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Drivers of Coopetition in the Plastic and Composites Material Industry

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Abstract

In this research, we explore which activities may be subject to coopetition in the plastic and composites industry. We also compared the main antecedents, outcomes, and moderators of coopetition in the plastic and composites industry with those identified in existing literature. Results indicate that the respondents have a desire for coopetition, but for activities not close to the customer (sales, after-sales service, customer information). On the other hand, respondents are in favor of collaborations for sharing (1) costs of shipping and/or importing raw materials, (2) information on other competitors, (3) technical expertise on non-exclusive products, and (4) information that could have an impact on the partner. In terms of antecedents, we found that there are positive elements that favor the creation of coopetition. However, certain elements at the relational level obstruct the formation of coopetition, such as (1) reciprocity, (2) fairness, (3) integrity, and (4) keeping promises.

Keywords: coopetition, collaboration, drivers, SMEs, plastic and composite industry

1. Introduction

In various countries, small and medium-sized enterprises (SMEs) exert a considerable effect on the economy (Agostini & Nosella, 2018). However, SMEs are generally characterized by limited resources, and they face significant challenges (Agostini & Nosella, 2018; Zahoor & Tabbaa, 2020) especially in the plastic and composites industry. These challenges reduce their development and endanger them in the face of increased competition. To counter these challenges, coopetition is becoming a strategic option for SMEs (Kraus et al., 2019), especially for the plastic and composites sector. In Canada, the plastic and composites industry market today is around 25.5 billion Canadian, on the other hand, it was 24.7 billion dollars in 2017. Although this market is increasing (growth of 3.5% between 2017 and 2018), it represents less than 5% of the global market. According to Statistics Canada, in 2019 Canada exported approximately C $ 11.4 billion and imported approximately C $ 13.1 billion. In addition, in 2020 there were 2,569 companies, 85.5% of them with 0 to 99 employees. The average turnover of a company is 1.1 million Canadian dollars. However, despite its progress in Canada, the plastics and composites industry is facing several challenges, including the seasonality of some markets (e.g., toys) and notably foreign competition. To set themselves apart from Asian price-based competition, companies in this sector are using coopetition to reduce costs and manufacturing complex custom products.

Coopetition is the simultaneous cooperation and competition between two or more actors (Crick, 2019) to create and appropriate the most value. Specifically, coopetition entails competition in some activities and simultaneous cooperation in others between two or more actors. Scholars have posited that coopetition has various benefits for companies, including competitive success (e.g., Bouncken & Fredrich, 2012), innovation (e.g., Bengtsson & Raza-Ullah, 2016; Bouncken & Fredrich, 2012; Kraus et al., 2019; Ritala, 2012; Zahoor & Al-Tabbaa, 2020), efficiency (e.g., Ritala et al., 2014), organizational learning (e.g., Bengtsson & Kock, 2000; Ritala et al., 2013), sales performance (e.g., Crick, 2019a), and profitability (e.g., Zahoor & Al-Tabbaa, 2020). However, despite this importance, surprisingly few studies have explored coopetition among SMEs in the B2B market. Indeed, as highlighted by extant work (Bengtsson & Kock, 2014; Crick & Crick, 2019), coopetition in B2B marketing is not well-studied in the literature. In addition, research into coopetition has focused mainly on large multinational enterprises (Kraus et al., 2019). Furthermore, to the best of the authors' knowledge, no studies have explored competition in the plastic and composites industry. This sector contains many SMEs that have a limited

capability (resources and competence) and face various challenges, such as highly intense competition.

Our first objective in this research is to identify activities that may be subject to coopetition in the plastic and composites industry. Our second objective is to explore the antecedents, moderators, and outcomes of coopetition in this industry and to compare them with those identified in the literature. By focusing on these objectives, this research makes at least three contributions to the collective knowledge. First, we extend existing literature by showing that some moderators not identified by extant work, such as a governance system, are important to motivate companies to foster coopetition in this industry. Second, some of the antecedents of coopetition found in the plastic industry (e.g., characteristics of managers, customer requests, environmental uncertainty) are common to those found in the existing literature. Finally, by considering a specific association in the plastic and composites industry, this research aims to help leaders of associations in the industry to better support their members and foster fruitful coopetition.

The paper proceeds in six sections. First, we review the definitions of coopetition, as well as its antecedents, moderators, and outcomes. This review helps us to extend the "antecedents, processes, and outcomes" model of coopetition introduced by Zahoor et al. (2020). Second, we explore the specificity of the plastic and composites industry, and perform an exploratory study. The third and fourth sections present the results and discussion. We then address the theoretical and managerial implications, and finally the limitations and future research directions, in the fifth and sixth sections, respectively.

2. Literature Review

Inter-firm collaboration is defined as the cooperation of two or more companies that pool part of their resources for the achievement of common strategic objectives so the benefits of the alliance are greater than what each company can achieve through individual efforts (Elmuti & Kathawala, 2001; Taleizadeh et al., 2017). B2B collaboration can be vertical or horizontal. Vertical collaboration manifests when a company collaborates with a supplier or customer. If the company collaborates with a competitor, the collaboration is horizontal. In this research, we are interested in horizontal collaboration.

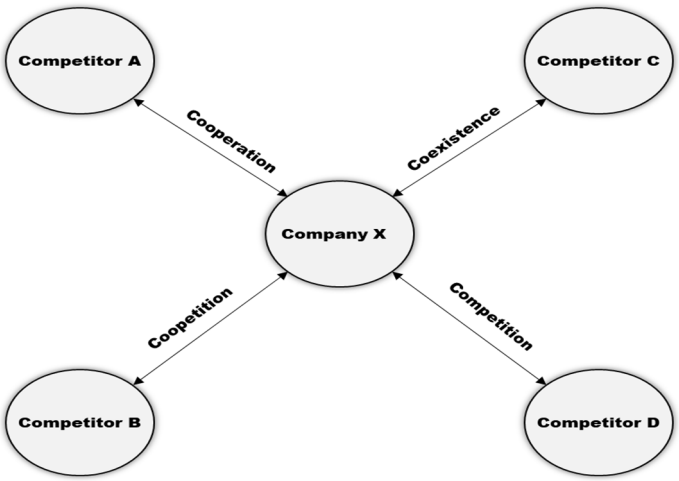

Figure 1. Forms of collaboration according to Bengtsson and Kock (1999)

Bengtsson and Kock (1999) distinguished four types of horizontal relationships (see Figure 1) that a firm can have with its competitors: (1) cooperation, (2) competition, (3) coexistence, and (4) coopetition. In terms of cooperation, company X makes economic and other exchanges (e.g., information, social links) with company A. This relationship can be formalized via a partnership or alliance, but the two companies do not compete. According to Easton and Araujo (1992), two firms (e.g., firm X and competitor D) are in competition if they pursue the same objectives (e.g., sale of a product/service) and the realization of this objective is controlled by another actor (e.g., a customer). Coexistence between firm X and competitor C occurs when these two firms have no economic exchange, but could have exchanges of social ties and information (Bengtsson & Kock, 1999). Finally, according to Bengtsson and Kock (1999), the collaboration between company X and company B takes the form of coopetition if the two companies cooperate and compete. Coopetition is the focus of the present research given its importance as a type of collaboration. We define coopetition precisely in the next section.

2.1 Definition of Coopetition

In the 1980s, Raymond Noorda introduced the term "coopetition" to refer to the cooperation and simultaneous competition pursued by certain companies (Bengtsson & Raza-Ullah, 2016). The term is a combination of "cooperation" and "competition" (Czakon et al., 2014). According to the literature, this term was popularized through research conducted by Brandenburger and Nalebuff (1996). These researchers used game theory to argue that companies have an interest in collaborating with their competitors to first expand the market or seek new markets, and then compete for market share. In other words, the goal of coopetition is to create more value in the market (called net worth by Brandenburger and Nalebuff, 1996) while competing for the largest share.

Table 1. Main definitions of coopetition

Authors	Definition
Nalebuff & Brandenburger, 1996	"Creating value that you can capture is the central theme in co-opetition". It consists of two opposite elements: 1) competition and 2) collaboration between two or more organizations.
Zineldin, 1998	Cooperation and competition at the same time to be more effective.
Bengtsson & Kock, 2000	"A dynamic and paradoxical relationship, which arises when two companies cooperate in some areas (such as strategic alliances), but simultaneously compete in other areas" (p. 411)
Vapola et al., 2000	"Refers to an active search for opportunities to create value and bargain for maximum value appropriation from the joint effort (Nalebuff & Brandenburger, 1996))" (p. 4)
Bonel & Rocco, 2007	"Emphasizes the mixed-motive nature of relationships in which two or more parties can create value by complementing each other's activity" (p. 71)
Padula & Dagnino, 2007	"The intrusion of competition in a cooperative game structure" (p. 33)
Rusko, 2011	"Emphasizes the simultaneous competition and cooperation between firms" (p. 311)
Bouncken & Fredrich, 2012	Combination of two opposite concepts: 1) competition and 2) collaboration.
Della Corte & Sciarelli, 2012	"A coopetitive firm has some cooperation relationships with firms that are, at the same time, competitors in some other markets (Dowling, Roering, Carlin, & Wisnieski, 1996) or mainly in the same market" (p. 369).
Bengtsson & Kock, 2014	"A paradoxical relationship between two or more actors, regardless of whether they are in horizontal or vertical relationships, simultaneously involved in cooperative and competitive interactions" (p. 180)
Raza-Ullah et al., 2014	"Materialises by creating an external boundary (via unifying forces) and internal boundaries (via divergent forces)" (p. 189).
Ritala et al., 2014	Simultaneously competitive and horizontal collaborative relationship between two or more organizations.
Bagdoniene & Hopeniene, 2015	"Refers to the notion that two or more organizations simultaneously cooperate in some activities" (p. 827)
Huang & Chu, 2015	"Refers to cooperation in competition"
Bengtsson & Raza-Ullah, 2016	"Cooperate with competitors" (p. 29)
Della Corte & Aria, 2016	Combining competition and cooperation in which actors can generate "win-win" situations or a positive-sum game.
Dorn et al. 2016	"Simultaneous cooperation and competition between at least two actors" (p. 484)
Crick, 2018b	"Coopetition is comprised of the interplay between competition and cooperation in the form of resource- and capability-sharing activities" (p. 257)
Crick, 2019 a	Coopetition is likely to occur when two or more companies realize that organizational performance is more likely to be obtained when they have access to a greater pool of resources and capabilities, which can be yielded through collaborating with their competitors (Rusko, 2011; Kim et al., 2013; Bengtsson and Kock, 2014; Hoffmann et al., 2018))" (p. 520)
Crick and Crick, 2019a	"Interplay between cooperation and competition" (p. 518)
Zacharia et al., 2020	"The ability to cooperate with competitors" (p. 414)

There are several definitions of coopetition in literature. Table 1 summarizes the main definitions generally accepted by the scientific community. According to this table, authors have been unanimous in the idea that coopetition comprises both cooperation and competition. However, there are differences at the level of (1) the number of actors, (2) the simultaneity between cooperation and competition, and (3) the unit of analysis—either coopetition at the level of actors or competition at the activity level.

Coopetition can be intra-firm or inter-firm, (Ritala et al., 2009). Intra-firm coopetition (i.e., within the same firm) can be between project teams, business units, or departments or functions (Strese et al., 2016). Coopetition can take place at a local level (local market) or an international level (foreign market). In this research, we focus on inter-firm coopetition, whether for local or international markets, which we simply refer to as coopetition hereinafter.

2.2 Antecedents of Coopetition

The antecedents of coopetition are prerequisites, factors, or even determinants that motivate companies to enter into a coopetition relationship. In recent years, significant research has been devoted to the antecedents of coopetition in different industries. Researchers have studied many prerequisites of coopetition at the (1) individual, (2) organizational, (3) network, and (4) environmental level. Individual factors relate to the personality or characteristics of owners, managers, or employees. For example, Geraudel and Salvetat (2014) showed that personality traits influence managers' propensity to cooperate. Specifically, more conscientious managers have a strong propensity to compete, whereas more agreeable managers have a greater propensity to cooperate. Finally, more nervous managers have a low propensity to cooperate. At the organizational level, for instance, a meta-analysis by Wang and Yang (2013) showed that congruence goals and similarity of organizational norms positively influence companies' desire for coopetition. Network factors such as the power of a competitor and the specific demand of a large customer can motivate coopetition (e.g., Tidstrom & Rajala, 2016). Finally, environmental factors such as deregulation, globalization, environmental uncertainty, and geographical proximity have been demonstrated as drivers of coopetition (e.g., Boschma, 2005; Bouncken et al., 2015; Czakon et al., 2014).

Table 2. Main antecedents of coopetition

Authors	Context	Methodology	Key finding
Zineldin, 1998	NA	Conceptual paper	**Effective inter-organization collaboration requires:** ▪ Atmosphere of frank debate ▪ Trust ▪ Interdependence ▪ Mutual positive expectation
Bengtsson & Kock, 2000	Two Swedish industries: brewery industry and lining industry + Finnish dairy industry	19 interviews conducted with CEO, Marketing Managers, Product, R&D, or Quality Manager	▪ Coopetitive relationships can be foster by heterogeneity in resources. ▪ Firms compete in activities close to the customers, and cooperate in activities far from customers
Simmons et al., 2001	NA	147 students	Personality traits of person with a behaviour of competition is wholly different from who with behaviour of cooperation
Ross et al., 2003	NA	251 students	Personality traits of a person affect his has a competitive and cooperative behaviour. Specifically, person with an openness or conscientiousness traits are more expected to be perceived as competitive. However, an agreeableness person is more cooperative. Finally, a person with extraversion trait can be both competitive and cooperative.
Boschma, 2005	NA	Conceptual paper	**Inter-firm cooperation can be affected by:** ▪ Social proximity (the degree of trust underpinning inter-firm cooperative behaviours). ▪ Cognitive proximity (competitors share similar knowledge and thought processes) ▪ Geographical proximity (the physical distance between competing businesses), ▪ Institutional proximity (the set of rules and laws (written and unwritten) that facilitate the cooperation between competitors), ▪ Organisational proximity (whether competing companies have collaborative relationships within their markets)
Wang &	Tourism	Case study approach	**Important factors for cooperation in local destination:**

Authors	Context	Methodology	Key finding
Krakover, 2008	industry	32 organization 32 industry interviews were conducted representing eight individual tourism businesses each from the four tourism sectors	▪ Focus of strategic thinking ▪ Locality of marketing campaign ▪ Maturity of destination marketing approach ▪ Leadership of local DMOs (DMO: stands for Destination Marketing Organization)
Felzensztein & Gimmon, 2009	Salmon industry in Chile and Scotland	53 questionnaires from managing directors	**Interfirm marketing cooperation is facilitated by:** ▪ Social networking (e.g., trust) ▪ Respect reciprocity ▪ Proximity
Felzensztein et al., 2010	Salmon industry in Chile and Scotland	53 questionnaires from managing directors	**Interfirm marketing cooperation is facilitated by the:** ▪ Need of marketing costs sharing (joint marketing delegations, joint trade fair participation, joint trade missions to new markets, joint market information research, joint sales to local markets ▪ Need of increasing sales (joint sales to local markets, joint sales to foreign markets, joint branding (co-branding), joint new product development, joint distribution strategies) ▪ Geographical co-location ▪ National cultural environments
Tortoriello et al., 2011	Italian Hotel industry	Survey from 72 hotel managers and archival data	**Cooperation among hotels is influenced by:** ▪ Interpersonal trust ▪ Perception of status, ▪ Reciprocal on not exchange of information
Bouncken & Fredrich, 2012	German High-Tech Industry	Survey from 469 firms	**Antecedents of coopetition:** ▪ Alliance strategy ▪ Alliance Function **Relationship between an alliance and coopetition is moderated by trust and dependency**
Felzensztein & Deans, 2013	Chilean wine industry	Questionnaires from 40 managers	**Important drivers for collaboration success between competitors:** ▪ Location in a specific region ▪ Access to information ▪ Technology
Wang & Yang, 2013	NA	Meta-analysis	**Antecedents of inter-firm opportunism are:** ▪ Goal congruence ▪ Cultural sensitivity ▪ Communication, ▪ Environmental volatility ▪ Norms ▪ Governance emphasis ▪ Relative dependence **Mediating factors affecting the relationship between Inter-firm opportunism and organizational performance are:** ▪ Commitment ▪ Functional conflict ▪ Overall satisfaction ▪ Trust. **Commitment also acts as a key moderating variable between inter-firm opportunism and other outcomes**
Czakon et al. (2014)	NA	Systematic literature reviews	**Coopetition antecedents are mainly:** ▪ Social networks ▪ Mimetism ▪ Deregulation ▪ Globalization

Authors	Context	Methodology	Key finding
Geraudel & Salvetat, 2014	NA	Questionnaire for 110 graduate students in a French business school who trainee future managers	▪ Resource interdependency ▪ Managerial propensity ▪ Personality traits are more relevant in the explanation of the propensity to cooperate. Specifically, a more conscientious manager has a high propensity to compete. Whereas a more agreeable manager has a more propensity to cooperate. Finally, a more neurotic manager has a low propensity to cooperate ▪ Network position has a strong effect on the propensity to compete and also on the propensity to cooperate. Specifically, adversarial in-degree and out-degree affect the managers' propensity to compete. While, Adversarial in-degree affect the manager's on the propensity to cooperate.
Bagdoniene & Hopeniene, 2015	Lithuanian tourism industry	semi-structured interviews from tour operators' managers (board of directors + director of commerce)	**Coopetition antecedents are mainly:** ▪ Access to missing resources, competencies, capabilities, and new markets ▪ Knowledge and information sharing ▪ Joint marketing activities to promote each other
Bouncken et al., 2015	NA	Systematic review	**Coopetition antecedents are mainly:** ▪ Environmental threats and opportunities (Padula and Dagnino, 2007) ▪ Institutional environment (e.g., imposition of cooperation by regional policy makers) (Mariani, 2007) ▪ Relative knowledge structure of firms (Padula and Dagnino, 2007) ▪ Need of more value creation and value appropriation (Bengtsson and Kock, 2000) ▪ Need to win a win a larger market (Liu 2013) ▪ Need to increase the size of the business (Von Friedrichs Grangsjo, 2003).
Geldes et al., 2015	Agribusiness in Chile	Two different online survey data collection from agribusiness firms (119 responses from the 1er survey and 312 from the second)	Interfirm marketing cooperation is affected by social proximity. But, both geographical proximity and cognitive-organisational proximity are not relevant to the interfirm marketing cooperation
Huang & Chu, 2015	SME Certified Public accounting agencies (CPAs)	Questionnaires from 225 CPAs	▪ Cooperation strategy is affected by expertise complementarity. ▪ Competition strategy is affected by expertise heterogeneity ▪ Trust is an important moderator for both sides of co-opetition
Akpinar & Vincze, 2016	German automotive industry	In-depth longitudinal case study based on the historical analysis of the coopetition between Volkswagen Group and Porsche AG during the period 2001–2012	▪ Power difference affects the level of competition ▪ Environmental threat affects the firms shifted of the power difference
Bengtsson & Raza-Ullah, 2016	NA	Systematic literature review Based on 142 papers	**Main drivers of coopetition:** ▪ **External drivers** ▪ Industrial characteristics ▪ Technological demands (convergence, life-cycle, uncertainty, complexity) ▪ Influential stakeholders ▪ **Relation-specific drivers**

Authors	Context	Methodology	Key finding
Czakon & Czernek, 2016	Tourism context in Poland	Interviews with 66 key stakeholders + performing observations + document analysis	▪ Partner characteristics (resources complementarity, knowledge asymmetry, goal congruity) ▪ Relationship characteristics (flexibility, trust) ▪ **Internal drivers** ▪ Internal goals ▪ Internal capabilities ▪ Prospective strategies ▪ Perceived vulnerability **Results reveals the difficulties in:** ▪ Identifying the individual benefits of coopetition ▪ Assessing the coherence of a respective member's benefits ▪ Evaluating partners' motivations and competences A decision to engaging in a network coopetition is not taken based on calculative trust, because it is difficult to calculate the benefits of coopetition. However, various trust-building mechanisms (e.g. capabilities, prediction, transference) can incite member to join in a network coopetition
Della Corte & Aria, 2016	Tourism industry in Italy	Survey study from SMEs in tourism (4- and 5-stars hotels that are members of national associations)	**Main drivers for the collaboration decision:** ▪ Reciprocal advantages ▪ Trust ▪ Compatibility and cultural interaction ▪ Communication flows and systems ▪ Managerial skills ▪ Positive attitude towards collaboration ▪ Correct outline of the project
Dorn et al., 2016	NA	Systematic review of 169 papers	**Main antecedents of coopetition:** ▪ **Inter-firm Level** Market conditions: Specific industry settings (for example, high-tech), High degree of change and competition, Early or late industry lifecycle stages, Regulatory bodies enforcing/prohibiting coopetition (e.g., Bouncken & Fredrich, 2012; Kotzab & Teller, 2003; Lai et al. 2007; Luo et al. 2006; Padula & Dagnino, 2007) ▪ **Dyadic factors between potential partner firms**: Compatible resource endowment, Presence of trust, Extant ties of potential partner firms (e.g., Barretta, 2008; Cheng et al. 2008; Ngowi & Pienaar, 2005; Osarenkhoe, 2010; von Friedrichs Grangsjo & Gummesson, 2006) ▪ **Individual factors of firms**: Need for knowledge and resource acquisition, Self-perception of the firm (for example, regarding vulnerability, position, strategy) (e.g., Eriksson, 2008b; Gnyawali & Park, 2009; Lydeka & Adomavicius, 2007; Schiavone & Simoni, 2011 ▪ **Intra-firm Level**: Interdependence of units and simultaneous competition between them for the parents' resources e.g., Luo, 2005
Lundgren-Henriksson & Kock, 2016	Finnish media industry	Semi-structured interviews conducted with 12 managers	**Main motivators factors for coopetition:** ▪ Perceived economic ▪ Perceived social ▪ Perceived cultural ▪ Different perceptions of strengths of competition ▪ Different expectations of coopetition
Strese et al., 2016a	NA	Survey from 392 department heads and project leaders of new product development teams	**Important factors for favoring cross-functional coopetition between departments:** ▪ Participative leadership style of department leaders ▪ Formalized organizational structures
Tidstrom & Rajala, 2016	Manufacturing industry	Case study between a large multinational	Coopetition strategy is influenced by the network level (customer demand).

Authors	Context	Methodology	Key finding
		company and its supplier	
Chim-Miki & Batista-Canino, 2017	Tourism industry	Systematic literature review on coopetition based on research published during 20 years.	**Main motivators factors for coopetition:** ▪ Strategic response to challenges ▪ Common goal of developing a destination ▪ Leadership ▪ Governance and industrial competitiveness ▪ Stakeholders' pressure ▪ Institutional environment ▪ Competition ▪ Commitment ▪ Trust ▪ Community feelings ▪ Social relationship ▪ Motives and values of individuals
Crick, 2018a	New Zealand wine industry	Conceptual	**Many drivers of coopetition as:** ▪ Organisational cultures ▪ Organisational capabilities
Crick, 2018b	New Zealand wine industry	38 interviews across 25 firms competing	**Coopetition is motivated by:** ▪ An industry-wide cooperative mind-set ▪ Organisations having access to competitors' resources and capabilities
Felzensztein et al., 2018	Chilean salmon industry	Longitudinal study conducted over ten years. Data collected from managers	**As firm's members as in cluster mature:** ▪ They tend towards more individual than cooperative ▪ They cooperate basically in cost-reducing, not in differentiation marketing strategy ▪ Inter-firm cooperation decreases as a result of a stronger social networks
Hannah & Eisenhardt, 2018	USA Residential Solar industry	Multiple case study of five from 2007 to 2014	Hence, coopetition activities need to benefit all companies involved
Crick, 2019b	NA	Conceptual research	Coopetition is motivated by the level to which managers and employees think in the value of cooperating with competitors
Kraus et al., 2019	Craft beer industry in Germany, Austria, Switzerland, and Liechtenstein	Semi-structured interviews with 18 SMEs + Secondary data	**Key drivers for coopetition are:** ▪ Mutual benefit ▪ Trust ▪ Commitment ▪ Sympathy ▪ Expectations to: ▪ Increase (product) quality ▪ Decrease (production) costs ▪ Share production processes ▪ Increase sales ▪ Provide and receive mutual assistance
Zacharia et al., 2019	Three industries from India: 1) Automotive industry, 2) Apparel industry, 3) IT industry	Semi-structured interview process of 21 industry executives	**Critical external business environment factors leading to coopetition:** ▪ Customer requirements (quantity/quality specifics, customer-driven product, sharing capabilities) ▪ Environmental uncertainty (ex., new technologies, industry body – IP protection, regional promotion) ▪ Organizational interconnectedness (capacity and capability sharing, strong relationships building)
Czakon et al., 2020	Tourism industry	Survey from 368 Polish tourism firms	**Two behavioral coopetition antecedents:** ▪ **Strategic rationale** ▪ Perceived benefits ▪ Strategic fit

Authors	Context	Methodology	Key finding
			▪ **Coopetition mindset** ▪ Cooperative orientation ▪ Past experience in coopetition ▪ Trust in partners **Main antecedents of coopetition:** ▪ **Individual level** ▪ Managerial attributes ▪ **Firm level** ▪ Incentives ▪ Internal R&D ▪ Innovation culture ▪ Strategic factors ▪ Inter-departmental connectedness ▪ Resources ▪ HR practices ▪ **Relational level** ▪ Strength f ties ▪ Partner diversity ▪ IOC proximity ▪ Collaboration management capability ▪ Social capital ▪ **Environmental level** ▪ Environmental uncertainly
Zahoor & Al-Tabbaa, 2020	NA	Systematic review	**Many variables moderated the relationship between these antecedents and coopetition:** ▪ **Firm-related** ▪ Firm size (-) ▪ Firm age (-) ▪ Absorption capacity (+) ▪ Entrepreneurial orientation (-) ▪ **Relationship-related** ▪ Mutual trust (+) ▪ Collaboration diversity (+) ▪ Openness (-) ▪ Network size (-) ▪ Learning/knowledge sharing (+) ▪ Frequent interaction (+) ▪ Governance mechanisms (+) ▪ **Environmental-related** ▪ Economic uncertainty (+) ▪ Industry environment (+) ▪ Market conditions (+) ▪ Technology uncertainty (+)
Crick & Crick, 2021a	American Wine industry	12 semi-structured interviews were conducted with owner managers + electronic survey from 323 wine producers	**Coopetition is affected positively and linearly by:** ▪ Coopetition-oriented mindset ▪ Competitor orientation ▪ Inter-firm trust ▪ Competitive intensity **Competitive intensity moderate negatively the relationship between coopetition and inter-firm trust**

However, Table 2 shows that the prerequisites for coopetition may differ from industry to industry, as well as from country to country. Hence, in this study we conduct exploratory research to identify the prerequisites of coopetition for the plastic and composites industry in Quebec (Canada).

2.3 Outcomes of Coopetition

Although coopetition is seen as risky collaboration, a number of studies have shown its benefits for companies in several industries. Table 3 presents the main results of the outcomes regarding coopetition found in the literature.

Table 3 shows that the outcomes or results are numerous, and relate to innovation (Basterretxea et al., 2019; Bengtsson and Raza-Ullah, 2016; Zahoor & Al-Tabbaa, 2020), performance (Zahoor & Al-Tabbaa, 2020), internationalization (Basterretxea et al., 2019), creation of greater value (Crick & Crick, 2016), and creation of new markets (Ritala et al., 2014). However, the relationship between coopetition and its outcomes (e.g., performance) is influenced by several moderating factors that can increase or decrease these outcomes. For example, economic uncertainty positively amplifies the influence of coopetition on performance. Conversely, if the entrepreneurial orientation of the owner or manager is high, the relationship between coopetition and performance is weak.

Table 3. Main outcomes of coopetition

Authors	Context	Methodology	Key outcomes of coopetition
Bonel & Rocco, 2007	Italian Soft drinks and beverages industry	34 Semi-structured interviews and participant observations	**Coopetition influences negatively and positively firm's Business model:** ▪ Coopetition can saturate some activities (e.g., production capacity) ▪ Coopetition can lead to replace some internal practices by external practices ▪ Coopetition can add new practices to the firm's business model
Rusko, 2011	Finnish forest industry	Secondary data in the period 1904–1998	▪ The high-level level of coopetition is accompanied by a value increment.
Bouncken & Fredrich, 2012	German High-Tech Industry	Survey from 469 firms	**Coopetition affect positively firm's:** ▪ Competitive success. ▪ Radical innovation of firms. ▪ Radical than incremental innovation **Trust and dependency moderate the relationship between coopetition and innovation**
Ritala, 2012	Finnish Cross-industry	209 firms' managers (e.g., R&D manager, managing director)	**Coopetition alignment (relative number of competitors along with of alliance partners) impact positively:** ▪ Innovation performance ▪ Market performance **Coopetition alignment impact positively innovation and market performance in condition of:** ▪ High market uncertainly (uncertainly about dynamic of technology, competition, and customer demand) ▪ High positive network externalities (user's value of product/service increase with the increase of the number of users) ▪ Low competition intensity
Bengtsson & Kock, 2014	NA	Conceptual article	Coopetition influences business models and strategy
Ritala et al., 2014	E-commerce industry	Longitudinal qualitative single-case study using Amazon.com as a descriptive real-life context.	**Coopetition can affect positively the firm's:** ▪ Resource access ▪ Market ▪ New market creation ▪ Efficiency
Strese et al., 2016b	NA	Survey from 392 department heads and project leaders of new product development teams	Cross-functional coopetition affects positively innovation performance
Della Corte & Aria, 2016	Tourism industry in Italy	Survey study from SMEs in tourism (4- and 5-stars hotels that are members of national	Coopetition enhances performance but a major factor is not only numbers of links but also developed trust between partners

Authors	Context	Methodology	Key outcomes of coopetition
		associations)	
van der Zee & Vanneste, 2015	Tourism industry	Relational bibliometric analysis on networks: 90 papers	**Network cooperation increases:** ▪ Outcome of tourism ▪ Destination performance and ▪ Quality ▪ Tourists' experiences ▪ Competitive position of tourism ▪ Economies of scale for SMEs ▪ Products innovation
Bengtsson & Raza-Ullah, 2016	NA	Systematic literature review Based on 142 papers	Main outcomes of coopetition: ▪ **Innovation:** Contradictory findings related to: 1) Innovation performance, and 2) Incremental & radical innovation ▪ **Knowledge related:** 1) knowledge sharing, 2) knowledge creation, and 3) knowledge acquisition ▪ **Firm performance:** 1) economic, financial performance, 2) market performance, 3) quality and service, and 4) competitive advantage ▪ **Relational:** 1) Maintenance or failure of the relationship, 2) Loss and recovery of trust, and 3) Commitment of resources, learning, & fulfillment of goals
Crick and Crick, 2016	New Zealand Sport industry (Taekwondo organisation)	Interviews with 25 instructors in various clubs + Secondary data from Websites	Coopetition add value
Crick, 2018a	New Zealand wine industry	Conceptual	Coopetition influences positively performance (e.g., sales)
Crick, 2018b	New Zealand wine industry	38 interviews across 25 firms competing	Coopetition increase performance
Felzensztein et al., 2018	Chilean salmon industry	Longitudinal study conducted over ten years. Data collected from managers	Coopetition impact positively performance
Basterretxea et al., 2019	Spanish Machine-tool industry	Multi-case approach based on interviews with 15 CEOs and research and development (R&D) managers	Inter-cooperation (joint sales offices, joint after-sale services, shared R&D units, knowledge exchange and relocation of key R&D technicians and managers) impact positively: ▪ Innovation ▪ Internationalization via inter-cooperation
Crick, 2019a	New Zealand Sport industry (non-mainstream sporting clubs)	After undertaking 25 field interviews, survey data were collected from 151 non-mainstream sporting clubs in New Zealand	▪ Coopetition affects positively sales performance ▪ Relationship between competition and sales performance is moderated: ▪ Negatively by inter-firm ▪ Positively by competitive intensity
Crick, 2019b	NA	Conceptual research	▪ Relationship between coopetition and performance is non-linear (inverted U-shaped) ▪ Relationship between coopetition and performance is moderated by: ▪ Trust between rivals ▪ Organizational resources and capabilities ▪ Competitive business environment ▪ Competitive intensity
Kraus et al., 2019	Craft beer industry in Germany, Austria, Switzerland,	Semi-structured interviews with 18 SMEs + Secondary data	▪ **Innovation-related outcomes** ▪ Innovation abilities development through creativity ▪ Product innovation ▪ Learning processes ▪ **Strategy-related outcomes**

Authors	Context	Methodology	Key outcomes of coopetition
	and Liechtenstein Three industries from India: 1)		▪ Market reach improvement and logistics ▪ Mutual marketing **Important outcomes from coopetition:**
Zacharia et al., 2019	Automotive industry, 2) Apparel industry, 3) IT industry	Semi-structured interview process of 21 industry executives	▪ Performance improvements (Cost reduction, Knowledge Sharing, innovation) ▪ Relational outcomes (trust, credibility, relationship effectiveness)
Estrada & Dong, 2020	Spanish Manufacturing industry	Panel data set from 911 firms between 2007 and 2014	**Coopetition experience affects negatively firm profitability. This relation become:** ▪ More negative as R&D investment increases ▪ Shifts from negative to positive as IT investment increases
Zahoor & Al-Tabbaa, 2020	NA	Systematic review	**Main outcomes of coopetition:** ▪ **Innovation outcomes** ▪ Product innovation ▪ Process innovation ▪ Service innovation ▪ Marketing innovation ▪ Organizational innovation ↓ ▪ **Performance outcome** ▪ Survival ▪ Competitive advantage ▪ Sales growth ▪ Profitability **Many variables moderated the relationship between coopetition and these outcomes:** ▪ **Firm-related** ▪ Firm size (-) ▪ Firm age (-) ▪ Absorption capacity (+) ▪ Entrepreneurial orientation (-) ▪ **Relationship-related** ▪ Mutual trust (+) ▪ Collaboration diversity (+) ▪ Openness (-) ▪ Network size (-) ▪ Learning/knowledge sharing (+) ▪ Frequent interaction (+) ▪ Governance mechanisms (+) ▪ **Environmental-related** ▪ Economic uncertainty (+) ▪ Industry environment (+) ▪ Market conditions (+) ▪ Technology uncertainty (+)
Crick & Crick, 2021a	American Wine industry	12 semi-structured interviews were conducted with owner managers + electronic survey from 323 wine producers	▪ Relationship between coopetition and performance is non-linear (inverted U-shaped). ▪ Coopetition-performance relationship is positively moderated by industry experience ▪ Coopetition influence positively financial performance
Crick & Crick, 2021b	New Zealand Wine		▪ Relationship between competition and sales performance is moderated: ▪ Negatively by competitive aggressiveness

Authors	Context	Methodology	Key outcomes of coopetition
Crick & Crick, 2021c	New Zealand Sport industry (non-mainstream sporting clubs)	After undertaking 25 field interviews, survey data were collected from 151 non-mainstream sporting clubs in New Zealand	▪ Positively by competitive intensity ▪ Coopetition affects positively sales performance ▪ Relationship between competition and sales performance is moderated: ▪ Negatively by inter-firm conflict ▪ Positively by competitive intensity
Liu et al., 2021	China multiple industries	280 manufacturing firms	▪ Coopetition influences positively technology transfer between firms ▪ Coopetition-technology transfer is positively moderated by asset specificity ▪ Coopetition moderate positively the relationship between Inter-firm justice and technology transfer
Wolf et al., 2021	NA	Online experiment with 242 participants	▪ Competition is more effective than cooperation in driving personal growth and performance ▪ Competition is less effective tan cooperation in driving behavioral engagement and life satisfaction ▪ These relationships are mediated by fear of failure and strive for success

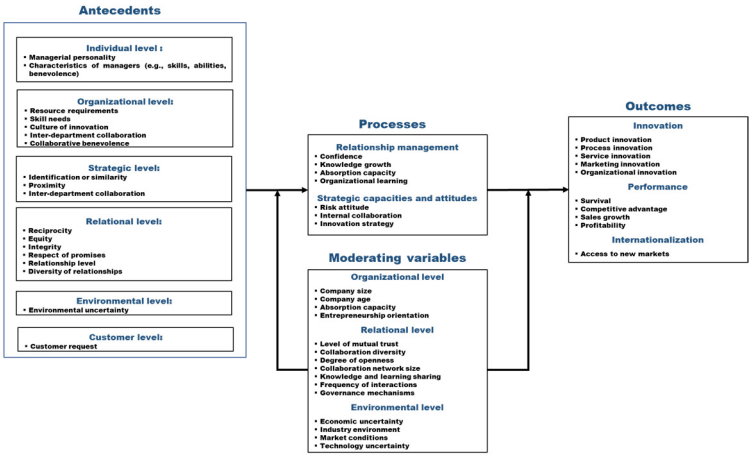

Figure 2. APRM model of coopetition adapted from Zahoor et al. (2020)

2.4 Drivers, Processes, and Outcomes Model of Coopetition

Various authors (e.g., Bengtsson & Raza-Ullah, 2016) have used the antecedents, processes, and outcomes model (or drivers, process, outcomes) to analyze coopetition. As highlighted by Bengtsson and Raza-Ullah (2016), this model helps to explain (1) why competitors cooperate (i.e., drivers), (2) the coopetition process, and (3) coopetition expectations (outcomes). However, several authors (Zahoor et al., 2020) have emphasized the importance of moderating variables between antecedents and processes, and between processes and outcomes. Therefore, in this study we adopt the antecedents, processes, results, moderators (APRM) model.

Based on research by Zahoor et al. (2020), Figure 2 presents the APRM model of the main variables studied in the literature. As noted above, the factors of the APRM model vary from industry to industry. Furthermore, in the case of competition between members of the plastic and composites industry, we conduct exploratory research to identify the important factors in each component of the APRM model.

3. Methodology

Prior scholars (ex., Czakon et al., 2020; Kraus et al., 2019) posited the majority of studies in coopetition has chosen qualitative exploratory research. The main reason of this choice is the competitive research is under studied and this method helps to better understand the managers' perception about the drivers of coopetition (Kraus et al., 2019). So, this research adopts exploratory research principles to verify the existence of components of the APRM model that are specific to the plastic and composites industry and not cited in the

literature to date. The research also verifies whether certain factors of the APRM model cited in the literature are important for plastic and composites industry companies.

To conduct the exploratory research, we opted for the case studies as recommended by Yin (1989). Indeed, this latter specified that case studies is suitable for complex phenomena exploratory. In particular, we needed included organizations that previously make coopetition and others not yet. So, we approached the managers of one important association of the plastic and composite industry in Quebec for three reasons. First, Canada holds the 6th position in the world for production of plastics and composites, and Quebec is the second-largest province in the composites and plastics industry. Second, globally, this industry has been growing for several years thanks to the increased use of plastics and composite materials in several industrial sectors, including the automotive and recreational vehicle, electronics, medical, and aerospace industries, to name only a few. However, despite this global growth, businesses in the region face several challenges, particularly the increased competition from Asian countries such as China, labor availability, and raw material supply. Finally, some organizations have made coopetition with other members in this association.

We contacted several members of this association, but only eight managers agreed to answer our questions. Nevertheless, the respondent profile provides an interesting sample representing the industry and allowed us to pursue the research work. Table 4 shows the nature of respondent firms. Specifically, we designate each respondent's company as company A, and their company's subject of competition as company X. Each organization represents a case in our research (Miles and Huberman, 2014), because before the managers answered our questions, we asked them to think about a competitor who could be a potential actor in coopetition.

The interview was conducted with the executive manager in each company. Each of them understands what the coopetition is. We asked questions to uncover the antecedents, processes, and outcomes of coopetition. We also asked questions to validate whether certain important factors in the literature (e.g., confidence) were important in the case of the plastic and composites industry. Respondents' answers were coded according to the themes and categories (Miles and Huberman, 2003) in consistent with the literature.

Finally, we used descriptive statistics to compare responses between respondents.

Table 4. Some characteristics of respondents' companies

	Company A is ---------- than Company X			Total
	Larger	Equal	Smaller	
Number	3	1	4	8
%	3.7.5%	12.5%	50.5%	100%

The sample comprised:

- Three large companies (in terms of gross sales) whose managers have considered engaging in coopetition with small companies;
- One manager who has considered engaging in coopetition with a roughly equal company in terms of gross sales;
- Four small companies who have considered engaging in coopetition with large companies.

4. Results

4.1 Drivers, Processes, and Outcomes Model of Coopetition

As defined above, coopetition relates to collaboration in activities. Therefore, the question arises as to the activities in which members of the plastic and composites industry want to collaborate. To answer this question, we asked respondents about their willingness to collaborate in critical activities highlighted in the literature. Table 5 presents the coded responses of the participants.

Table 5. Level of willingness to engage in collaborative activities

Collaborative activities:	Wiliness		
	Negative	Positive	Total
At the sales level	**44.4%**	**55.6%**	**100%**
To serve customers	**44.4%**	**55.6%**	**100%**
To create a new product or a new product line (innovation).	**33.3%**	66.7%	**100%**
To share the costs of shipping or / and importing raw materials with Company X.	**25.0%**	75.0%	**100%**
To share long-term or short-term storage costs.	**55.6%**	**44.4%**	**100%**
To share information about other competitors.	**22.2%**	77.8%	**100%**
To share technical expertise on non-exclusive products.	**33.3%**	66.7%	**100%**
To share important information about customers / markets.	**55.6%**	**44.4%**	**100%**
To help solve unexpected and important problems encountered by the partner.	**55.6%**	**44.4%**	**100%**
To convey information that could impact the partner.	**37.5%**	62.5%	**100%**
To troubleshoot the partner with non-exclusive products, in order to enable him to troubleshoot his customer.	**22.2%**	77.8%	**100%**

The data in Table 5 suggest that the respondents have a willingness to collaborate to:

- Create new products or product lines;
- Share the costs of shipping and/or importing raw materials;
- Share information about other competitors;
- Share technical expertise on non-exclusive products;
- Transmit information that could have an impact on the partner;
- Troubleshoot with the partner on non-exclusive products, in order to enable the focal firm to continue to serve its customers in the event of a supply difficulty.

Nevertheless, Table 5 also shows that respondents do not want to collaborate for any activities that are close to the customer, that is: (1) at the sales level, (2) to serve customers, and (3) to share important information about customers/markets. In addition, they are not willing to share long-term or short-term storage costs. Likewise, members are not willing to help another member with unexpected and important issues.

4.2 APRM Model and Plastic and Composites Industry

Table 6 summarizes the main elements of the APRM model that correspond to the responses of the participants.

Regarding the antecedents of coopetition, respondents expressed various elements, namely:

- The difficult and competitive environment that encourages companies to collaborate;
- The heterogeneity of resources and skills in the sense that the two companies must have complementary resources and skills. In this regard, one respondent said, “One has the technology and the other the network”;
- Lack of capacity, meaning that a single company cannot carry out a project;
- The strategic positioning of the company. In this regard, one respondent emphasized that, “collaboration must in one way or another lead to the positioning of each of the companies (e.g., innovation)”;
- The customer’s request to form a consortium;
- The “win” of each actor in the collaboration. However, this win must be distributed according to the participation rate of each actor. This principle ties in with the concept of fairness expressed in the literature as the antecedent of coopetition.

Table 6. elements of the aprm model that match participants' responses

APRM Model			
Antecedents	**Process**	**Results**	**Moderators**
Challenging environment	Knowledge expansion	Improvement	Small size of companies
Heterogeneity of resources and skills		Internationalization	Large market
Lack of resources		Innovation	Clear agreements
Strategic positioning of the company		Profitability	Governance actor responsible for networking is strongly wanted
Customer request to work with a consortium			Definition of field and competency of each company to find complementarities
Win-win relationship			Environment
Mutual profitability			

Apart from strategic positioning, all elements cited by respondents have been expressed in the literature relating to other industries.

At the level of coopetition processes, respondents only noted the process of expanding knowledge about the industry and its evolution.

In terms of coopetition outcomes, the four elements cited by respondents were: (1) improvement, (2) internalization (i.e., conquering new international markets), (3) innovation, and (4) profitability. All of these elements have been cited in the literature (see Table 2).

Finally, in terms of moderating factors, the respondents discussed:

- The size of the market: a large market may encourage companies to collaborate, but not a small market. One respondent specified, "Our market is too small to divide the pie";
- Challenges and a competitive environment, which encourages companies to collaborate;
- The presence of clear agreements (which call for a governance mechanism of coopetition);
- The presence of a strong representative body (responsible for networking).

Respondents mentioned two factors not indicated in the literature related to moderating variables and that promote coopetition: (1) the presence of a strong representative body (responsible for the networking), and (2) definition of the fields of activity of each actor to achieve complementarity. These two elements are most likely linked, as the networking organization can help define the complementary fields of activity between members of the association.

4.3 Validation of Some Antecedents

In order to validate some important antecedents in the literature that were not mentioned explicitly in the open questions, we asked respondents about the elements that affect the levels of antecedents shown in Figure 2. Table 7 summarizes these elements. Specifically, at the individual level, we assessed the characteristics of the respondents and of the target company of the collaboration.

Furthermore, since, in the case of this research, benevolence refers to the willingness to protect and improve the well-being of others, we considered benevolence at the organizational level as the respondent's perception that the target collaborating company will seek to protect and improve the interests of the respondent's company. In other words, in the case of collaboration, the target collaborating company will be considered benevolent if its managers are seen as people who will make decisions and actions that are in the best interests of the respondent's company.

At the strategic level, we focused on identifying the respondent's perception that their company is quite similar to the target company of the collaboration.

Considering the importance of the relational level in the formation and development of relationships, we verified four elements. The first concerns "reciprocity," defined by Gouldner (1960), one of the first proponents of this concept, as "owed by one partner to the other based on the other's prior behavior" (p. 170). Czakon and Czernek (2016) defined reciprocity as the mechanism for the continuity and development of the actors of coopetition trust. Equity is achieved when the collaborating actor is rewarded according to their participation rate. The relationship refers to the degrees of knowledge and connections with managers of the target company of the collaboration.

Table 7. Validation of certain antecedents (levels and elements)

Antecedents		**Score:**		
Level	**Element**	Negative	Positive	**Total**
Individual	Respondent characteristics	20.0%	80.0%	**100%**
	Characteristics of company managers subject to collaboration	31.5%	68.5%	**100%**
Organizational	Kindness of the management of the company subject to the collaboration	33.7%	66.3%	**100%**
Strategic	Identification (or similarity) to the company subject to the collaboration	31.7%	68.3%	**100%**
	Reciprocity of the company subject to the collaboration	**67.1%**	**32.9%**	**100%**
	Corporate equity subject to collaboration	**50.0%**	**50%**	**100%**
Relational	Integrity and respect for the company's promises subject to the collaboration	**46.5%**	**53.5%**	**100%**
	Relationship with the company subject to the collaboration	**80.0%**	**20%**	**100%**

Table 7 shows that the scores of the elements (gray color) of the relational level are low, especially at the level of reciprocity (only 32.9%). On the other hand, the scores for items at the individual level are high (e.g., 80% for the characteristics of the respondent) and the scores for the organizational (e.g., 66.3% for benevolence) and strategic (e.g., 68.3% for identification) are also fairly high.

4.4 Validation of some collaboration processes

At the process level, the most important and most studied factor in literature is trust. Therefore, we wanted to establish whether the respondent trusted the target company of the collaboration. To show the importance of trust, we asked whether the respondent thought that the target company for the collaboration could make a good business partner.

Table 8. Validation of certain processes

Dimensions	**Score:**		
	Negative	Positive	**Total**
Trust in the partner	38.2%	61.8%	**100%**
The target company for the collaboration would be a good business partner	37.5%	62.5%	**100%**

Table 8 shows the responses obtained from study participants. This table shows that trust in the target company of the collaboration is quite high (61.8%). This result is confirmed by the score for the question “The target company of the collaboration would be a good business partner” (62.5%). These scores show that there is a real possibility of collaboration between two competitors in the association, but only under certain conditions.

5. Conclusion

The study carried out among members of the association in the plastic and composites industry shows that there is a possibility of collaboration between competing companies for innovation, performance, and internationalization. However, to achieve these collaborations, one must consider the presence of (1) certain antecedents, (2) trust, and (3) certain moderating variables (identified in red in Figure 3).

At the background level, the research indicates that there is work to be done in terms of the relationship between members. In this regard, the control mechanism suggested that eliminating tensions between members may help establish guidelines for the fairness of the collaboration. Likewise, the role that the association can play in fostering networking among members can also considerably reduce mistrust among them.

The results of this research show that respondents do not want to collaborate on any activities that are close to the customer. These findings agree with those cited in the literature to date. Indeed, research by Bengtsson and Kock (2000) in two countries and three industries, namely Sweden (brewing industry, rubber coating industry) and Finland (dairy industry), showed that firms compete in activities that are close to customers and cooperate in activities that are far from customers. To this end, several activities can be the subject of collaboration, including: (1) sharing the costs of shipping and/or importing raw materials, (2) sharing of information on other competitors,

(3) sharing technical expertise on non-exclusive products, (4) transmission of information that could have an impact on the partner (coopetitor), and (5) troubleshooting for the partner by providing non-exclusive inputs, in order to enable it to serve its customer.

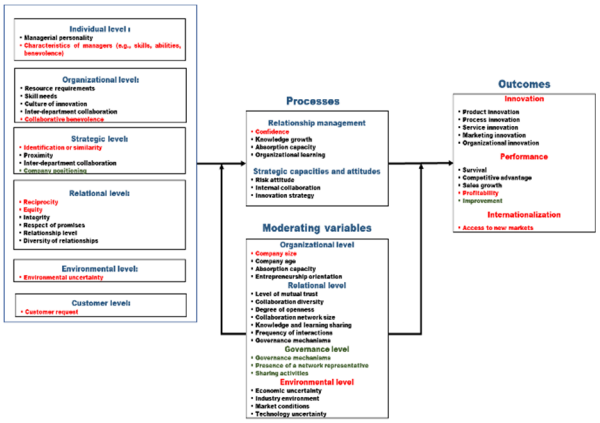

Figure 3. Elements of the APRM model identified from research with members of the association

6. Theoretical and Managerial Implications

From the theoretical perspective, this study adds at least three contributions. First, our study reviews existing literature on coopetition and updates the APRM model of Zahoor et al. (2020). Second, this research is the first to show that some antecedents, processes, and outcomes in the plastic and composites industry are similar to those of other industries, while other factors are different (see Figure 3). Finally, in addition to the APRM model, we explore activities that can be the subject of coopetition. Our results reveal that respondents did not want to collaborate in activities that are close to the customer (e.g., selling activities, sharing important information about customers/markets).

From a managerial perspective, considering the literature review and the research results we can make seven recommendations, although these results need to be confirmed by all members of the association of the plastic and composites industry. These recommendations include the following:

1. Strengthen the relationship between association members. This relationship can greatly improve the willingness to collaborate among members. The leaders of the association, including the board of directors and CEO, can play an important role, through the programming of networking activities.

2. Create a think tank led by the director general to identify activities or areas of complementarity between members of the association.

3. Set up collaboration analysis committees in certain activities of the value chain, such as R&D and logistics activities (costs of shipping and/or importing raw materials).

4. Set up a collaborative competitive intelligence watch system that transmits information to members.

5. Implement legal guidelines to frame the distribution of exchanges between employees.

6. Create a committee to resolve disputes or disagreements between collaborating members within the association.

7. Identify international markets and members who can cooperate in each of these markets.

7. Limitations and Future Research

Although the results obtained through this research are interesting, it has one important limitation: it is exploratory research whose results are based on a limited number of respondents. Thus, the results cannot be generalized to all members of the plastic and composites industry in Quebec or Canada. Therefore, future research is encouraged to validate and enrich our study.

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