European Management Journal xxx (xxxx) xxx

Contents lists available at ScienceDirect

European Management Journal

journal homepage: www.elsevier.com/locate/emj

Revisiting the cooperation–competition paradox: A configurational approach to short- and long-term coopetition performance in business networks

Francesca Ricciardi [a], Alessandro Zardini [b,*], Wojciech Czakon [c], Cecilia Rossignoli [b], Sascha Kraus [d]

[a] University of Turin, Corso Unione Sovietica 218/bis, 10134, Torino, Italy
[b] University of Verona, Via Cantarane 24, 37139, Verona, Italy
[c] Jagiellonian University, Łojasiewicza 4, 30-348, Kraków, Poland
[d] Free University of Bozen-Bolzano, Piazza Università 1, 39100, Bolzano, Italy

ARTICLE INFO

Keywords:
Coopetition
Paradox
3D model of relational space
Configurational analysis
Business networks

ABSTRACT

Cooperation and competition are often viewed as incompatible, antagonistic forces, thus are operationalized as two extremes on a continuum. However, they can coexist and even enable each other, thus may be operationalized as orthogonal constructs. We address this contradictory phenomenon by developing a more granular view of the cooperation–competition paradox. Building on interdisciplinary research, we develop a three-dimensional model of relational space (fairness–opportunism, sharing–control, and engagement–rivalry), providing a novel tool with which to investigate the paradoxical interplay between cooperation and competition through eight operationalizable configurations. Using fuzzy-set qualitative comparative analysis (fsQCA), we test our model by assessing how different configurations of interfirm relationships influence the short- and long-term success of a sample of 217 firms. Our findings show that only two of the eight possible relational configurations are associated with firm success, one in both the long and short term, and the other in the short term only.

1. Introduction

The cooperation–competition duo is considered an important organizational paradox (Crick & Crick, 2020; Bouncken, Laudien, Fredrich, & Görmar, 2018a, 2018b; Gnyawali et al., 2016; Czakon et al., 2014). Indeed, although they undoubtedly conflict, both types of social interaction are necessary in business relationships, and they are found to coexist and coevolve in innumerable contexts (Bengtsson & Kock, 2000; Lacoste, 2012; Mariani, 2007). However, scholarly views on cooperation and competition are largely based on partial and polarized theories (Bouncken et al., 2015, 2018a, 2018b; Devece et al., 2019; Gnyawali & Charleton, 2018). According to Bengtsson et al. (2010), the cooperation literature "usually ignores competitive influences on a relationship, or merely treats them as negative influences. Similarly, the competition literature tends to view cooperation as a market imperfection hampering competitive dynamics and resulting benefits" (p. 195).

Conversely, Bengtsson and Kock (2014) give voice to a growing academic community that rejects the either/or assumptions of traditional views on cooperation and competition and advocates a paradoxical approach to investigating the cooperation–competition interplay. Nevertheless, to successfully accumulate knowledge in this emerging research field, it is important to overcome the extant ambiguities in the definitions of these constructs and, more importantly, our understanding of the reciprocal relationship between them (Dagnino & Mariani, 2010; Gast et al., 2015; Hoffmann et al., 2018; Köseoğlu et al., 2019).

The central problem is that as antagonistic phenomena, cooperation, and competition should be operationalized as two opposite extremes on a continuum, while as potentially coexisting and mutually beneficial phenomena, they should be viewed as orthogonal constructs (Bengtsson et al., 2010) (see Fig. 1). If the mix between cooperation and competition (i.e., coopetition) occurs on a continuum, the phenomenon is described as ranging from strong competition to strong cooperation; thus, when cooperation increases, it is at the expense of reduced competition. Conversely, if cooperation and competition are modeled as orthogonal

* Corresponding author.
E-mail addresses: francesca.ricciardi@unito.it (F. Ricciardi), alessandro.zardini@univr.it (A. Zardini), wojciech.czakon@uj.edu.pl (W. Czakon), cecilia.rossignoli@univr.it (C. Rossignoli), sascha.kraus@zfke.de (S. Kraus).

https://doi.org/10.1016/j.emj.2021.07.002
Received 14 December 2020; Received in revised form 19 June 2021; Accepted 1 July 2021
Available online 5 July 2021

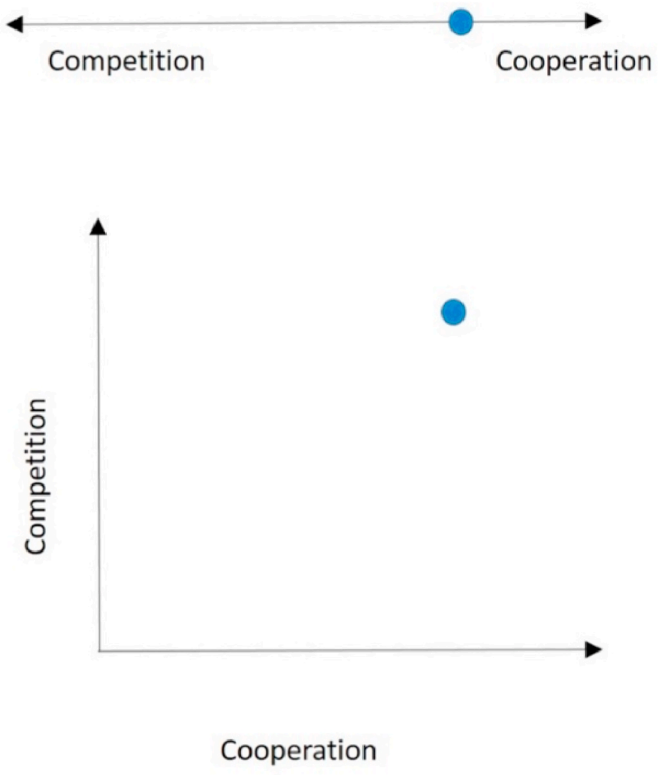

Fig. 1. The competition–cooperation operationalization continuum.

constructs, high (low) levels of cooperation may also enable high (low) levels of competition, and vice-versa. Recent theoretical developments suggest that balancing high or moderately high levels of cooperation and competition may be instrumental in reaping the beneficial outcomes of the relationship (Gnyawali & Ryan Charleton, 2018).

The question arises as to whether the two concepts can be simultaneously operationalized (Mattsson & Tidström, 2015) as both orthogonal and on a continuum. To the best of our knowledge (Bouncken and Barwinski, 2021), this implication of the cooperation–competition paradox has not yet been addressed (Czakon et al., 2020). We believe that the lack of consistent operationalization has hindered scholars from fully exploiting the potential of the paradoxical approach to describe and explain the interplay between cooperation and competition in a consistent, integrated fashion.

Our study focuses on this gap by addressing the following research question: *What configurations of the cooperation–competition paradox are associated with success?*

We conceptualize firm success as a multi-faceted construct including short-term, present-time success (in terms of financial performance, market performance, and firm power) and capacity of long-term success (in terms optional capital and business model viability).

As for cooperation and competition, we build on the recent findings of the evolutionary approach (Rand & Nowak, 2013; Sigmund, 2010) and adopt a more granular view of both constructs. In our study, we propose a three-dimensional (3D) model of interfirm relationships. The three axes of the 3D relational space correspond to three polarized dimensions of the cooperation–competition relationship: *fairness–opportunism*, *sharing–control*, and *engagement–rivalry*. Because the axes are orthogonal, they effectively describe the coexistence of cooperation and competition at the interdimensional level. The values of each dimension are expected to vary on a continuum along each axis, effectively capturing the reciprocally eroding interplay between cooperation and competition at the intra-dimensional level.

The 3D model of relational space reveals eight basic configurations of social interactions, providing a novel tool with which to measure the paradoxical interplay between cooperation and competition in an integrated fashion. Therefore, the model may enable more systematic investigations of the diversity and dynamism of social relationships at the inter- and intra-organizational levels in both cross-sectional and longitudinal studies.

In this study, we used the model to assess how different configurations of interfirm relationships influenced the short- and long-term success of a sample of 217 Italian firms that had entered into official network contracts (Cantele et al., 2016; Ricciardi et al., 2016). Thus, all firms in the sample had developed their network interactions using the same institutional logic (Wooten & Hoffman, 2008), enabling us to exclude institutional forces (Mariani, 2018) as an alternative explanation for the relationship between coopetitive configurations and firm outcomes. Using fuzzy-set qualitative comparative analysis, we found that full cooperation (high fairness/high sharing/high engagement) was the only configuration associated with both short- and long-term success. We also found that a paradoxical mixed configuration (high opportunism/high sharing/high rivalry) was associated with short-term success in terms of firm power, market performance, and financial performance.

2. Conceptual development: An integrated view of cooperation and competition

2.1. Contribution of the evolutionary approach

For decades, evolutionary scholars focused only on competition mechanisms. However, since the 1970s and especially the 1980s, they have given increasing attention to evolutionary explanations of cooperation, viewed as a complementary mechanism to competition under selective pressures. In 2012, the *Journal of Theoretical Biology* marked its fiftieth anniversary with a special issue on the evolution of cooperation (Nowak, 2012). Given this systematic attention, the stream of evolutionary studies on the interplay between cooperation and competition has today became a river. Meanwhile, management scholars have become more aware that classical concepts of evolutionary economics, which are rooted in early twentieth century evolutionary research and are strongly biased toward the rational actor assumption, must be complemented with further studies explaining social embeddedness in the business context (Dosi & Marengo, 2007).

These two important research streams, from the life sciences and social sciences, respectively, have relentlessly converged toward an interdisciplinary approach to human nature (Fowler & Schreiber, 2008). An impressive number of empirical studies have offered explanations for how and why competition results in the emergence of cooperation under selective pressures, and vice-versa (Sigmund, 2010; West et al., 2007). Evolutionary scholars refer to the dynamic balance between traditional structures and mutations as a condition for the emergence of relatively stable configurations of traits (Reschke & Kraus, 2009).

According to this emerging view (Preston & De Waal, 2002; Rand & Nowak, 2013), the coexistence of cooperation and competition is not an exception nor a recent phenomenon. Rather, it is the typical way through which individuals, groups, organizations, and communities interact because neither cooperation nor competition in isolation can lead to long-term survival under selective pressures. Further, the evolutionary approach highlights that it is impossible to establish an optimal balance between cooperation and competition in the long term because both phenomena eventually generate threats or opportunities that disrupt even the most stable equilibrium. Therefore, the only possible equilibria between cooperation and competition are relationship specific, provisional, and homeostatic, achieved through continual adjustments and feedback. Coopetition researchers refer to these equilibria by mobilizing such concepts as balancing (Bouncken, Fredrich, Kraus, & Ritala, 2020; Cortese et al., 2018), navigating simultaneity (Bouncken, Fredrich, Kraus, & Ritala, 2020; Gnyawali & Charleton,

2018), or seeking harmony (Chou & Zolkiewski, 2018).

The evolutionary view encourages researchers to overcome all ideological approaches to cooperation and competition by highlighting the poor explanatory power of traditional either/or views such as cooperation is good/competition is bad (or vice-versa) or humans are competitive by nature, while cooperation is culturally and socially constructed (or vice-versa). The findings of evolutionary scholars have converged toward the suggestion that while specific manifestations of cooperation and competition exist in specific social and cultural contexts, they are enabled by innate hardwired cognitive and emotional attitudes (Sigmund, 2010). Therefore, both natural and cultural evolution have led humans to be "super-coopetitors", capable of continuously rebuilding and moving across complex relational spaces.

According to this evolutionary view of cooperation and competition, the multilevel relational space of each actor (e.g., individual, group, organization, or community) comprises networks of diverse relationships characterized by various provisional combinations (Reschke & Kraus, 2009) of cooperation and competition that evolve over time. Importantly, evolutionary studies confirm the paradoxical relationship between cooperation and competition. While cooperation and competition are often triggered by opposing and mutually exclusive emotional and cognitive processes that have evolved over time because of biological and cultural selective pressures (Lundgren-Henriksson & Kock, 2016; Raza-Ullah, 2020; Tidström, 2014), they are also reciprocally enabling—high levels of cooperation tend to create high evolutionary rewards for new forms of competition, and vice versa (Czakon et al., 2020; Gnyawali & Charleton, 2018; Sigmund, 2010). Therefore, it is important to model the paradoxical interplay between these two phenomena. By taking a more granular view and unpacking the dimensions of this paradoxical interplay, we concur with the evolutionary approach by examining configurations of the cooperation–competition paradox as mutations in the biological environment (Reschke & Kraus, 2009) to identify those that contribute to success.

2.2. Three polarized axes: expectations of others, use of resources, and goals

The evolutionary perspective, which provides coherent explanations for the paradoxical interplay between cooperation and competition, also offers hints for modeling this interplay. It reveals configurations, or identifiable features, as variants or "mutations" of coopetitive relationships that are tested in the environment with the aim of retaining or discarding them (Reschke & Kraus, 2009).

In this study, we follow Sigmund (2010) in outlining a granular framework of cooperation and competition. Sigmund's work is highly consistent with the larger body of knowledge on the coevolution of cooperation and competition (De Waal, 2009; Nowak, 2012; Preston & De Waal, 2002; Bouncken & Barwinski, 2021; Rand & Nowak, 2013). Sigmund categorizes the choice between cooperation and competition as three basic dimensions: (1) to be fair (or not), (2) to share resources (or not), and (3) to engage in joint (or rivalrous) enterprises. This view is highly compatible with the paradoxical approach to management problems. In fact, studies have focused on how organizational phenomena are shaped by the paradoxical tension (Lewis, 2000) between two key opposing strategies: whether to support something or oppose it.

By applying the support vs. oppose tension to the three dimensions of the cooperate-or-compete choice identified by Sigmund (2010), we developed a comprehensive construct describing cooperation and competition as two sides of the same coin, thus incorporating the paradoxical tensions within and across the three dimensions of the construct. Building on this approach, we arrived at the following three either/or dimensions of the cooperation–competition (or coopetition) construct:

1. To support or oppose the legitimate expectations of others (*fairness–opportunism* axis)
2. To support or oppose the use of resources by others (*sharing–control* axis)
3. To support or oppose the goals of others (*engagement–rivalry* axis).

Each axis of the 3D model describes variables on a continuum. For example, high levels of fairness necessarily imply low levels of opportunism within a certain interaction or relationship. Additionally, the three axes can be viewed as orthogonal; for example, high levels of fairness (a dimension of cooperation) can coexist with high levels of rivalry (a dimension of competition). In this way, the three axes create a 3D space, represented as a Cartesian space in Fig. 2, which illustrates the relational space model used to answer our research question.

2.3. Dimension 1: fairness–opportunism

People judge the behaviors of others based on legitimate expectations. Thus, unfair, or unreliable behaviors are perceived as unacceptable unless they respect behavioral thresholds perceived by other actors as critical. For example, a late payment by a customer may be considered unacceptable after a week in some circumstances or after a year in others. These thresholds are socially constructed (e.g., through negotiations or ideological conflicts) and may differ significantly from context to context. Nevertheless, all socially constructed behavioral thresholds are built on a basis of innate prosocial attitudes (Sigmund, 2010). In other words, even if the threshold at which a certain behavior is perceived as unacceptably selfish or inappropriate varies across different cultures and situations, all human societies are built on the idea that behavioral thresholds exist and those who violate them should be punished.

Fairness is a widespread concept indicating respect of others' thresholds of behavioral acceptability in social interactions. An actor's behavior is considered fair as long as it meets the perceived expectations of others involved in the relationship. However, if the actor fails to meet these expectations, the behavior is perceived as *opportunistic* or greedy (Rossi & Warglien, 2009). Fairness is seen as critical for firms engaged in business-to-business activities (Sabri et al., 2021). Recent studies have

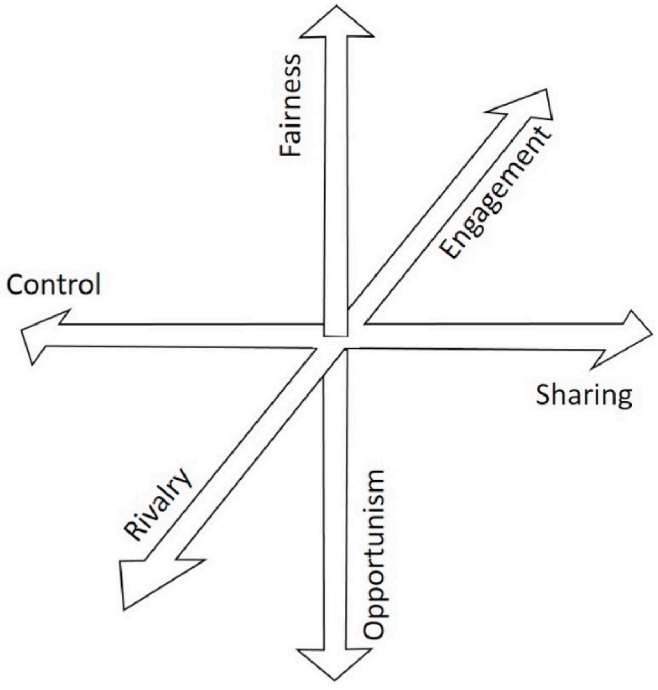

Fig. 2. 3D model of relational space: cooperation (fairness/sharing/engagement) and competition (opportunism/control/rivalry) viewed as both orthogonal and on a continuum.

examined fairness as a key perception of individuals dealing with coopetition tensions by correcting behaviors, procedures, and outcomes (Liu et al., 2020). By taking a social embeddedness perspective, we capture the behavioral choices faced by individuals. Prior approaches have adopted the rational economic agent perspective, which posits that actors can be egocentric when pursuing their own interests or allocentric if the pursuit of one's interests involves the interests of others (Brandenburger & Nalebuff, 1995). Therefore, a relationship is fair (opportunistic) to the extent that the involved actors are expected, capable, and willing to respect (disappoint) the legitimate expectations of others.

While long-term relationships built on trust are more likely to be characterized by fairness, relationships between strangers may also be built on fairness, especially if the actors are confident about the ability of their institutional environments to prevent unfair behaviors. Fairness is costly—it requires not only active commitment but also the waiving of opportunities or payoffs. For this reason, individual actors may choose to behave opportunistically, while inequity-averse actors are often in the minority (Fehr & Schmidt, 1999). However, fairness also brings benefits, especially in the long term and at the system level (Granovetter, 1985). If a relationship is fair, the involved parties can mutually meet each other's expectations, leading to a more trusting and stable relationship, fewer resources lost in punishing behaviors perceived as opportunistic, and decreased uncertainty (Lado et al., 2013).

Conversely, if an actor behaves in a way that is perceived as opportunistic, the relationship becomes unstable because people often seek to punish or cut ties with those perceived as unreliable (Hauert et al., 2007). Repeated unfairness undermines constructive relationships because of the instability of behaviors adopted by actors (Czakon, 2010). Social systems with low levels of reciprocal fairness are usually incapable of protecting or creating resources, eventually collapsing after costly conflicts to seize slices of an increasingly smaller pie (Santos & Pacheco, 2011). Conversely, the total absence of opportunism is also detrimental because it results in a harmful decrease of emotional, cognitive, and institutional antibodies against opportunism (Raza-Ullah & Kostis, 2020), making the system vulnerable to sudden, catastrophic invasions of cheaters (Doebeli & Hauert, 2005). It is important to note that a high degree of fairness does not necessarily imply that a relationship is friendly or collaborative. For example, fair *rivalry* is at the base of both sports and perfectly competitive markets.

Thus, we distinguish the fairness–opportunism axis from the other two dimensions of the cooperation–competition continuum: sharing–control and engagement–rivalry.

2.4. Dimension 2: sharing–control

Sharing occurs when actors waive their control over resources and make them accessible to others. Sharing behaviors are common (Powell & Grodal, 2005)—individuals, communities, and organizations often share knowledge, relationships, and other resources, including tangible goods and power, even under no obligation to do so, thus purposefully renouncing control over such critical resources (Koka & Prescott, 2002) for the benefit of others.

Similar to fair behaviors, sharing behaviors are essential for enabling the self-organizing capabilities of social groups. Indeed, individuals rarely have full control over all the resources they need to survive and thrive and fail to fully exploit the resources they do actually control. Therefore, providing others with access to potentially critical resources is an effective strategy to enable capabilities that otherwise would remain inactive (Blomqvist & Levy, 2006). In particular, firms sharing their knowledge is critically important to show their strategic intent (Seepana et al., 2020). Examples span all historical periods and include the social interactions that typically occur in mentoring, clubs, charities, work teams, and online communities. For innovation projects to be successful, knowledge sharing is required between firms (Rouyre & Fernandez, 2019), within firms (Tsai, 2002), and within teams (Baruch & Lin, 2012). Transparency is a key factor in sharing relationships because in opaque social environments, individuals may feel that sharing is unlikely to be reciprocated nor lead to enhanced reputation (Nowak, 2006). Individuals in a central position and who are trusted by others can facilitate knowledge sharing in coopetition (Chiambaretto et al., 2019).

In some situations, an actor may decide to hinder access to resources, especially if resources are in short supply or can be used against the interests of the actor (Chen & Miller, 2015). Hence, the opposite of sharing is control (Eriksson, 2008), identified as one pole of the paradoxical tension between sharing and protecting (Tidström, 2014). Without some control, unlimited sharing may leave a firm without any benefits from the value jointly created with others (Wilhelm & Sydow, 2018). Recent coopetition studies demonstrate that preventing unintended knowledge leaks to competitors is important in innovation projects (Rouyre & Fernandez, 2019) and increasing product innovation performance (Estrada et al., 2016). Formal and informal control mechanisms can be deployed to this aim (Fernandez & Chiambaretto, 2016). Interestingly, individuals who engage in both sharing and an acceptable level of control play an important role in coopetition (Chiambaretto et al., 2019).

Based on this understanding, we propose the following definition of sharing–control: A relationship is mutually sharing/controlling to the extent that the involved actors are expected, capable, and willing to provide/restrict access to resources that are potentially valuable to others.

Providing others with access to a resource comes at a cost. First, making a resource accessible often requires effort; for example, it takes time to share knowledge by contributing to Wikipedia. In addition, if the shared resource is finite, the actor who shares it will lose the possibility of using it in the future. For example, if a family hosts a banquet, the money spent on food and beverage will be irreversibly lost. The sharing of intangible resources may also carry a cost; that is, losing the option of control. For example, once a firm has shared valuable business information with another firm, the latter may use that information against the interests and will of the former.

Similar to sharing, control also carries costs and risks. First, struggling to gain or retain control over resources may be difficult. Further, a controlling attitude is often perceived as a thirst for power, potentially resulting in loss of reputation and costly conflicts. Finally, relationships with high levels of reciprocal control have low levels of knowledge exchange and trust, negatively affecting innovation capabilities.

To define a relationship as sharing, actors are not necessarily required to pursue specific shared goals. For example, if the managers of two different firms exchange business information at a party, they do not become directly engaged in each other's specific goals (such as managing a customer or making a decision). They simply make a resource (knowledge) available and allow the other to use it at will.

Thus, sharing–control is distinct from the third dimension of the cooperation–competition continuum: engagement–rivalry.

2.5. Dimension 3: engagement–rivalry

Engagement occurs when an actor purposefully helps another fulfill a specific need or goal. In many cases, an individual's decision to help another is based on the expectation that it will also fulfill the former's needs. If expectations are reciprocal, engagement behaviors are more likely to become mutual in the long term (Dyer & Singh, 1998). For example, two firms collaborating in a product innovation project can be described as mutual engagement (Adler & Kwon, 2002; Borgatti & Foster, 2003). In contrast, rivalry occurs when an actor fights against another whose goals are perceived as conflicting. Thus, relationships are characterized by mutual engagement/rivalry to the extent that involved actors are expected, capable, and willing to help/fight each other to pursue common/conflicting goals.

Engagement carries costs and risks. First, it requires effective communication and coordination, which are costly. One way to engage

effectively in coopetition is to establish a dedicated coopetition project team (Le Roy & Fernandez, 2015), even if formal mechanisms are not sufficient and informal mechanisms need to be implemented (Fernandez & Chiambaretto, 2016). Combining both requires more effort but also offers higher benefits (Bouncken et al., 2016). Second, given that actors' needs are rarely identical, actors will eventually transfer some of their resources and capabilities from the pursuit of their own goals to the pursuit of others' goals. Importantly, this withdrawal may prove destabilizing or unsustainable. Third, given that mutual engagement often results in some degree of mutual dependence, this type of cooperation limits room for maneuver. Fourth, engagement may require high investments and exposure to risk of disaster should the common project fail and/or the relationship end badly (e.g., if trust is betrayed).

Rivalry also carries costs and risks. Indeed, rivalry implies some kind of contest between actors who are actively fighting for something they value (Bouncken, Fredrich, & Kraus, 2020). Preparing for and engaging in this fight may be resource consuming, especially considering the risks inherent in losing the contest. Winners also face risks, including long-lasting hostilities of former contenders. Overall, the costs and risks of rivalry, like those of engagement, may prove unsustainable. For this reason, actors who compete through rivalry are often tempted either give up or resort to easier means of competition such as opportunism or control. For example, a football team competes through *fair rivalry* if players do their best in training and on the field and through *opportunistic rivalry* if they bribe the referee.

Fair rivalry is fragile because it is vulnerable to being superseded by other forms of competition; however, it is highly beneficial at the societal level. In fact, fair competition is an irreplaceable mechanism through which to encourage people to do their best and engage in common enterprises against rivals. Engagement and rivalry are powerful forms of cooperation and competition, respectively. These social processes allow actors to achieve goals that would otherwise be out of reach, such as raising children or producing effective medicines.

For this reason, emotional attitudes and socially constructed values have emerged in natural and cultural evolution, respectively, that support and reward fair engagement and fair rivalry. Indeed, the term "fair rivalry" shows that the fairness–opportunism and engagement–rivalry tensions—two clearly distinguishable dimensions of the cooperation–competition continuum—may be disentangled and recombined. Fair engagement and fair rivalry are perceived as the behaviors of heroes, and the results achieved through these social processes in all fields (e.g., sports, business, or science) are the subject of pride. Society usually sanctions those who opportunistically avoid engagement or rivalry. Typical examples include severely punishing deserters or blaming sports teammates who are lazy during training.

In view of the above, engagement may require specific, tailored agreements to establish the rules of the game for specific relationships depending on the common and/or reciprocal goals pursued (Santos & Pacheco, 2011). Thus, it is not surprising that engagement is often ruled by specific contracts (Mariani, 2016; Reuer & Ariño, 2007). These contracts may include economic agreements, especially if direct reciprocation between actors is difficult (e.g., employment contracts). Conversely, rivalry tends to be more extemporaneous, and rivals are not likely to be in the mood to negotiate the specific rules of the game before each contest. Therefore, the rules governing rivalry (e.g., the rules of football or commercial competition) are often established by legitimate external institutions. Institutional effectiveness is particularly important to increase the chance of fair rivalry in the absence of ad hoc contracts between rivals.

In sum, both engagement and rivalry may exist in several diverse configurations: for example, if engagement occurs with fairness and sharing, it is significantly different from engagement that is opportunistic or aimed at control. These observations confirm the usefulness of clearly distinguishing the three axes of the cooperation–competition construct.

2.6. Investigating the relational space through the 3D model

The 3D model illustrated in Fig. 2 allows us to identify eight basic configurations of relationships, ranging from fully cooperative (fairness, sharing, and engagement) to fully competitive (opportunism, control, and rivalry). These eight configurations, based on whether the expectations, use of resources, and goals of others are supported or opposed, are shown in Table 1. Based on game theory and the evolutionary approach to relationships (Nowak, 2006; Preston & De Waal, 2002; Rand & Nowak, 2013; Sigmund, 2010), interesting predictions can be made about the conditions for success for the eight relational configurations.

Relationships in which actors engage with each other toward a common goal (i.e., the four configuration codes in Table 1 with *E* as the final letter) can only be successful if partners have or develop value co-creation capabilities (Bouncken, Fredrich, Ritala, & Kraus, 2020). Conversely, relationships in which actors are rivalrous (i.e., the four configuration codes with *R* as the final letter), including higher-level external relationships (e.g., competition with industries in other countries), can only be successful if in the process of co-creation actors are not required to address challenges.

The first configuration (high fairness (F), high sharing (S), high engagement (E)) (FSE) is labeled *full cooperation*. In this type of relationship, all actors behave in accordance with the key social expectations of others, share at least one relevant resource, and collaborate toward at least one relevant goal. FSE is the configuration with the strongest creativity and learning potential, thus is particularly successful in contexts in which flexibility and innovation are rewarded. Because these relationships are characterized by high levels of trust and

Table 1
The eight relational configurations resulting from the 3D model of relational space.

Configuration		Relationship	Conditions for success	Stability
FSE	Fairness + sharing + engagement	Full cooperation	Anti-opportunism barriers; co-creation capabilities; innovation*	High
FSR	Fairness + sharing + rivalry	Beau geste relationship	Transparency; no co-creation required; * availability of resources	High
FCE	Fairness + control + engagement	Transactional collaboration	Anti-opportunism barriers; co-creation capabilities; stability*	High
FCR	Fairness + control + rivalry	Sportsmanlike competition	Opportunities for redress; transparency; strong institutions; no co-creation required*	High
OSE	Opportunism + sharing + engagement	Distrustful collaboration	Unless shared, resources are not available or useable; * co-creation capabilities	Low (tends to FSE or OSR)
OSR	Opportunism + sharing + rivalry	Predatory agreement	Unless shared, resources are not available or useable; * no co-creation required*	High
OCE	Opportunism + control + engagement	Reluctant collaboration	Dire "life raft" conditions; lack of alternatives; co-creation capabilities	Low (tends to OCR or FCE)
OCR	Opportunism + control + rivalry	Full competition	Severe lack or depletion of resources; no co-creation required*	High

Note. *Also needed in managing external or higher-level relationships.

interdependence, they are particularly vulnerable to cheaters, meaning that they require strong cultural, operational, and institutional antibodies against opportunism for success.

The second configuration (high fairness (F), high sharing (S), high rivalry (R)) (FSR) is labeled the *"beau geste" relationship*. In this configuration, all actors behave in accordance with the key social expectations of others and share at least one relevant resource but are rivals in terms of their key goals. For example, commercial competitors that exchange business information may be included in the FSR category. This configuration mainly through reciprocation and reputation; thus, transparency is particularly important for the success of this configuration.

The third configuration (high fairness (F), high control (C), high engagement (E)) (FCE) is labeled *transactional collaboration*, in which all actors behave in accordance with key social expectations and collaborate toward at least one relevant goal but strictly control (rather than share) their respective resources. This relational configuration is common in long-term, highly regulated relationships such as employment contracts or hierarchical business networks. The FCE relationship is particularly successful in contexts in which efficiency, stability, and predictability are rewarded.

The fourth configuration (high fairness (F), high control (C), high rivalry (R)) (FCR) is labeled *sportsmanlike competition* in which actors behave in accordance with key social expectations but strictly control (rather than share) their resources and are rivals in terms of their key goals. This relationship corresponds with the classic concept of fair competition—to be successful, it requires clear rules and strong institutions to reduce the temptation to cheat, and losers must be given the opportunity for redress.

The fifth configuration (high opportunism (O), high sharing (S), high engagement (E)) (OSE) is labeled *distrustful collaboration* in which actors behave contrary to key social expectations but share at least one relevant resource and collaborate toward at least one relevant goal. In this case, actors collaborate and share resources but do not trust each other. Because collaboration is incompatible with opportunism, OSE is an intrinsically unstable configuration, even when the conditions of success are met. Actors will either strive to create institutional conditions for fairness, thus transforming the OSE relationship into an FSE relationship, or abandon the collaboration as soon as possible, thus transforming the OSE relationship into an OCR relationship or a non-relationship.

The sixth configuration (high opportunism (O), high sharing (S), high rivalry (R)) (OSR) is labeled *predatory agreement* in which actors behave contrary to key social expectations and are rivals in terms of their key goals but share at least one relevant resource. Typically, an OSR relationship occurs when actors decide to share otherwise unavailable resources, which are typically provided by an external party (e.g., public funding).

The seventh configuration (high opportunism (O), high control (C), high engagement (E)) (OCE) is labeled *reluctant collaboration* in which actors behave contrary to key social expectations and strictly control their resources but collaborate toward at least one relevant goal. Typically, actors choose this type of relationship when they must collaborate under conditions of *force majeure*. Similar to OSE, OCE is an unstable configuration because it combines opportunism and engagement, which are triggered by incompatible logical and emotional triggers. If the *force majeure* situation persists, the relationship can only remain successful if it becomes more cooperative (e.g., FSE or FCE). If the *force majeure* situation ends, an OCE relationship typically transforms into a fully competitive OCR relationship or a non-relationship.

The final configuration (high opportunism (O), high control (C), high rivalry (R)) (OCR) is labeled *full competition* in which actors behave contrary to key social expectations, strictly control their resources and are rivals in terms of their key goals. This type of relationship can only be successful in conditions of severe shortage or depletion of resources; otherwise, fair rivalry configurations such as FCR are more advantageous in the long term. In addition, this relationship exposes actors to the risk of being outperformed by rival networks in co-creating value. Therefore, for OCR relationships to be successful, it is particularly important that value co-creation is not a critical capability.

3. Method

Our 3D model is valuable for conducting novel investigations rooted in evolutionary studies about the nature, antecedents, and consequences of coopetition. The model can be used to test the boundary conditions under which various relational configurations result in short- and long-term success and failure at the firm, network, and system levels. It is also possible to investigate how and why configurations transform from one to the other and the factors determining the distribution and success of a configuration. Institutional drivers are important in understanding coopetition dynamics (Mariani, 2018). Therefore, we empirically test the 3D model of interorganizational relationships by focusing on relational configurations under a specific institutional driver—Italian network contracts.

3.1. Italian network contracts as an institutional driver of interfirm relationships

Introduced into Italian law in 2009 (Law 33/2009), network contracts are novel interorganizational agreements aimed at creating favorable conditions for interfirm collaboration, resource sharing, and engagement in projects of common interest among partnering firms, such as internationalization, supply chain integration, and research and development. The rationale behind this law is that such collaborative interfirm relationships will enable innovation and robustness in the face of turbulent and globalized business environments. Firms that enter into network contracts operate under a uniform institutional logic that encourages and enables coopetition as the key to resilience and competitiveness. Hence, adopting a sample of firms that have entered into network contracts can facilitate the understanding of how different configurations of coopetition influence firm performance by minimizing the role of the institutional environment. In other words, our purposeful sampling enabled us to better clarify the role of relational configurations *"per se"* in explaining the differences in performance of firms in the same institutional environment.

3.2. Fuzzy-set qualitative comparative analysis

To explore whether one or more of the eight relational configurations are associated with short- and/or long-term firm success, we conducted fsQCA, which is particularly suited to exploratory investigations because it entails a "configurational way of thinking and theorizing about the complexity inherent in causation among management and organizational phenomena" (Misangyi et al., 2017, p. 259). Thus, this method is especially useful for investigating the causal complexity implicit in our 3D model. The limited diversity reduces endogeneity issues and identifies the presence of an outcome as well as the paths leading to its absence (Bouncken, Fredrich, & Kraus, 2020). fsQCA is both a research paradigm and a data analytical technique (Kraus et al., 2018; Mellewigt et al., 2018). Fiss (2011) explains that traditional statistical methods such as structural equation and regression modeling are only suitable for investigating symmetric causal correlations. In other words, correlation can capture only one cause and effect relationship at a time. In contrast, fsQCA enables the simultaneous exploration of all possible interactions and outcomes in a set of variables defined as characteristics of the phenomenon under investigation. Essentially, fsQCA focuses on the combined effects of causal conditions because it assumes causation to be complex, intertwined, and holistic. It aims to identify and explain causal connections (configurations) between a set of phenomena on the basis of asymmetric linkages (Ragin, 2008). Thus, the use of fsQCA enabled us to address the causal asymmetry, equifinality, and possible interdependence between the three initial conditions of the 3D model depicted in

Fig. 2 (fairness, sharing, engagement) (Ragin, 2000, 2008; Woodside, 2010). Moreover, by using fsQCA, it is possible to associate low values of an input variable with both low and high values of output variables (Woodside, 2010). These findings make fsQCA particularly suited for concept formation, elaboration, and refinement and theory development (Fiss, 2011). To minimize common method bias, we used Podsakoff et al.'s (2012) set of principles for correcting estimate values.

Table 2
Questionnaire items.

Initial Variables				
Variable	Variable label	Cronbach's Alfa	Items	EFA component matrix (KMO = 0.75, Sig=0.000)
Fairness (as opposed to Opportunism)	F	0.89	The network agreements provide clear and easily applicable penalties for any incorrect behavior of the participating firms.	0.903
			There is a right level of trust between people who interact within the network.	
Sharing (as opposed to Resource Control)	S		There is a robust sharing of common values in the network.	0.910
			Thanks to the network, the partners share human resources and/or other essential resources.	
Engagement (as opposed to Rivalry)	E		The network develops joint projects that, without the network, our company could not address.	0.905
			The network develops the strategy through a network-level business plan.	
Long-term success factors (outcomes)				
Variable	Variable label	Cronbach's Alfa	Items: *In the last year, (also) thanks to the network...*	EFA component matrix (KMO = 0.62, Sig=0.000)
Optional Capital	Ooc	0.88	…our firm has discovered new market opportunities.	0.944
			…our firm had the opportunity to expand (or diversify) the range of suppliers and/or partners.	
			…our firm had the opportunity to increase investments.	
Business Model Viability	Obm		…our firm has been highly credible in our reference markets.	0.943
			…our firm has proposed products/services for which there is high demand.	
			…our firm has reached profitable customers via effective channels.	
Short- to middle-term success factors (outcomes)				
Variable	Variable label	Cronbach's Alfa	Items: *In the last year, (also) thanks to the network...*	EFA component matrix (KMO = 0.68, Sig=0.000)
Power	Opw	0.85	…our firm influenced, directly or indirectly, those who make the laws or rules of the sector.	0.891
			…our firm has prevented counterparties with opposing interests from harming.	
Market	Omk		…sales have increased.	0.917
			…market shares have increased.	
			…customer satisfaction has increased.	
Economic-Financial Performance	Oef		…our firm reduced costs and/or waste.	0.907
			…our firm increased its productivity.	
			…our firm increased its profitability.	
			…our firm increased its return on investments.	

3.3. Data collection

According to Confindustria, the leading Italian industrial association, approximately 18,000 firms were involved in network contracts under Law 33/2009 as of December 2019. We focused on networks established between 2010 and 2014 to exclude recent relationships and the buffeting effects of the 2008 global financial crisis. In addition, given that the effects of institutionalized networking take time to unfold, we selected networks that had been established for at least 4 years. This resulted in a sample of around 900 firms to which questionnaires were emailed. Questionnaires were completed by managers of 217 firms (engaged in 74 networks), yielding an overall response rate of 24.1%.

Respondents represented a broad and balanced range of industries, including services (35%), manufacturing (35%), fashion and clothing (8%), information and telecommunications (10%), and food and beverage (12%). In terms of firm size, 40% had 10–50 employees, 44% had 50–249 employees, 12% had 250–499 employees, and 4% had more than 500 employees.

Questionnaire items were developed based on the extant literature. All items (for both the initial conditions and outcomes) were based on a 3-point Likert scale. The final scales were validated through exploratory and confirmatory factor analysis. Table 2 shows the questionnaire items for the three initial variables—fairness (*F*), sharing (*S*), and engagement (*E*)—and the five outcome variables—long-term outcomes: optional capital (O_{OC}) and business model viability (O_{BM}); short-term outcomes: power (O_{PW}), market excellence (O_{MK}), and economic/financial performance (O_{EF}).

3.4. Fuzzy set calibration

Before running fsQCA, a calibration process is needed to transform the original data into a continuous value interval from 0 to 1 (Ragin & Fiss, 2008; Woodside, 2010). This includes identifying breakpoints that enable the assignment (or not) of membership of set cases (Greckhamer, 2011). Therefore, all characteristics were converted into fuzzy set continuous values (Fiss, 2011) by applying the direct calibration method of coding (Ragin, 2008). This method relies on identifying specific anchors for each attribute, which were chosen on the basis of technical (based on percentile distribution) and qualitative (based on theoretical expertise and qualitative knowledge) assessments (Greckhamer, 2011).

We used the average values of questionnaire items for initial variables to estimate outcomes. Questionnaire items were based on a 3-point Likert scale; thus, values were between 1 and 3. The initial variables (*F*, *S*, and *E*) were transformed into three categories (low, medium, and high), with low being the opposite of the opposing variables: opportunism (*O*), control (*C*), and rivalry (*R*), to simplify the analysis without losing model significance. The five outcomes (O_{OC}, O_{BM}, O_{PW}, O_{MK}, and O_{EF}) were transformed into three categories (low, medium, and high). The threshold value (i.e., the point of maximum ambiguity) was set to 2 to isolate high-level values.

Finally, to validate the calibration, we also employed the fuzzification/defuzzification procedure defined by Li (2013) and obtained comparable results, suggesting that no information had been lost in the transformation process.

4. Results

First, Pearson's correlation coefficient showed 16 significant positive correlations among the initial variables and the five outcome variables (O_{OC}, O_{BM}, O_{PW}, O_{MK}, and O_{EF}) (see Table 3). All correlations had a significant net effect because values were no higher than 0.33 (Ragin, 2008), excluding multicollinearity. Thus, initial variables and outcome measures were nonlinear and asymmetric. Hence, it was appropriate to use fsQCA.

Following Ragin (2008), we set the threshold to 0.90 for necessary conditions and 0.75 for sufficient conditions to ensure high model reliability and robustness. Following Schneider and Wagemann (2012), we analyzed necessary and sufficient conditions separately. No condition turned out to be individually necessary for reaching the outcomes (or non-outcomes). In line with Greckhamer (2011), we used a combination of intermediate and parsimonious solutions, which included all counterfactuals, regardless of their plausibility (Ragin, 2008).

Using sufficient analysis to identify "truth tables", intermediate solutions coincided with parsimonious solutions. fsQCA analysis identified one solution (S1) associated with long-term success outcomes (O_{OC} and O_{BM}) and two solutions (S1 and S2) associated with short- and medium-term success outcomes (O_{PW}, O_{MK}, and O_{EF}). To synthesize the results as suggested by Ragin and Fiss (2008), we used a notation system in which each column represents a configuration of conditions linked to the respective outcome: filled circles (•) indicate the presence of a condition, while crossed circles (⊗) indicate the absence of a condition (see

Table 4
Results of fuzzy-set qualitative comparative analysis.

	Outcomes							
	O_{OC}	O_{BM}	O_{PW}		O_{MK}		O_{EF}	
	S1	S1	S1	S2	S1	S2	S1	S2
F	•	•	⊗	•	⊗	•	⊗	•
S	•	•	•	•	•	•	•	•
E	•	•	⊗	•	⊗	•	⊗	•
Consistency	0.78	0.83	0.83	0.86	0.89	0.85	0.92	0.86
Raw coverage	0.59	0.56	0.31	0.48	0.33	0.47	0.30	0.43
Unique coverage	0.59	0.56	0.08	0.26	0.10	0.25	0.09	0.22
Solution consistency	0.78	0.83	0.82		0.84		0.85	
Solution coverage	0.59	0.56	0.56		0.57		0.52	
Frequency cutoff	4	4	4		4		4	
Consistency cutoff	0.78	0.83	0.83		0.85		0.86	

Note. Conditions: *F*: fairness; *S*: sharing; *E*: engagement. Outcomes: O_{OC}: optional capital; O_{BM}: business model viability; O_{PW}: power; O_{MK}: market excellence; O_{EF}: economic/financial performance. • indicates the presence of a condition; ⊗ indicates the absence of a condition.

Table 3
Pearson's correlation matrix ($N = 202$).

Variables		*F*	*S*	*E*	O_{OC}	O_{BM}	O_{PW}	O_{MK}	O_{EF}
Conditions	*F*	1							
	S	.208**	1						
	E	.194**	.324**	1					
Outcomes	OOC	.027	.278**	.277**	1				
	OBM	.132	.237**	.275**		1			
	OPW	.079	.129	.216**			1		
	OMK	.019	.320**	.310**				1	
	OEF	.152*	.296**	.214**					1

Note. Conditions: *F*: fairness; *S*: sharing; *E*: engagement. Outcomes: O_{OC}: optional capital; O_{BM}: business model viability; O_{PW}: power; O_{MK}: market excellence; O_{EF}: economic/financial performance. * Correlation significant at the 0.05 level (two-tailed); ** correlation significant at the 0.01 level (two-tailed).

Table 4). A single table summarizing the five outcomes (O_{OC}, O_{BM}, O_{PW}, O_{MK}, and O_{EF}) was developed to improve understanding of the analysis (see Appendix 1).

5. Discussion

The results of our empirical analysis suggest that Italian network contracts established by Law 33/2009 are effective institutional drivers for encouraging interfirm collaborations for short-term success and long-term resilience. Interestingly, the full cooperation configuration (FSE) was the only configuration associated with both short- and long-term success of firms involved in network contracts, empirically substantiating the theoretical claims that coopetition requires high levels of cooperation in terms of fairness, sharing, and engagement. This result is interesting because it partially contradicts recent propositions that coopetition is beneficial when firms balance high levels of cooperation with high levels of competition (Gnyawali & Ryan Charleton, 2018). The success of the full cooperation configuration was found both the short and long term, suggesting that coopetition requires both short-term adaptation and flexibility and long-term stability to reap the benefits. Therefore, a successful coopetition configuration must focus primarily on cooperation rather than competition.

However, fsQCA also revealed another configuration associated with firm success: the highly paradoxical predatory agreement configuration (OSR). Based on follow-up interviews and an expert panel survey, the presence of successful OSR relationships among firms in network contracts may be explained as follows. Some firms may only superficially adopt the institutional logic of the network contract (i.e., fair interfirm collaboration toward common innovative projects) with the purpose of attracting public funding or participating in public tenders. Therefore, it is possible that firms that do not trust each other nor intend to engage in common projects will share resources (e.g., public funding) through the network contract. This approach is consistent with the predatory agreement configuration.

Notably, the coverage value of the predatory agreement configuration was significantly lower than that of full cooperation, and predatory agreement was associated with short-term success only. This suggests that predatory agreement is a short-sighted relationship with little capacity to enhance the long-term resilience of partnering firms. This is consistent with the rationale behind Law 33/2009 and confirms the effectiveness of Italian network contracts. It also suggests the need for solutions to reduce the potential for the superficial, opportunistic adoption of network contracts by firms. Our results strengthen prior research findings that firms in coopetitive relationships should establish effective protection, control, and governance mechanisms. Firms oriented toward the short term may be tempted to adopt the predatory agreement configuration to serve their interests. Therefore, it is important for firms pursuing both short- and long-term success to implement mechanisms that protect their interests from firms oriented toward short-term success only.

6. Conclusion

Based on evolutionary studies (Reschke & Kraus, 2009) and the paradoxical approach to management (Smith & Lewis, 2011), this study offers a highly needed integrated conceptualization of simultaneous cooperation and competition, two complementary forces that shape social relationships at all levels of analysis. Compared with the traditional cooperation–competition paradox, the 3D model of relational space allows scholars to investigate the interplay between cooperation and competition in more detail. Our conceptualization is soundly embedded in the multidisciplinary research on the evolutionary role of cooperation and competition (De Waal, 2009; Nowak, 2012; Rand & Nowak, 2013; Sigmund, 2010). In reconceptualizing cooperation and competition as an integrated paradoxical construct, we have identified three polarized dimensions of the cooperation–competition interplay: fairness–opportunism, sharing–control, and engagement–rivalry. Our findings propose solutions for the paradoxical relationship between cooperation and competition, viewed as social phenomena that simultaneously disable and enable each other. Our 3D model of relational space leverages the three dimensions of the construct to operationalize cooperation and competition as simultaneously orthogonal and on a continuum.

The proposed model contributes to the literature by providing a conceptual tool aimed at developing a more sophisticated integrated theory of the dynamic interplay between cooperation and competition. With our 3D model, each relationship can be classified on the basis of its specific configuration; for example, fairness–control–engagement or opportunism–sharing–rivalry. This detailed analysis opens up opportunities to map the relational space at all levels of analysis, particularly for accurate investigations of how relationships between subjects (be they individuals, groups, organizations, or communities) evolve longitudinally over time. This paves the way for possible future studies on the causes and consequences of the evolution of interorganizational relationships, which are particularly relevant in coopetition research (Mariani & Giorgio, 2017). It also allows managers to shape the dimensional variations of the cooperative–competitive relationship (Reschke & Kraus, 2009).

Additionally, our empirical analysis of successful relational configurations under a specific institutional driver (Italian network contracts) confirms the potential of the 3D model and illustrates a possible way to use this model to investigate the relationships between relational configurations and their institutional antecedents and outcomes in business networks. In particular, we identified one configuration that is effective in both the long and short term and another that is effective only in the short term.

Interestingly, in the sample under analysis disrupt the traditional classifications of vertical value chain networks, considered intrinsically more cooperative, and horizontal networks of commercial competitors, considered intrinsically more competitive. This result suggests that the nature of interfirm relationships results from a complex, dynamic, idiosyncratic interplay between the institutional environment, organizational logic, and stakeholders' attitudes and experiences. More specifically, the results of this study show that despite Law 33/2009 being established to encourage highly cooperative business relationships, the paradoxical configuration of opportunism–sharing–rivalry is associated with short-term firm success, probably arising from the superficial implementation of the contract to exploit funding and public tender opportunities.

These results open up interesting opportunities to investigate the relationships between relational configurations, institutional environment, and firm success. Our findings on successful configurations in the short and long term offer a theoretical pattern to be expected across various coopetition settings. However, we also expect deviations from this pattern given the country-specific and institutionally-driven context of our study. The recent introduction of the flexible pattern matching method (Bouncken, Fredrich, Kraus, & Ritala, 2020) offers a useful tool for future studies in various contexts. For example, this method may be used to study variations in the 3D model configurations and identify those that are harmful to firms, regardless of the context. Similar to studies of coopetition in coworking spaces, further research can yield additional configurations or proto-institutions (Bouncken et al., 2018a, 2018b) for interfirm relationships. Pattern matching studies may also help develop a formal definition of coopetition as a successful relational configuration, similar to recent studies of novel phenomena such as shared digital identities (Bouncken and Barwinski, 2021).

Moreover, involving institutional perspectives and flexible pattern matching will open avenues for longitudinal studies (Bouncken et al., 2021). For instance, the evolution of coopetitive relationships over time (Fernandez & Chiambaretto, 2016) can be studied in terms of relational configurations and successful design (Mariani, 2016; Ricciardi et al., 2016). Longitudinal studies are important to understand how firms can

address tensions over time and successfully adjust configurations to relevant contingencies. In other words, while we found one configuration to be associated with long-term success, it may be that adapting configurations may yield similarly positive outcomes. A potentially useful perspective to better understand adaptation is to move beyond randomized variations (Reschke & Kraus, 2009) to embrace learning effects (Bouncken et al., 2016) and capability development (Blomqvist & Levy, 2006). Learning may have both short-term effects in terms of increasing operational efficiency through learning curves, and long-term effects in terms of coopetition capabilities (Afuah, 2000).

Our study also offers several managerial implications. First, the three axes of the model can help managers evaluate the behaviors of their own and other firms to determine their chance of short- and long-term success. Moreover, our 3D model may help managers shape relational configurations to ensure the success of cooperation with competitors.

The limitations of our study are related to its empirical setting. Italy's institutional regulations may encourage opportunistic behaviors aimed at attracting public funding, which is different from opportunism aimed at cooperating competitors. Hence, future studies should focus on different arrangements, particularly multiple partnerships established and maintained by a focal organization, to examine the robustness of our model.

Inattention to these issues has limited the possibilities of integrating the outcomes of different research streams, such as those on competitive dynamics, competitive advantage, social networks, or social embeddedness. The 3D model of the relational space may enable knowledge accumulation through shared definitions and a common view of the cooperation–competition phenomenon. The proposed 3D model of relational space could also be used in other research streams such as network analysis or organizational behavior studies.

Appendix A

Outcome: Ooc	Solution 1
F	◻
S	◻
E	◻
Consistency	0.78
Raw coverage	0.59
Unique coverage	0.59
Solution consistency	0.78
Solution coverage	0.59

Frequency cutoff: 4
Consistency cutoff: 0.78

Outcome: Obm	Solution 1
F	◻
S	◻
E	◻
Consistency	0.83
Raw coverage	0.56
Unique coverage	0.56
Solution consistency	0.83
Solution coverage	0.56

Frequency cutoff: 4
Consistency cutoff: 0.83

Outcome: Opw	Solution 1	Solution 2
F	⊗	◻
S	◻	◻
E	⊗	◻
Consistency	0.83	0.86
Raw coverage	0.31	0.48
Unique coverage	0.08	0.26
Solution consistency	0.82	
Solution coverage	0.56	

Frequency cutoff: 4
Consistency cutoff: 0.83

Outcome: Omk	Solution 1	Solution 2
F	⊗	◻
S	◻	◻
E	⊗	◻
Consistency	0.89	0.85
Raw coverage	0.33	0.47
Unique coverage	0.10	0.25
Solution consistency	0.84	
Solution coverage	0.57	

Frequency cutoff: 4
Consistency cutoff: 0.85

Outcome: Oef	Solution 1	Solution 2
F	⊗	◻
S	◻	◻
E	⊗	◻
Consistency	0.92	0.86
Raw coverage	0.30	0.43
Unique coverage	0.09	0.22
Solution consistency	0.85	
Solution coverage	0.52	

Frequency cutoff: 4
Consistency cutoff: 0.86

References

Adler, P. S., & Kwon, S.-W. (2002). Social capital: Prospects for a new concept. *Academy of Management Review, 27*(1), 17–40. https://doi.org/10.5465/amr.2002.5922314

Afuah, A. (2000). How much do your co-opetitors' capabilities matter in the face of technological change? *Strategic Management Journal, 21*(3), 397–404. https://doi.org/10.1002/(sici)1097-0266(200003)21:3%3C397::aid-smj88%3E3.0.co;2-1

Baruch, Y., & Lin, C.-P. (2012). All for one, one for all: Coopetition and virtual team performance. *Technological Forecasting and Social Change, 79*(6), 1155–1168. https://doi.org/10.1016/j.techfore.2012.01.008

Bengtsson, M., Bengtsson, M., & Kock, S. (2000). *Industrial Marketing Management, 29*(5), 411–426.

Bengtsson, M., & Kock, S. (2014). Coopetition—Quo vadis? Past accomplishments and future challenges. *Industrial Marketing Management, 43*(2), 180–188. https://doi.org/10.1016/j.indmarman.2014.02.015

Bengtsson, M., Wilson, T. L., Bengtsson, M., Eriksson, J., & Wincent, J. (2010). Co-opetition dynamics–an outline for further inquiry. *Competitiveness Review: An international business journal, 20*(2), 194–214. https://doi.org/10.1108/10595421011029893

Blomqvist, K., & Levy, J. (2006). Collaboration capability—a focal concept in knowledge creation and collaborative innovation in networks. *International Journal of Management Concepts and Philosophy, 2*(1), 31–48. https://doi.org/10.1504/ijmcp.2006.009645

Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29*(6), 991–1013. https://doi.org/10.1016/s0149-2063_03_00087-4

Bouncken, R., & Barwinski, R. (2021). Shared digital identity and rich knowledge ties in global 3D printing—a drizzle in the clouds? *Global Strategy Journal, 11*(1), 81–108. https://doi.org/10.1002/gsj.1370

Bouncken, R. B., Clauß, T., & Fredrich, V. (2016). Product innovation through coopetition in alliances: Singular or plural governance? *Industrial Marketing Management, 53*, 77–90. https://doi.org/10.1016/j.indmarman.2015.11.011

Bouncken, R. B., Fredrich, V., & Kraus, S. (2020). Configurations of firm-level value capture in coopetition. *Long Range Planning, 53*(1). https://doi.org/10.1016/j.lrp.2019.02.002. Article 101869.

Bouncken, R. B., Fredrich, V., Kraus, S., & Ritala, P. (2020a). Innovation alliances: Balancing value creation dynamics, competitive intensity and market overlap. *Journal of Business Research, 112*, 240–247. https://doi.org/10.1016/j.jbusres.2019.10.004

Bouncken, R. B., Fredrich, V., Ritala, P., & Kraus, S. (2020b). Value-creation-capture-equilibrium in new product development alliances: A matter of coopetition, expert power, and alliance importance. *Industrial Marketing Management, 90*, 648–662. https://doi.org/10.1016/j.indmarman.2020.03.019

Bouncken, R. B., Gast, J., Kraus, S., & Bogers, M. (2015). Coopetition: A systematic review, synthesis, and future research directions. *Review of Managerial Science, 9*(3), 577–601. https://doi.org/10.1007/s11846-015-0168-6

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: Value creation and appropriation tensions in an entrepreneurial space. *Review of Managerial Science, 12*(2), 385–410. https://doi.org/10.1007/s11846-017-0267-7

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: Value creation and appropriation tensions in an entrepreneurial space. *Review of Managerial Science, 12*(2), 385–410. https://doi.org/10.1007/s11846-017-0267-7

Brandenburger, A. M., & Nalebuff, B. J. (1995). July–August). The right game: Use game theory to shape strategy. *Harvard business review*. https://hbr.org/1995/07/the-right-game-use-game-theory-to-shape-strategy.

Cantele, S., Vernizzi, S., & Ricciardi, F. (2016). The emerging wave of agility-oriented business networks in Italy: A new strategy for facing global competition. *World Review of Entrepreneurship Management and Sustainable Development, 12*(2–3), 270–284. https://doi.org/10.1504/WREMSD.2016.074967

Chen, M. J., & Miller, D. (2015). Reconceptualizing competitive dynamics: A multidimensional framework. *Strategic Management Journal, 36*(5), 758–775. https://doi.org/10.1002/smj.2245

Chiambaretto, P., Massé, D., & Mirc, N. (2019). "All for one and one for all?" Knowledge broker roles in managing tensions of internal coopetition: The Ubisoft case. *Research Policy, 48*(3), 584–600. https://doi.org/10.1016/j.respol.2018.10.009

Chou, H. H., & Zolkiewski, J. (2018). Coopetition and value creation and appropriation: The role of interdependencies, tensions and harmony. *Industrial Marketing Management, 70*, 25–33. https://doi.org/10.1016/j.indmarman.2017.08.014

Cortese, D., Giacosa, E., & Cantino, V. (2018). Knowledge sharing for coopetition in tourist destinations: The difficult path to the network. *Review of Managerial Science*, 1–12. https://doi.org/10.1007/s11846-018-0322-z

Crick, J. M., & Crick, D. (2020). The yin and yang nature of coopetition activities: Non-linear effects and the moderating role of competitive intensity for internationalised firms. *International marketing review*. Advance online publication. https://doi.org/10.1108/IMR-01-2019-0018

Czakon, W. (2010). Emerging coopetition: An empirical investigation of coopetition as interorganizational relationship instability. In S. Yami, S. Castaldo, G. B. Dagnino, & F. Le Roy (Eds.), *Coopetition: Winning strategies for the 21st century* (pp. 58–73). Edward Elgar Publishing.

Czakon, W., Fernandez, A. S., & Minà, A. (2014). Editorial: From paradox to practice: The rise of coopetition strategies. *International Journal of Business Environment, 6*(1), 1–10. https://doi.org/10.1504/IJBE.2014.058040

Czakon, W., Srivastava, M. K., Le Roy, F., & Gnyawali, D. R. (2020). Coopetition strategies: Critical issues and research directions. *Long Range Planning, 53*(1). https://doi.org/10.1016/j.lrp.2019.101948. Article 101948.

Dagnino, G. B., & Mariani, M. M. (2010). Coopetitive value creation in entrepreneurial contexts: The case of AlmaCube. In S. Yami, S. Castaldo, G. B. Dagnino, & F. Le Roy (Eds.), *Coopetition: Winning strategies for the 21st century* (pp. 101–123). Edward Elgar Publishing.

Devece, C., Ribeiro-Soriano, D. E., & Palacios-Marque, D. (2019). Coopetition as the new trend in inter-firm alliances: Literature review and research patterns. *Review of Managerial Science, 13*, 207–226. https://doi.org/10.1007/s11846-017-0245-0

Doebeli, M., & Hauert, C. (2005). Models of cooperation based on the Prisoner's Dilemma and the Snowdrift game. *Ecology Letters, 8*(7), 748–766. https://doi.org/10.1111/j.1461-0248.2005.00773.x

Dosi, G., & Marengo, L. (2007). On the evolutionary and behavioral theories of organizations: A tentative roadmap. *Organization Science, 18*(3), 491–502. https://doi.org/10.1287/orsc.1070.0279

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review, 23*(4), 660–679. https://doi.org/10.5465/amr.1998.1255632

Eriksson, P. E. (2008). Achieving suitable coopetition in buyer–supplier relationships: The case of AstraZeneca. *Journal of Business-To-Business Marketing, 15*(4), 425–454. https://doi.org/10.1080/15470620802325674

Estrada, I., Faems, D., & de Faria, P. (2016). Coopetition and product innovation performance: The role of internal knowledge-sharing mechanisms and formal knowledge protection mechanisms. *Industrial Marketing Management, 53*, 56–65. https://doi.org/10.1016/j.indmarman.2015.11.013

Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics, 114*(3), 817–868. https://doi.org/10.1162/003355399556151

Fernandez, A. S., & Chiambaretto, P. (2016). Managing tensions related to information in coopetition. *Industrial Marketing Management, 53*, 66–76. https://doi.org/10.1016/j.indmarman.2015.11.010

Fiss, P. (2011). Building better causal theories: A fuzzy set approach to typologies in organization research. *Academy of Management Journal, 54*(2), 393–420. https://doi.org/10.5465/amj.2011.60263120

Fowler, J. H., & Schreiber, D. (2008). Biology, politics, and the emerging science of human nature. *Science, 322*(5903), 912–914. https://doi.org/10.1126/science.1158188

Gast, J., Gundolf, K., Harms, R., Collado, E., Gast, J., Filser, M., Gundolf, K., & Kraus, S. (2015). Coopetition research: Towards a better understanding of past trends and future directions. *International Journal of Entrepreneurship and Small Business, 24*(4), 492–521. https://doi.org/10.1504/IJESB.2015.068637

Gnyawali, D. R., Madhavan, R., He, J., & Bengtsson, M. (2016). The competition–cooperation paradox in inter-firm relationships: A conceptual framework. *Industrial Marketing Management, 53*, 7–18. https://doi.org/10.1016/j.indmarman.2015.11.014

Gnyawali, D. R., & Ryan Charleton, T. (2018). Nuances in the interplay of competition and cooperation: Towards a theory of coopetition. *Journal of Management, 44*(7), 2511–2534. https://doi.org/10.1177/0149206318788945

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*(3), 481–510. https://doi.org/10.1086/228311

Greckhamer, T. (2011). Cross-cultural differences in compensation level and inequality across occupations: A set-theoretic analysis. *Organization Studies, 32*(1), 85–115.

Hauert, C., Traulsen, A., Brandt, H., Nowak, M. A., & Sigmund, K. (2007). Via freedom to coercion: The emergence of costly punishment. *Science, 316*(5833), 1905–1907. https://doi.org/10.1126/science.1141588

Hoffmann, W., Lavie, D., Reuer, J. J., & Shipilov, A. (2018). The interplay of competition and cooperation. *Strategic Management Journal, 39*(12), 3033–3052. https://doi.org/10.1002/smj.2965

Koka, B. R., & Prescott, J. E. (2002). Strategic alliances as social capital: A multidimensional view. *Strategic Management Journal, 23*(9), 795–816. https://doi.org/10.1002/smj.252

Köseoğlu, M. A., Yildiz, M., Okumus, F., & Barca, M. (2019). The intellectual structure of coopetition: Past, present and future. *Journal of Strategy and Management, 12*(1), 2–29. https://doi.org/10.1108/JSMA-07-2018-0073

Kraus, S., Ribeiro-Soriano, D., & Schüssler, M. (2018). Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research—the rise of a method. *The International Entrepreneurship and Management Journal, 14*(1), 15–33. https://doi.org/10.1007/s11365-017-0461-8

Lacoste, S. (2012). "Vertical coopetition": The key account perspective. *Industrial Marketing Management, 41*(4), 649–658. https://doi.org/10.1016/j.indmarman.2011.09.013

Lado, A., Dant, R., & Tekleab, A. (2013). Trust–opportunism paradox, relationalism, and performance in interfirm relationships: Evidence from the retail industry. *Strategic Management Journal, 29*(4), 401–423. https://doi.org/10.1002/smj.667

Le Roy, F., & Fernandez, A. S. (2015). Managing coopetitive tensions at the working-group level: The rise of the coopetitive project team. *British Journal of Management, 26*(4), 671–688. https://doi.org/10.1111/1467-8551.12095

Lewis, M. W. (2000). Exploring paradox : Toward a more comprehensive guide. *Academy of Management Review, 25*(4), 760–776. https://doi.org/10.5465/amr.2000.3707712

Li, Q. (2013). A novel Likert scale based on fuzzy sets theory. *Expert Systems with Applications, 40*(5), 1609–1618. https://doi.org/10.1016/j.eswa.2012.09.015

Liu, R., Yang, J., & Zhang, F. (2020). Managing technology transfer between coopetitive firms: The roles of coopetition, asset specificity and justice. *Journal of Business & Industrial Marketing*. https://doi.org/10.1108/JBIM-10-2019-0462. Advance online publication.

Lundgren-Henriksson, E. L., & Kock, S. (2016). Coopetition in a headwind—the interplay of sensemaking, sensegiving, and middle managerial emotional response in coopetitive strategic change development. *Industrial Marketing Management, 58*, 20–34. https://doi.org/10.1016/j.indmarman.2016.05.012

Mariani, M. M. (2007). Coopetition as an emergent strategy: Empirical evidence from an Italian consortium of opera houses. *International Studies of Management & Organization, 37*(2), 97–126. https://doi.org/10.2753/IMO0020-8825370205

Mariani, M. M. (2016). Coordination in inter-network co-opetitition: Evidence from the tourism sector. *Industrial Marketing Management, 53*, 103–123. https://doi.org/10.1461-j.indmarman.2015.11.015

Mariani, M. M. (2018). The role of policy makers and regulators in coopetition. In A. S. Fernandez, P. Chiambaretto, F. Le Roy, & W. Czakon (Eds.), *The Routledge companion to coopetition strategy* (pp. 105–116). Routledge.

Mariani, M. M., & Giorgio, L. (2017). The "Pink Night" festival revisited: Meta-events and the role of destination partnerships in staging event tourism. *Annals of Tourism Research, 62*, 89–109. https://doi.org/10.1016/j.annals.2016.11.003

Mattsson, L.-G., & Tidström, A. (2015). Applying the principles of yin–yang to market dynamics: On the duality of cooperation and competition. *Marketing Theory, 15*(3), 347–364. https://doi.org/10.1177/1470593114564903

Mellewigt, T., Hoetker, G., & Lütkewitte, M. (2018). Avoiding high opportunism is easy, achieving low opportunism is not: A QCA study on curbing opportunism in buyer–supplier relationships. *Organization Science, 29*(6), 1208–1228. https://doi.org/10.1287/orsc.2018.1227

Misangyi, V. F., Greckhamer, T., Furnari, S., Fiss, P. C., Crilly, D., & Aguilera, R. (2017). Embracing causal complexity: The emergence of a neo-configurational perspective. *Journal of Management, 43*(1), 255–282. https://doi.org/10.1177/0149206316679252

Nowak, M. A. (2006). Five rules for the evolution of cooperation. *Nature, 314*(5805), 1560–1563. https://doi.org/10.1126/science.1133755

Nowak, M. A. (2012). Evolving cooperation. *Journal of Theoretical Biology, 299*, 1–8. https://doi.org/10.1016/j.jtbi.2012.01.014

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63*(5), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Powell, W. W., & Grodal, S. (2005). Networks of innovators. In J. Fagerberg, D. C. Mowery, & R. R. Nelson (Eds.), *The Oxford handbook of innovation* (pp. 56–85). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199286805.003.0003.

Preston, S. D., & De Waal, F. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences, 25*(1), 1–20. https://doi.org/10.1017/S0140525X02000018

Ragin, C. C. (2000). *Fuzzy-set social science*. University of Chicago Press.

Ragin, C. C. (2008). *Redesigning social inquiry: Fuzzy sets and beyond*. Chicago University Press.

Ragin, C. C., & Fiss, P. C. (2008). Net effects analysis versus configurational analysis: An empirical demonstration. In C. C. Ragin (Ed.), *Redesigning social inquiry: Fuzzy sets and beyond* (pp. 190–212). Chicago University Press.

Rand, D. G., & Nowak, M. A. (2013). Human cooperation. *Trends in Cognitive Sciences, 17*(8), 413–425. https://doi.org/10.1016/j.tics.2013.06.003

Raza-Ullah, T., & Kostis, A. (2020). Do trust and distrust in coopetition matter to performanceRaza-Ullah, T. *Experiencing the paradox of coopetition: A moderated mediation framework explaining the paradoxical tension–performance relationship. Long Range Planning, 53*(1), Article 101863. https://doi.org/10.1016/j.lrp.2018.12.003, 2020.

Reschke, C. H., & Kraus, S. (2009). An evolutionary perspective on the management of stability and change. *Evolutionary and Institutional Economics Review, 5*(2), 259–278. https://doi.org/10.14441/eier.5.259

Reuer, J. J., & Ariño, A. (2007). Strategic alliance contracts: Dimensions and determinants of contractual complexity. *Strategic Management Journal, 28*(3), 313–330. https://doi.org/10.1002/smj.581

Ricciardi, F., Zardini, A., & Rossignoli, C. (2016). Organizational dynamism and adaptive business model innovation: The triple paradox configuration. *Journal of Business Research, 69*(11), 5487–5493.

Rossi, A., & Warglien, M. (2009). An experimental investigation of fairness and reciprocity as determinants of intraorganizational coopetition. In G. B. Dagnino, & E. Rocco (Eds.), *Coopetition strategy: Theory, experiments and cases* (pp. 258–273). Routledge.

Rouyre, A., & Fernandez, A. S. (2019). Managing knowledge-sharing-protecting tensions in coupled innovation projects among several competitors. *California Management Review, 62*(1), 95–120. https://doi.org/10.1177/0008125619885151

Sabri, O., Djedidi, A., & Hani, M. (2021). When does coopetition affect price unfairness perception? The roles of market structure and innovation. *Journal of Business & Industrial Marketing, 36*(2), 209–229. https://doi.org/10.1108/JBIM-05-2019-0192

Santos, F. C., & Pacheco, J. M. (2011). Risk of collective failure provides an escape from the tragedy of the commons. *Proceedings of the National Academy of Sciences, 108*(26), 10421–10425. https://doi.org/10.1073/pnas.1015648108

Schneider, C. Q., & Wagemann, C. (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis*. Cambridge University Press.

Seepana, C., Paulraj, A., & Huq, F. A. (2020). The architecture of coopetition: Strategic intent, ambidextrous managers, and knowledge-sharing. *Industrial Marketing Management, 91*, 100–113. https://doi.org/10.1016/j.indmarman.2020.08.012

Sigmund, K. (2010). *The calculus of selfishness*. Princeton University Press.

Smith, W. K., & Lewis, M. W. (2011). Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review, 36*(2), 381–403. https://doi.org/10.5465/AMR.2011.59330958

Tidström, A. (2014). Managing tensions in coopetition. *Industrial Marketing Management, 43*(2), 261–271. https://doi.org/10.1016/j.indmarman.2013.12.001

Tsai, W. (2002). Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge-sharing. *Organization Science, 13*(2), 179–190. https://doi.org/10.1287/orsc.13.2.179.536

West, S. A., Griffin, A. S., & Gardner, A. (2007). Evolutionary explanations for cooperation. *Current Biology, 17*(16), 661–672. https://doi.org/10.1016/j.cub.2007.06.004

Wilhelm, M., & Sydow, J. (2018). Managing coopetition in supplier networks–A paradox perspective. *Journal of Supply Chain Management, 54*(3), 22–41. https://doi.org/10.1111/jscm.12167

Woodside, A. G. (2010). *Case study research: Theory, methods and practice*. Emerald.

Wooten, M., & Hoffman, A. J. (2008). Organizational fields: Past, present, and future. In R. Greenwood, C. Oliver, K. Sahlin, & R. Suddaby (Eds.), *The SAGE handbook of organizational institutionalism* (pp. 130–147). Sage Publications.