship stability and innovation output and type (radical versus incremental). As an industry's age increases, the industry moves from the earlier introduction and growth stages to the later shakeout, maturity and decline stages (Peltoniemi, 2011). A bigger number of competitors with greater diversity of innovations characterizes the early introduction and growth stages as opposed to the later shakeout, maturity and decline stages. During early stages the industry tends to attract (1) a bigger number of entrants seeking new opportunities than in later stages, (2) entrants that are more R&D, skill and labor intensive than their counterparts in later ILC stages and (3) entrants with innovative product designs that are competing for market dominance (Peltoniemi, 2011).

A bigger number of competitors with more radical innovations characterizes the early introduction and growth stages. Whereas a smaller number of larger-sized competitors with more incremental innovations characterizes the later shakeout, maturity and decline stages. As an industry moves from its early stages to its later stages, a dominant design and an industry standard start to emerge fostering industry consolidation and decreasing the number, while increasing the size, of firms in the industry. It also shifts emphasis from predominantly radical product innovation toward process and production development and management, on one hand, and R&D programs aimed at planned incremental improvements, on the other hand, giving competitive advantage to the larger incumbent firms. This seems to make radical innovations by incumbents from within an industry less likely to happen as it destroys the value of their established resources, capabilities and competencies (Peltoniemi, 2011).

The above analysis of the evolution of an industry's structure and innovation over the ILC applies whether the industry participants are independent competing firms or partnering coopeting firms and whether the relationships between the coopeting firms are stable or unstable. Regardless of the industry's participants' organizations' form or stability, an

industry's age, the second boundary condition, will affect the competitive structure of the organizations within an industry and the innovation output and type.

P5. Industry age negatively moderates the relationship between coopetitive relationship stability and innovation output; such that, as industry age increases, the positive relationship between coopetitive relationship stability and innovation output weakens.

P6. Industry age negatively moderates the relationship between coopetitive relationship stability and innovation type; such that, as industry age increases, coopetitive relationship stability will lead to fewer radical innovations and more incremental innovations.

4. Discussion and contributions

Coopetitive relationship studies usually focus on the partners or the partners' benefits. Even when linking coopetition to innovation, researchers have usually focused on which partner will benefit more from the highest level of innovation performance or innovation appropriation (Czakon *et al.*, 2020b; Lavie, 2006). Focusing on partners' separate benefits resulted in questions mainly regarding the relationship stability including durability and continuity. While interorganizational relationships and namely noncompetitive relationships have been thoroughly studied (Chaudhry, 2020), few researchers have started studying the characteristics of the coopetitive relationship as distinct from the noncompetitive relationship (Bacon *et al.*, 2020). The coopetitive relationship by itself is an important unit of analysis and the next step in coopetition theory development must concentrate on this relationship as an independent unit of analysis with its own inputs and outputs in addition to understanding the relationship characteristics.

4.1 Theoretical contributions

Prior research on coopetition has suggested that a properly governed coopetitive relationship (Bouncken *et al.*, 2016) based on trust rather than formal contracts (Poppo *et al.*, 2008) reduces tensions which feed firms' competitive behavior (Chen *et al.*, 2007; Park *et al.*, 2014). Yet, very few studies paid attention to the coopetitive relationship itself and the characteristics that differentiate it from noncompetitive relationship (Bacon *et al.*, 2020). This paper describes the coopetitive relationship as an independent unit taking into consideration the relationship not the partners (equivalent to studying friendship rather than friends). The paper treats the relationship as a resource and applies to it the RBT returning to Barney's (1991) original foundations where strategic VRIO resources lead to sustainable competitive advantage. In this case, locked-in resources and coopetitive relationship stability are the strategic resources that lead to higher innovation output and innovations that are more radical. By applying RBT to the relationship level rather than to the firm level, this paper explains why some coopetitive relationships succeed while others fail.

Second, this paper shifts the focus from the partners' resources, shared and non-shared, to the coopetitive relationship's resources. It develops the new concept of locked-in resources and differentiates it from shared resources. The main concern of certain partners' self-interest ruining the coopetitive relationship, as highlighted by Biondi and Giannoccolo (2012), becomes less dominant when the partners invest in locked-in resources instead of shared resources. Locked-in resources are the strategic resources of the coopetitive relationship (Rusko *et al.*, 2013); their value diminishes outside this coopetitive relationship.

This paper sheds the light on the concept of stability in coopetitive relationships. While previous research supports the arguments about the impact of coopetitive relationships on innovation and the importance of trust (Bacon *et al.*, 2020; Poppo *et al.*, 2008) to build strong ties,

in this paper the focus is on the coopetitive relationship's stability as a front and center construct. The paper argues that locked-in resources improve the coopetitive relationship's stability rather than directly affect the innovation output or type. It is the relationship's stability, now a strategic resource specific to the relationship, which leads to the desired innovation output and type. It complements the concept of coopetitive relationship strength (Bacon *et al.*, 2020; Kumar and Dutta, 2017) and argues that strength may lead to a temporary competitive advantage but stability helps strength achieve a sustainable competitive advantage through more innovation output and more radical innovations than strength alone.

Fourth, this paper explains the importance of industry competitive intensity as a moderator between locked-in resources and coopetitive relationship stability. Interorganizational relationships do not exist in a vacuum. Industry competitive intensity strengthens the impact of locked-in resources on coopetitive relationship stability. It also explains how industry age affects the impact of coopetitive relationship stability on innovation output and type. While previous research argues that coopetitive relationships lead to incremental innovation (Bouncken *et al.*, 2018a), this paper argues that this is dependent on the industry age. The introduction of industry age in the framework provides richer insights into the expected type and quantity of innovation resulting from a coopetitive relationship.

4.2 Managerial implications

This model also has practical implications for managers seeking to establish coopetitive relationships with their competitors. This paper provides practical advice on how to build stable and beneficial coopetitive relationships. First, we advise managers intending to go into a coopetitive relationship to practice a paradigm shift, that is to shift their concentration to the relationship itself (the friendship) not the partners involved (the friends). Discussions should be about what is in the best interest of the relationship, namely investing in locked-in resources rather than in shared resources. Shared resources may give rise to opportunistic behavior, where one partner wants to protect their resources or take advantage of the other partner's resources. Both cases lead to the rise of suspicion of opportunistic behavior which detrimental to the coopetitive relationship (Czakon *et al.*, 2020b), Partners are encouraged to develop locked-in resources that are beneficial only in the context of the coopetitive relationship and try to feed these resources to preserve the relationship stability. Most relationships, interorganizational or otherwise, have their difficulties. Strong relationships overcome challenges, but if their strength fades, they lose their advantage, hence our model advises partners to focus on relationship stability in addition to strength, which requires time, effort and resources invested to build it.

"Expectation is the root of all heartache" a saying attributed to Shakespeare. Whether true or not, we believe that if managers' expectations from the coopetitive relationship are not realistic, they will be deceived and might hasten into ending a good relationship. Managers are advised to adjust their expectations from the coopetitive relationship's innovation quantity and type based on their industry's competitive intensity level and age. Managing expectations will help managers overcome many coopetitive relationship challenges and thus significantly improve the stability and outcomes of their coopetitive relationships.

4.3 Directions for future research

We hope our model will encourage researchers to test it empirically. It can be examined in any industry where coopetitive relationships are abundant such as in the automobile industry as highlighted in the examples used in the paper, or in the information technology sector characterized by high R&D costs and a race to provide innovative outputs. The mobile phone, airline (Klein *et al.*, 2020) and biotechnology (Anand *et al.*, 2009) industries also can be examined since many companies collaborate in certain aspects and compete in others.

To test the model, we propose two-steps approach. Because this model proposes two new constructs, namely locked-in resources and coopetitive relationship stability, we propose the first empirical test to be explorative. Interviews with managers from partners involved can be conducted and get their personal evaluation of the kind of resources each partner invested and rank their compliance with the characteristics specified earlier for the locked-in resources. Researchers can also ask the managers to assess the strength and stability of the relationship and ask for the variables they consider important and then compare them to measures used in other studies of strength (Bacon *et al.*, 2020) and stability (Lai *et al.*, 2005; Leana and Barry, 2000). Researchers also can inquire about the managers' assessment of the industry competitive intensity, industry age and the level of innovation output and type and then compare these to quantitative measures used in previous studies. Once we create measures for all the variables, we can follow prior research in coopetition and test the theoretical arguments utilizing longitudinal data sets (Chiambaretto and Fernandez, 2016; Klein *et al.*, 2020).

5. Conclusion

This paper advances a model that highlights the importance of the coopetitive relationship stability as a mediator between the resources invested and the expected innovation quantity and type. Our study complements existing research on interorganizational relationships in general (Chaudhry, 2020) and coopetitive relationships in specific (Bacon *et al.*, 2020; Yami *et al.*, 2010; Zacharia *et al.*, 2019). The study also includes the possible impact of the industry competitive intensity on the relationship between resources and stability and industry age on the relationship between stability and innovation output and type. We hope this paper opens up possibilities for empirical research to improve our measurement for locked-in resources and coopetitive relationship stability.

Note

1. The choice of the relationships between Renault and Nissan, as an example of a strong coopetitive relationship on one hand and between Hero and Honda, as an example of a weak coopetitive relationship on the other hand, was made on August 2017 after reviewing several coopetitive alliances. Hence, the choice of the Renault and Nissan relationship was made before the currently ongoing concerns regarding Carlos Ghosn, the former CEO of Renault-Nissan. We have been monitoring the impact of this crisis on the Renault and Nissan relationship and we believe that due to the nature of the resources locked-in the relationship, the relationship is not only holding, it is improving. It will be interesting to keep following this example as it unfolds.

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