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**WALKING THE TIGHTROPE: COOPETITION CAPABILITY
CONSTRUCT AND ITS ROLE IN VALUE CREATION**

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Abstract:	<p>Prior research emphasizes the paradoxical nature of coopetition and the need for specialized capabilities—coopetition capability—to deal effectively with opportunities and challenges stemming from the simultaneous pursuit of cooperation and competition and to create superior value. However, we know little about the underlying conceptual properties of coopetition capability (construct clarity) and lack a reliable and valid scale to measure it (construct validity). We conduct a study in three phases to address this critical gap. First, building on paradox literature, we conceptualize coopetition capability as a multi-dimensional construct reflected by three underlying dimensions: competition mindset, analytical acumen, and executional skills. Second, we develop a 15-item psychometrically valid scale using a sample of 647 cooperative alliances in high-technology sectors. Finally, using a matched sample of 536 cooperative alliances, we extend the focal construct's nomological network by examining two relationships: coopetition experience's impact on coopetition capability and the effect of coopetition capability on the relationship between the coopetition paradox and value creation. Overall, our paper lays a foundation for deeper theory development and empirical research on coopetition by providing much-needed construct clarity and psychometrically valid measures for coopetition capability.</p> <p>Keywords: coopetition; coopetition capability; coopetition paradox; horizontal alliances; value creation</p>

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**WALKING THE TIGHTROPE: COOPETITION CAPABILITY CONSTRUCT AND ITS
ROLE IN VALUE CREATION**

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ABSTRACT

Prior research emphasizes the paradoxical nature of coopetition and the need for specialized capabilities—coopetition capability—to deal effectively with opportunities and challenges stemming from the simultaneous pursuit of cooperation and competition and to create superior value. However, we know little about the underlying conceptual properties of coopetition capability (construct clarity) and lack a reliable and valid scale to measure it (construct validity). We conduct a study in three phases to address this critical gap. First, building on paradox literature, we conceptualize coopetition capability as a multi-dimensional construct reflected by three underlying dimensions: coopetition mindset, analytical acumen, and executional skills. Second, we develop a 15-item psychometrically valid scale using a sample of 647 cooperative alliances in high-technology sectors. Finally, using a matched sample of 536 cooperative alliances, we extend the focal construct's nomological network by examining two relationships: coopetition experience's impact on coopetition capability and the effect of coopetition capability on the relationship between the coopetition paradox and value creation. Overall, our paper lays a foundation for deeper theory development and empirical research on coopetition by providing much-needed construct clarity and psychometrically valid measures for coopetition capability.

Keywords: coopetition; coopetition capability; coopetition paradox; horizontal alliances; value creation

WALKING THE TIGHTROPE: COOPETITION CAPABILITY CONSTRUCT AND ITS ROLE IN VALUE CREATION

Firms often engage in relationships that involve simultaneous cooperation and competition with each other with an intent to create value (Gnyawali & Ryan Charleton, 2018; Ketchen, Snow, & Hoover, 2004; Rai, 2016). Contrary to a traditional view in alliance research that considered competition among alliance partners harmful as it could weaken cooperation, limit resource exchange, and increase instability and risk of alliance failure (Das & Teng, 1998, 2000; Kale, Singh, & Perlmutter, 2000; Khanna, Gulati, & Nohria, 1998; Hamel, 1991; Park & Ungson, 2001), more recent perspectives—horizontal alliances (e.g., Belderbos, Gilsing, & Lokshin, 2012; Luo, Rindfleisch, & Tse, 2007; Nault & Tyagi, 2001) and coopetition (e.g., Bengtsson & Kock, 2000; Gnyawali, He, & Madhavan, 2006; Ketchen et al., 2004)—suggest that such behaviors are important and even necessary for managing opportunities and challenges brought about by rapid technological changes, competitive pressures, and demand uncertainties (Ansari, Garud, & Kumaraswamy, 2016; Burgers, Hill, & Kim, 1993; Gnyawali & Park, 2011). However, on the flip side, the simultaneity of the opposing logics of cooperation and competition (Chen, 2008; Gnyawali, Madhavan, He, & Bengtsson, 2016) invariably leads to greater tensions between the alliance partners because of the need to tactfully balance common and private benefits (Gnyawali & Ryan Charleton, 2018). Consequently, managing these relationships effectively is inherently more challenging and demanding (Ansari et al., 2016; Hannah & Eisenhardt, 2018; Hoffmann, Lavie, Reuer, & Shipilov, 2018).

In this respect, scholars have argued that firms need a specialized set of capabilities—coopetition capability—that would help them effectively manage opportunities and challenges stemming from coopetition (e.g., Bengtsson, Raza-Ullah, & Vanyushyn, 2016; Gnyawali et al., 2016; Raza-Ullah, 2020). While existing research has provided several views on the nature of

coopetition capability, we lack a strong conceptual and empirical foundation for coopetition capability as a construct (Hoffmann et al., 2018). Accordingly, Hoffmann et al. (2018: 3044) argue that “despite some preliminary qualitative research ..., little is known about firms’ approaches to managing the tension between competition and cooperation.” Put differently, coopetition capability lacks ‘construct clarity,’ which Suddaby (2010) suggests is critical for any systematic conceptual and empirical research. An equally important and inseparable issue is the lack of a scale that precisely and accurately operationalizes and measures coopetition capability, or what is commonly called ‘construct validity’ (Bacharach, 1989; Bagozzi, Yi, & Phillips, 1991; MacKenzie, Podsakoff, & Podsakoff, 2011). Construct validity is necessary for researchers to “synthesize research and develop normative guidelines for managers” (Boyd, Bergh, Ireland, & Ketchen Jr., 2013: 3). Considering these gaps, we ask the following research questions: (i) what unique features constitute coopetition capability (construct clarity)? and (ii) how to operationalize and measure coopetition capability (construct validity)?

We address these questions by drawing on the paradox literature (e.g., Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011; Smith & Tushman, 2005). Among the various approaches to deal with paradoxes (see Lewis, 2000; Lewis & Smith, 2014; Poole & Van de Ven, 1989; Smith & Lewis, 2011 for more details), coopetition research emphasizes adopting the integration approach to deal with paradoxical tensions inherent in coopetition (e.g., Bengtsson et al., 2016; Chen, 2008; Gnyawali et al. 2016). Such an approach entails viewing the opposing forces of cooperation and competition as a *duality*—“interdependent [as opposed to independent and separate]—both contradictory and complementary” (Farjoun, 2010: 203)—and the interplay of these opposing forces as “interwoven and synergistic” (Andriopoulos & Smith, 2009: 697). As a result, the integration approach offers an opportunity to combine the paradoxical elements synergistically (Gnyawali et al., 2016; Lado, Boyd, & Hanlon, 1997). However, on the flip side, it

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3 also invariably exacerbates the intensity of paradoxical tensions even further as the inherent
4 contradictions gain more salience when the opposing forces are juxtaposed (Smith & Lewis, 2011).
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6 Keeping this in mind, we conceptualize coopetition capability as a firm-level capability that helps
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8 firms adopt the integration approach to realize two objectives: leverage the positive potential of
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10 the cooperation-competition paradox and manage the resulting paradoxical tensions.
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14 We conduct our study in three phases. First, building on prior literature and drawing insights
15 from managers' interviews and a focus group, we explicate the conceptual domain of coopetition
16 capability. We posit coopetition capability as a second-order construct reflected by three
17 underlying first-order organizational-level capabilities: coopetition mindset, analytical acumen,
18 and executional skills. Second, we use primary data from 647 cooperative alliances in high-
19 technology sectors to develop a 15-item psychometrically valid scale for measuring coopetition
20 capability. In the final phase, we use a matched sample of 536 cooperative alliances to examine
21 coopetition capability in its broader nomological network. Specifically, we show that coopetition
22 experience impacts coopetition capability positively and that coopetition capability moderates the
23 relationship between the coopetition paradox and value creation positively.
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38 This paper addresses a critical research gap underscored by Hoffmann et al. (2018: 3037) that
39 "...we know little about the unique capabilities required for managing the interplay of competition
40 and cooperation." We make three important contributions to the literature. First, we provide much-
41 needed construct clarity to the coopetition capability construct by systematically conceptualizing
42 it as a multi-dimensional construct with unique micro-level processes and organizational routines.
43
44 Second, we pave the way for more in-depth theorizing and nuanced empirical research on
45 coopetition by developing a psychometrically valid scale that captures the most salient elements
46 of the construct. Finally, we extend the focal construct's existing nomological network and thereby
47 advance a long-standing discussion regarding the nature of coopetition and its role in value
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creation (Gnyawali et al., 2006; Gnyawali & Ryan Charleton, 2018; Hoffmann et al., 2018; Ketchen et al., 2004; Rai, 2016).

CONCEPTUAL UNDERPINNINGS FOR COOPETITION CAPABILITY

Horizontal Alliances and Coopetition Research: Key Insights and Overlaps

Research on strategic alliances has traditionally viewed cooperation and competition as “separate modes of interaction among firms” (Hoffmann et al., 2018: 3034) and suggests that competitive tension between alliance partners is harmful as it could weaken cooperation, limit resource exchange/knowledge transfer, aggravate risk of opportunistic behavior, and increase instability and susceptibility to alliance failure (Arslan, 2018; Das & Teng, 1998; 2000; Kale et al., 2000; Khanna et al., 1998; Hamel, 1991; Park & Russo, 1996; Park & Ungson, 2001). More recently, however, two overlapping but distinct streams of research have evolved, arguing that alliance partners often cooperate and compete simultaneously to generate mutually beneficial outcomes (Hoffmann et al., 2018): horizontal alliances, referred to as “alliances between competitors” operating at the same level in the industry value chain (Belderbos et al., 2012: 1813; also see, Burgers et al., 1993; Gimeno, 2004; Luo et al., 2007; Nault & Tyagi, 2001; Oxley, Sampson, & Silverman, 2009); and coopetition, referred to as “simultaneous competition and cooperation among firms with value creation intent” (Gnyawali & Ray Charleton, 2018: 2513; also see Bengtsson & Kock, 2000; Gnyawali et al., 2006; Ketchen et al., 2004).

Both streams of research generally agree on the motivations for forming such inter-firm relationships (Belderbos et al., 2012; Lado et al., 1997; Gnyawali & Ryan Charleton, 2018). Specifically, firms enter into such alliances for developing new technologies and products in response to the convergence of technologies, shortened product life cycles, and emergence of new technologies (Belderbos et al., 2012; Burgers et al., 1993; Gnyawali & Park, 2011), learning and gaining access to critical resources and capabilities (Burgers et al., 1993; Gnyawali & Park, 2009),

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3 entering new markets and reducing uncertainty (Burgers et al., 1993; Gnyawali & Park, 2009),
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5 mitigating competitive pressure due to decline or maturity of an industry (Luo, 2007), improving
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7 competitive position (Gnyawali & Park, 2009), and/or reducing costs and sharing risks (Fernandez,
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9 Le Roy, & Chiambaretto, 2018; Gnyawali & Park, 2011).

12 Similarly, despite these advantages, both research streams also agree that pursuing such inter-
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14 firm relationships is inherently more challenging (Gnyawali & Ryan Charleton, 2018; Hamel,
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16 1991; Hoffmann et al., 2018; Hannah & Eisenhardt, 2018). This is because simultaneity of the
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18 contradictory forces of cooperation and competition—cooperation facilitates alignment of
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20 objectives while competition promotes the pursuit of private agenda (Kale et al., 2000; Khanna et
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22 al., 1998; Gnyawali & Park, 2009)—invariably results in greater tensions between the alliance
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24 partners (Ansari et al., 2016; Das & Teng, 2000; Hamel, 1991; Hoffman et al., 2018; Luo et al.,
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26 2007). Such relationships are more susceptible to failure (Park & Russo, 1996) as they face greater
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28 risks of opportunistic behavior, including appropriation of a partner's critical resources (Das &
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30 Teng, 1998; Lavie, 2006) and undesirable knowledge spillovers, reduced commitment, limited
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32 resource sharing, misalignment of incentive structure, and/or free ridership (Belderbos et al., 2012;
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34 Gnyawali & Park, 2009; Kale et al., 2000; Khanna et al., 1998).

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39 Therefore, how firms manage the tensions that stem from the pursuit of simultaneous
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41 cooperation and competition is a matter of central concern in both streams of research (Hoffmann
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43 et al., 2018). In this respect, prior research has identified two broad approaches to managing the
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45 tensions in such relationships: separation or integration of contradictory elements (Poole and Van
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47 de Ven, 1989). In the separation-based approaches, partners may pursue (a) *organizational*
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49 separation where alliance partners employ *different* organizational units or teams to engage in
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51 cooperation and competition elements. For example, in the Apple-Samsung relationship, while the
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53 sales teams of both firms compete fiercely to capture greater smartphone market share, the supply
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3 chain teams of both firms simultaneously collaborate to facilitate the timely supply of components
4 from Samsung to Apple (Brandenburger & Nalebuff, 2021); (b) *domain* separation, where partner
5 firms engage in simultaneous competition and cooperation but these activities take place in
6 *different* domains (e.g., product lines, geographical markets, or value chain activities). For
7 example, in 2013, Ford and GM agreed to share the transmission technologies at the R&D stage
8 but competed in manufacturing operations (Brandenburger & Nalebuff, 2021); and (c) *temporal*
9 separation, where partners *switch* between cooperation and competition over time. For example,
10 Volkswagen follows a cooperative approach with a preferred supplier while designing and
11 developing a part but induces price competition among its global suppliers while procuring it
12 (Wilhelm & Sydow, 2018).
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26 Scholars, however, argue that separation-based approaches suffer from one major limitation.
27 Even if firms employ *organizational*, *domain*, or *temporal* separation for buffering competitive
28 elements from collaborative elements of the relationship, the top management still needs to
29 integrate and coordinate their contradictory demands at higher levels, which causes tension
30 (Bengtsson et al., 2016; Eisenhardt, Furr, & Bingham, 2010; Gnyawali et al., 2016). Therefore,
31 scholars recommend the integration approach, which involves combining the contradictory
32 elements of cooperation and competition as *interdependent* opposites (e.g., Chen, 2008; Hoffmann
33 et al., 2018; Smith & Lewis, 2011). Although the notion of interdependence between cooperation
34 and competition is a key concept in horizontal alliance literature for explaining various outcomes
35 (e.g., formation of countervailing alliances (Gimeno, 2004) or effect on firms' value in alliances
36 with rivals (Oxley et al., 2009), this stream of literature has surprisingly paid little attention to
37 examining integration approach for managing tensions stemming from the simultaneity of
38 cooperation and competition. Next, we describe how recent coopetition research is beginning to
39 address this gap (e.g., Bengtsson et al., 2016; Gnyawali et al., 2016).
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Paradoxical Tensions in Coopetitive Alliances

Drawing from paradox literature (e.g., Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011; Smith & Tushman, 2005), coopetition scholars suggest that coopetition at its core involves a cooperation-competition paradox (Bengtsson et al., 2016; Gnyawali et al., 2016; Raza-Ullah, 2020), where a paradox consists of “contradictory yet interrelated elements that exist simultaneously and persist over time” (Smith & Lewis, 2011: 382). Moreover, the central concept in any paradoxical situation is tension, which emerges because contradictory elements “seem logical when considered in isolation, but irrational, inconsistent, and even absurd when juxtaposed” (Smith & Lewis, 2011: 387). Thus, the key to managing these relationships is to understand and address this paradox and the resultant paradoxical tension for realizing the potential opportunities of synergistic value creation (Arslan, 2018; Gnyawali & Ryan Charleton, 2018; Lado et al., 1997; Park & Ungson, 2001) and for minimizing any increased susceptibility to alliance failure and value destruction (Hoffmann et al., 2018; Gnyawali & Ryan Charleton, 2018; Park & Russo, 1996).

In this respect, alliance partners may adopt an integration approach that involves “developing a wholly new conception” that supersedes the oppositional elements (Poole & van de Ven, 1989: 573) and emphasizes synergistic combination. More specifically, integration requires that managers view seemingly opposing forces as a duality, i.e., “while [the individual elements are] conceptually distinct [and contradictory], [they] are no longer separate but, rather, are interdependent and potentially compatible—mutually enabling and a constituent of one another” (Farjoun, 2010: 205). Such an approach is potentially more rewarding as it enables firms to explore interdependencies and complementarities between the contradictory elements, leveraging the “energizing potential” of a paradox (Andriopoulos & Lewis, 2009: 702). However, it also invariably accentuates the paradoxical tension because the inherent contradictions between the

opposing forces gain more salience when such forces are juxtaposed (Smith & Lewis, 2011). As a result, firms would likely find that integration is “cognitively and administratively taxing,” and adopting it successfully is far from a straightforward process (Hoffmann et al., 2018: 3043).

For these reasons, prior coopetition research argues that a set of specialized capabilities—coopetition capability—is required to help firms adopt the integration approach effectively (e.g., Bengtsson et al., 2016; Gnyawali et al., 2016). A question may arise at this point: why is coopetition capability necessary when a well-established construct of alliance capability already exists? Although alliance capabilities (Schilke & Goerzen, 2010) are important in coopetition alliances, they are not specifically purposed or equipped to help firms understand and manage the coopetition paradox, particularly with respect to the integration approach. We argue that coopetition capability with its underlying routines and mechanisms would fill this critical need, thus enabling alliance partners to leverage the cooperation-competition paradox in a way that creatively “captures both extremes” (Eisenhardt, 2000: 703) and manages the resultant paradoxical tensions (Bengtsson et al., 2016; Gnyawali et al., 2016). A body of work has begun to give shape to the coopetition capability construct along these lines. However, we still lack a clear understanding of coopetition capability’s underlying conceptual properties (Hoffmann et al., 2018). Next, we provide a critical review of extant research on coopetition capability and build on this review to systematically develop the construct.

PHASE I: CONCEPTUALIZING COOPETITION CAPABILITY

Coopetition Capability: A Review and Assessment of Existing Research

Gnyawali and Park (2011) first introduced the concept of coopetition capability, noting the role of coopetition mindset, coopetition experience, and superior and complementary resources. Building on these notions, Gnyawali et al. (2016) then conceptualized coopetition capability as paradox management capability consisting of two dimensions: analytical capability and

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3 executional capability. Analytical capability enables firms to understand the coopetition paradox
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5 cognitively, and executional capability helps to deal with the paradox. Relatedly, Bengtsson et al.
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7 (2016: 22) conceptualized coopetition capability as a unidimensional construct and defined it as
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9 “the ability to think paradoxically and to initiate processes that help firms attain and maintain a
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11 moderate level of tension, irrespective of the strength of the paradox.” In a more recent work,
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13 Bengtsson, Raza-Ullah, and Srivastava (2020: 3) broadened the concept by arguing that
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15 coopetition capability is “a firm's ability to (a) understand the paradoxical nature of coopetition,
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17 (b) develop a repertoire of alternative strategies, and (c) make timely and accurate strategic
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19 decisions to balance the contradictory demands.” Similarly, Raza-Ullah (2020: 6) conceptualized
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21 it as a two-dimensional construct: “emotional capability (i.e., the organizational ability to
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23 recognize, accept, and embrace conflicting emotions) and balancing capability (i.e., the
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25 organizational ability to balance competing demands without jeopardizing the common
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27 objectives).” Please refer to the Online Supplementary Material: Table A1 for details on existing
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29 studies on coopetition capability. Table 1 provides an index of all the supplementary material
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31 available at <http://xxx.sagepub.com/supplemental>.
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44 These prior works provide useful insights in understanding coopetition capability, but existing
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46 definitions and conceptualizations are ambiguous and often contradictory, thereby undermining
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48 construct clarity. For example, while prior experience is often viewed as an antecedent of alliance
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50 capability (Heimeriks & Duysters, 2007; Kale, Dyer, & Singh, 2002; Schilke & Goerzen, 2010),
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52 both Gnyawali and Park (2011) and Bengtsson et al. (2016) view prior coopetition experience as
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54 part of coopetition capability. This contradicts the idea that the construct definition should not
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56 incorporate antecedents or outcomes (Suddaby, 2010). Similarly, confusion exists as to whether
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coopetition mindset is a distinct element (Gnyawali & Park, 2011), is a part of analytical capability (Gnyawali et al., 2016), or if it is at all an element of coopetition capability (Bengtsson et al., 2016). Furthermore, whereas Raza-Ullah (2020) conceptualized balancing capability as a combination of analytical capability and executional capability, Gnyawali et al. (2016) considered analytical and executional capability as distinct elements. Besides, Raza-Ullah (2020) draws from emotional ambivalence literature to conceptualize emotional capability as a specific component of coopetition capability. However, emotion could be a part of cognition as per the paradox literature (Smith & Lewis, 2011; Smith & Tushman, 2005), which is consistent with the coopetition mindset as conceptualized by other researchers (e.g., Gnyawali & Park, 2011; Bengtsson et al., 2020). Finally, superior and complementary resources noted initially as a part of coopetition capability (Gnyawali & Park, 2011) are not really unique to coopetition or the integration approach, as they are important even in the context of strategic alliances (Lambe, Spekman, & Hunt, 2002; Madhok & Tallman, 1998).

As such, existing conceptualizations of coopetition capability are loose and fragmented. The overall confusion about the definitions, nature, and dimensions of coopetition capability implies that it lacks what Suddaby (2010) calls construct clarity. This lack of clarity, in turn, impedes the design and conduct of empirical research, hindering confidence in empirical findings related to the construct (Ketchen, Ireland, & Baker, 2013), which also highlights the issue of construct validity (Bacharach, 1989; Bagozzi et al., 1991; MacKenzie et al., 2011). In what follows, we systematically address the issue of coopetition capability's construct clarity by providing a precise definition, laying out its scope conditions, and specifying semantic relationships with related constructs in its nomological network. In doing so, we also address the issue of construct validity by developing a valid and reliable scale to measure coopetition capability (Bacharach, 1989; Bagozzi et al., 1991; MacKenzie et al., 2011).

Conceptual Domain and Definition of Coopetition Capability

We conceptualize coopetition capability as a three-dimensional construct: coopetition mindset, analytical acumen, and executional skills. We develop this conceptualization by building on both (a) the insights from the literature review discussed above and (b) qualitative analysis of several practitioners' semi-structured interviews (with 13 senior executives: four from pharmaceutical industry and three each from power & energy, telecommunication, and information technology industries) and a focus group (with four senior executives) during August – October 2014. Interviews help researchers gain a better understanding of a relatively undefined and ambiguous phenomenon (Suddaby, Bruton, & Si, 2015). Our analysis revealed a match between the aspects of coopetition capability discussed in prior literature and those that emerged from the qualitative analysis: the pursuit of coopetition entails having an appropriate mindset to recognize and accept the paradox, readiness and ability to evaluate the paradoxical situation and devise appropriate strategic actions, and ability to choose and implement the most appropriate response and adapt as the paradoxical situation changes. (Online Supplementary Material: Table A2 presents central themes that emerged from the qualitative data analysis).

Coopetition mindset. Coopetition mindset is about having a shared firm-level mental model that recognizes and embraces the paradox at the core of coopetition (Gnyawali et al., 2016). Such shared mental models are instrumental in channeling and distributing top management's attention (Ocasio, 1997) and in shaping firms' behavior in two important ways. *First*, mental models that view the simultaneous pursuit of competing forces as interdependent and potentially compatible (Farjoun, 2010; Smith & Lewis, 2011)—as opposed to irreconcilable opposites—help develop a more comprehensive view of underlying opportunities and challenges. *Second*, such models may also help in accepting the paradoxical tensions and seemingly conflicting goals and objectives pursued by the coopetition partners (Lado, Boyd, Wright, & Kroll, 2006; Luo, 2007), which may

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3 in turn spur creative thinking and lead to superior outcomes. In sum, coopetition mindset helps
4 firms exploit synergies and create win-win situations by “combating natural, often
5 counterproductive tendencies to over rationalize or avoid tensions” (Andriopoulos & Lewis, 2009:
6 709).
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12 As the Chief Operating Officer (COO) of a large telecommunication firm describes such a
13 mindset:
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17 Initially, the team members had serious doubts about the feasibility of this project ... they were
18 not sure whether to collaborate or compete. However, our top management was fully convinced
19 that collaboration with this particular competitor offers us advantages even though there may
20 be greater risks ... collaboration with other non-competitor firms could not offer such
21 advantages. The CMD asked us to be prepared to face the tensions that would come up in this
22 alliance.
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25 We illustrate such a mindset in the context of the Samsung-Sony joint venture (Gnyawali &
26 Park, 2011). Despite fierce rivalry, the two firms formed a joint venture (JV) called S-LCD in 2004
27 to develop LCD panels—a project that entailed vast financial investments and technological risks.
28 The partners saw a potential for creating significant value—a new market for flat-screen TVs—by
29 winning the standardization battle between LCD and PDP TVs. As the President and CEO of
30 Samsung Electronics' LCD Business said, “[t]he cooperation ... offers an opportunity to lead the
31 rapidly growing LCD TV market and standardization of glass substrate and LCD TV sizes. It is a
32 win-win situation for both companies” (Phys.org, 2004). However, Samsung and Sony were also
33 suspicious of each other as they had to compete intensely in the TV market to appropriate a larger
34 share of the value (market share). As Chu Woosik, a VP at Samsung remarked, “[i]t costs \$3 billion
35 to make a new LCD line and the cooperation is to share benefits and risks and to maximize
36 synergies” (Inoue & Miyoung, 2003).
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52 Building on these insights, we define coopetition mindset as *the ability of a firm to recognize*
53 *and accept cognitively the paradoxical nature of coopetition*. Coopetition mindset is akin to
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3 paradoxical cognition, which has two elements—cognitive processes and paradoxical frames
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5 (Smith & Tushman, 2005). While cognitive processes relate to how managers perceive, interpret,
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7 and act on information (Smith & Tushman, 2005), paradoxical frames provide “a foundation for
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9 cognitive processes that can handle inconsistencies” (Smith & Tushman, 2005: 527). The key
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11 elements in this definition are ‘paradoxical nature,’ ‘recognize,’ and ‘accept.’ We have described
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13 in detail the ‘paradoxical nature’ of coopetition above. So, we now turn our attention to the latter
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15 two elements. Recognition entails an understanding that coopetition is about exploring the
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17 potential for interdependencies, complementarities, and interrelatedness between cooperation and
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19 competition (Gnyawali et al., 2016), whereas acceptance is about knowingly embracing
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21 cooperation and competition as a duality, i.e., the paradoxical elements are contradictory but also
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23 mutually enabling and inseparable (Chen, 2008; Farjoun, 2010).
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28 **Analytical acumen.** Coopetitive alliances are highly dynamic relationships, requiring the
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30 alliance partners to constantly evaluate emerging situations and develop alternative response
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32 strategies so that unproductive conflict and paradoxical tensions are mitigated. Since the
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34 competing demands result in paradoxical tensions that persist throughout the life of an alliance
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36 (Hannah & Eisenhardt, 2018), addressing such tensions requires ongoing responses rather than
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38 one-time resolution (Lewis, 2000). Thus, analytical acumen is about the firm’s ability to perform
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40 an in-depth examination of the paradoxical situations, explore ways of dealing with them, and
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42 develop appropriate creative strategies to manage the paradoxical tensions.
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47 As a Senior Executive in the Alliance Function of a large pharmaceutical firm observed:
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49 In this alliance, we are collaborating with a competitor on an innovation project. We entered
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51 into this relationship knowing well that it is ridden with tensions and difficulties. However,
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53 there is no point in merely appreciating that tensions exist...we realized early on that it was
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55 better to constantly analyze why these tensions emerged and how to address them.
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To illustrate analytical acumen, we describe how the same partners—Airbus Defense and Space (ADS) and Thales Alenia Space (TAS)—developed different strategies to manage projects that had different objectives and risk profiles. In the Yahsat project, a radically innovative project that involved extensive financial and technological risk, ADS and TAS jointly and severally shared the risks on a *no-fault basis*. Moreover, they employed an expensive and complex Coopetitive Project Team (CPT) project structure to facilitate joint supervision, close and daily collaboration, share and pool the best resources and competencies, and manage the risk of opportunistic behavior (Fernandez et al., 2018). As the Head of the Business with Yahsat explained, “For Yahsat ... no matter what happens, we share the risks on a no-fault basis. We have solidarity. So, it is riskier. We depend on the partner to achieve the project” (Fernandez et al., 2018: 403). By contrast, since the Arabsat 4 and Arabsat 5 projects sought incremental innovation and involved limited financial and technological risks, the alliance partners adopted a different strategy: the risk burden fell on the partner—ADS or TAS—that was supposedly at fault, and the partners managed the project via Separate Project Teams (SPT), a much simpler and less costly project structure than CPT, to reduce the risk of unintended knowledge spillover and protect the core competencies of the partners (Fernandez et al., 2018).

Building on these insights, we define analytical acumen as *the ability of a firm to evaluate the coopetition situation and develop alternative strategic choices to address the paradoxical tensions*. The key elements in this definition are “evaluate” and “develop alternative strategic choices.” Coopetitive relationships entail pursuing cooperative and competitive strategies simultaneously, yet maintaining and implementing such coopetitive strategies in an ongoing manner is challenging and costly (Lado et al., 1997). Therefore, we suggest that analytical acumen consists of mechanisms and processes that facilitate systematic evaluation of paradoxical situations and development of a deeper understanding of ways in which the opposing forces impact cooperative

relationships. Furthermore, because the demands from competition and cooperation are contradictory and often changing, analytical acumen is also about exploring various options and developing a more diverse repertoire of creative strategies (Gnyawali & Ryan Charleton, 2018; Lado et al., 1997). Since tensions persist throughout the life of a coopetitive alliance (Hannah & Eisenhardt, 2018), analytical acumen is also about constantly monitoring and evaluating the response patterns (Lewis & Smith, 2014) and developing strategic choices to resolve these tensions on a continuous basis (Lewis, 2000).

Executorial skills. Coopetitive alliances are highly dynamic, risky, and challenging, requiring firms to make strategic choices as per the evolving situation and implement these strategies effectively to manage the paradoxical situation. Thus, executorial skills are about the ability of the firm to make appropriate strategic choices from a set of available alternatives and develop organization routines and processes to implement the chosen strategy. Executorial skills complement cooperation mindset and analytical acumen. In essence, executorial skills enable firms to “achieve a dynamic balance (or syncretism) between cooperation and competition strategies” (Lado et al., 1997: 122).

As the CEO of a large power & energy firm explained:

We are not used to such relationships ... we experience high tensions and conflicts. We have different routines and processes. So, we developed new organizational routines and formalized processes to work together. It involved both formal and informal processes ... Sometimes because of unforeseen situation, we choose new value creating strategies. We even modified the scope of our relationship ...

Consider the illustrative example of the Samsung and Sony JV noted earlier. Both firms encouraged knowledge sharing to facilitate LCD innovation and developed unique patent sharing and patent protection mechanisms for balancing cooperation and competition. To encourage cooperation, they cross-licensed their patents: while Samsung cross-licensed 11,000 patents, Sony cross-licensed 13,000 patents (Gnyawali & Park, 2011). At the same time, they excluded the so

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3 called ‘Differentiated Technology Patents’ to maintain their distinctiveness and promote healthy
4 competition (Gnyawali & Park, 2011: 655). As a result, these arrangements both facilitated
5 knowledge and technology sharing in joint product development and helped in protecting their
6 core knowledge (Gnyawali & Park, 2011). As a result, they continued and even intensified their
7 commitment and financial investment despite the threat of opportunistic behavior from one
8 another. As Murayama, a senior engineer in Sony TV, explained, “If we put up barriers, they’ll
9 close up too” (Dvorak & Ramstad, 2006).

19 Building on these insights, we define executional skills as *the ability of a firm to make*
20 *appropriate strategic choices to manage the paradoxical tensions, develop and use routines and*
21 *processes to implement the strategic choices, and adapt to changing conditions.* The key elements
22 in this definition are “make appropriate choices,” “routines and processes,” and “adapt.”
23 Executional skills refer to the ability of firms to make the best possible choice from a repertoire of
24 alternative strategies to address the paradoxical tension (Bengtsson et al., 2020). Firms also build
25 organizational routines and processes—essential building blocks, which when bundled together
26 form a capability (Eggers & Kaplan, 2013)—to implement these strategic choices effectively.
27 These routines are geared towards managing mechanisms that are unique to coopetition’s “mutual
28 pursuits, resource leverage, safeguarded resources, and relevant commitments” (Gnyawali & Ryan
29 Charleton, 2018: 2514). The consequences of these mechanisms, however, depend on the
30 navigation of simultaneity, which entails maintaining “appropriate intensity of competition and
31 cooperation, and balance between these competing logics” (Gnyawali & Ryan Charleton, 2018:
32 2514). Thus, executional skills are also about developing organizational routines and processes
33 that help “achieve a dynamic balance between cooperation and competition strategies” (Lado et
34 al., 1997: 122). Since the scope and content of cooperative relationships are likely to change over
35 time because of the environmental conditions and interaction between the alliance partners

(Bengtsson et al., 2020), executional skills include firms' ability to adapt to evolving situations by developing routines and processes that facilitate change in the structure, scope, and content of alliances (Bengtsson et al., 2016; Gnyawali et al., 2016).

The three capabilities—coopetition mindset, analytical acumen, and executional skills—discussed above are individual elements of coopetition capability. Since “capabilities are complex, structured and multidimensional” (Winter, 2003: 992), we posit that these capabilities fit together coherently in a synergistic manner and contribute to a distinct higher-order capability—coopetition capability. The overall construct of coopetition capability is a blend of cognition (mindset) and behavior. Coopetition capability, because of the inter-related, mutually reinforcing nature of its dimensions, is difficult to buy, imitate, assemble, substitute, or replace (Hunt, 1999: 152). Based on the above, we define coopetition capability as *a higher-order capability, which enables firms to adopt an integration approach to manage the paradoxical tensions inherent in coopetition.*

Coopetition Capability: Scope Conditions and its Relationship with Alliance Capability

Since no construct is universally applicable, it is important for achieving construct clarity to delineate the contextual conditions under which a given construct will apply (Suddaby, 2010). Although coopetition has been conceptualized and defined in several ways, its key characteristic is the *simultaneity* of cooperation and competition between two or more actors, giving rise to paradoxical tensions. A paradox and paradoxical tensions will emerge only when there is *temporal* simultaneity between cooperation and competition that persists over time, and the alliance partners intentionally and deliberately instigate such a simultaneity (Smith & Lewis, 2011). However, “not all temporal overlaps between competition and cooperation are the same, nor will they have similar consequences” or result in similar levels of paradoxical tensions (Gnyawali & Ryan Charleton, 2018: 2520). The intensity of paradoxical tension is, therefore, crucial; it will be high when the intensity of both cooperation and competition is simultaneously high (Gnyawali & Ryan

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3 Charleton, 2018). In such situations, the coopetition capability construct will assume more salience
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5 in managing cooperative relationships.

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8 Based on this understanding, we specify coopetition capability's scope or boundary conditions
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10 in terms of the constraints of "space, time, and value" (Suddaby, 2010: 349). Regarding the
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12 constraint of space, coopetition may take place across multiple levels: project (e.g., Fernandez et
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14 al., 2018), inter-firm (e.g., Bengtsson & Kock, 2000; Gnyawali & Park, 2011), portfolio
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16 (Bengtsson & Kock, 2014), network (e.g., Gnyawali et al., 2006), and industry ecosystem [(e.g.,
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18 TiVo alliances within US TV industry ecosystem (Ansari et al., 2016)]. The coopetition capability
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20 construct is applicable to all cooperative relationships where cooperative and competitive activities
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22 are identifiable, and the simultaneity between cooperation and competition is manifested between
23
24 the same actors. It is most salient in the case of inter-firm dyadic relationships, as such relationships
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26 involve a more complex, direct, and intimate interaction between partners (Gnyawali & Park,
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28 2011). Nevertheless, it would have limited applicability in contexts such as US TV industry
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30 ecosystem (Ansari et al., 2016) where coopetition occurs indirectly (e.g., Actor A cooperating with
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32 Actor B and competing with Actor C), resulting in comparatively lower intensity of paradoxical
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34 tensions.

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37 Regarding the constraints of value and time (Suddaby, 2010), the coopetition capability
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39 construct would be applicable to both horizontal [e.g., JV (S-LCD) between Samsung and Sony
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41 (Gnyawali & Park, 2011)] and vertical [e.g., alliance between Dell and Lenovo (ex-IBM) (Ross
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43 Jr, & Robertson, 2007)] alliances, as long as the choice to enter into such a relationship is
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45 intentional and deliberate, and the competition and cooperation occur simultaneously. By contrast,
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47 it would have limited applicability in the context of the value-net models (Brandenburger &
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49 Nalebuff, 1996), where the simultaneity of cooperation and competition is rarely with the same
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51 firm. Similarly, our coopetition capability construct will not be applicable to other kinds of
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3 paradoxical tensions such as the “learning paradox,” or “belonging paradox” (Smith & Lewis
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5 2011: 383) because cooperation and competition are not simultaneous in such cases.
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8 Furthermore, for achieving construct clarity, we also clarify the roles of coopetition capability
9
10 and alliance capability in managing coopetitive relationships. Alliance capability is a higher-order
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12 capability comprising organizational routines that enable a firm “to purposefully create, extend, or
13
14 modify the firm’s resource base, augmented to include the resources of its alliance partners”
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16 (Helfat et al., 2007: 66). As discussed, coopetition capability is a specialized set of capabilities that
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18 enable firms to adopt an integration approach and manage the paradoxical tensions. Thus, the two
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20 sets of capabilities serve two different albeit complementary purposes: while alliance capability
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22 helps in effecting change in the resource base, coopetition capability enables partners to manage
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24 the paradoxical tensions, thus leveraging the benefits and minimizing the risks of pursuing
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26 simultaneous cooperation and competition. Although inter-organizational coordination routines
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28 (Schilke & Goerzen, 2010) help to mitigate the heightened risks of a partner’s opportunistic
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30 behavior and facilitate exchange of resources by devising appropriate governance mechanisms,
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32 coopetition capability plays a different role in helping firms maintain “appropriate intensity of
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34 competition and cooperation, and balance between these conflicting logics” (Gnyawali & Ryan
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36 Charleton, 2018: 2514). Consequently, as the intensity of paradoxical tensions increases,
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38 coopetition capability gains greater salience in helping firms effectively navigate the simultaneity
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40 of cooperation and competition by managing these paradoxical tensions to a moderate level
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42 (Bengtsson et al., 2016).
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49 **PHASE II: SCALE DEVELOPMENT AND VALIDATION**

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51 We now address the issue of construct validity by developing a psychometrically valid scale
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53 (Bacharach, 1989; Bagozzi et al., 1991; MacKenzie et al., 2011) for coopetition capability. We
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55 followed the procedures outlined by MacKenzie et al. (2011) and conducted four studies to
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construct a scale for coopetition capability (Online Supplementary Material: Figure A1 provides an overview of the steps).

Study 1: Item Generation

We adopted a deductive approach to develop an initial pool of items that fully represents the conceptual domain of the coopetition capability construct (Churchill, 1979; MacKenzie et al., 2011). Following prior guidelines on scale development (Hinkin, 1995; MacKenzie et al., 2011), we used insights from the existing research on the focal construct and a qualitative study to develop an exhaustive list of items. We also sought the opinions of practitioners and experts (MacKenzie et al., 2011) and modified several items to ensure face validity. We developed 31 items indicating various dimensions of coopetition capability: coopetition mindset = 10 items, analytical acumen = 11 items, and executional skills = 10 items (Online Supplementary Material: Table A3 provides the details of the initial pool of items generated in study 1).

Study 2: Professional Review, Assessment of Content Validity, and Measurement Model

Professional review. Following MacKenzie et al. (2011), we provided the items and a description of coopetition capability to nine academics familiar with coopetition research and 15 coopetition alliance managers. We requested them to classify the items in three groups: retain without modification, retain but modify, and drop. We also encouraged them to suggest new items. As a result, we added seven new, modified four, and dropped seven items, leaving us with 31 items: coopetition mindset = 12, analytical acumen = 11, and executional skills = eight items.

Assessment of content validity. To assess the content validity of the items retained after the professional review, we performed two tasks. In task 1, we presented 31 items and definitions of various coopetition capability dimensions to a new set of six coopetition researchers and eight coopetition alliance managers. We requested them to assign the items to one of the three

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3 dimensions of coopetition capability. As coopetition capability is a relatively new construct and
4 has a limited empirical base, we followed Anderson and Gerbing's (1991) procedure to compute
5 two indices on this sorted data: the proportion of substantive agreement (P_{SA}) and substantive
6 validity coefficient (C_{SV}). We retained only those items that had P_{SA} and C_{SV} values equal to or
7 greater than 0.5 (Anderson & Gerbing, 1991).
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15 In task 2, following the procedures outlined by Hinkin and Tracey (1999), we asked the experts
16 to rate the appropriateness of each item on a 7-point Likert-type scale ranging from 1 (very strongly
17 disagree) to 7 (very strongly agree). Then, we applied a repeated one-way ANOVA to each item
18 to examine whether the item had the highest score on its posited domain and conducted pair
19 comparison tests to assess the domain with the highest appropriateness value. Finally, we
20 compared the results of task 1 and task 2, which showed that 12 items [coopetition mindset (five
21 items), analytical acumen (four items), and executional skills (three items)] did not exhibit
22 adequate content validity. After dropping these 12 items, we were left with 19 items that are
23 presented in Table 2. (Online Supplementary Material: Table A4 provides the results pertaining to
24 only study 2).
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39 Insert Table 2 about here
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42 **Measurement model specification.** Law, Wong, and Mobley (1998) assert that a newly
43 developed multidimensional construct must specify its relationship—either as reflective or
44 formative (Jarvis, MacKenzie, & Podsakoff, 2003; MacKenzie et al., 2011)—with respect to its
45 dimensions. Correct specification of the dimensions is critical for appropriate operationalization
46 and development of psychometrically valid measures (Bollen, 1989; MacKenzie et al., 2011).
47 Hence, following Jarvis et al. (2003), we model coopetition capability as a second-order reflective-
48 reflective Type-I construct reflected by three first-order reflective constructs—coopetition
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mindset, analytical acumen, and executional skills. We model coopetition capability as such because it is a holistic concept with highly correlated and reinforcing dimensions. Moreover, a second-order reflective-reflective construct captures the complementarities among the three first-order dimensions by accounting for their interactions and covariations (see Jarvis et al., 2003 for further details on second-order reflective-reflective Type-I constructs).

Study 3: Scale Construction

Study 3 involved four steps: questionnaire design, data collection, data purification, and scale construction and refinement.

Questionnaire design. We used the 19 items retained at the end of study 2 to design a questionnaire. We used a 7-point Likert scale (1 = very strongly disagree; 7 = very strongly agree) for measuring the items of coopetition capability. We conducted a pilot test and in-depth interviews with a new set of 22 alliance managers familiar with coopetition alliances to further refine the questionnaire (MacKenzie et al., 2011).

Data collection. For examining coopetition capability, we used dyadic alliances as the unit of analysis following previous alliance studies (e.g., Kale et al., 2000; Lambe et al., 2002; Rai, 2016; Raza-Ullah, 2020). Although coopetition capability is a firm-level capability and may subsist within a firm outside of an alliance context, we observe its effects or manifestations only in alliance context. Moreover, interactions between the alliance partners in a dyad are more complex, direct, and intimate (Gnyawali & Park, 2011). As such, dyadic alliances allow better capturing of the inherent tensions and complexities in the coopetitive relationship (e.g., Bengtsson & Kock, 2000; Rai, 2016). Similarly, we chose high-technology industries as our empirical setting because coopetitive alliances are mostly formed for the purposes of research and development (R&D), exchange of technology/co-development of technology, and/or product innovation (e.g., Ansari et al., 2016; Gnyawali et al., 2006; Ketchen et al., 2004; Luo, 2007).

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3 We collected data in India in three stages. First, we obtained contact information of the initial
4 list of 2053 firms in four industrial sectors—pharmaceuticals, telecommunication, power &
5 energy, and information technology—using the Prowess Release 3.1 database from the Centre for
6 Monitoring Indian Economy (Rai, 2016). Second, we contacted each firm by phone or email to
7 inquire whether it was currently engaged in a coopetition alliance (Schilke & Cook, 2015). A direct
8 contact was necessitated as there is no ready-to-use database for coopetitive alliances and alliance
9 managers (Rai, 2016). We clearly explained the meaning and characteristics of coopetition
10 alliances. We preferred to collect data from ongoing coopetition alliances as the informant's
11 response is more reliable on relatively recent matters (Homburg, Klarmann, Reimann, & Schilke,
12 2012).

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26 Third, we administered the survey from January to April 2015. In total, 457 firms agreed to
27 participate in our study. We released multiple surveys (2763 surveys in total) to potential
28 informants within a participating firm because a firm may engage in multiple coopetitive alliances
29 with the same partner or with different partners (Rai, 2016). We sent the surveys to the Chief
30 Executive Officers (CEOs) or the Managing Directors (MDs) and requested them to nominate an
31 appropriate informant who was conversant with the alliance activity to complete the survey and
32 share the details of the informant with us. We then wrote to each nominated informant and
33 requested that they complete the survey with a particular dyadic coopetitive alliance as a reference
34 point. In the survey, we explained the meaning and characteristics of a coopetitive alliance with a
35 few typical examples. We released the surveys using two modes—web-enabled (online survey)
36 and e-mail (offline survey). In addition to the items for the coopetition capability construct retained
37 after the substantive validity test, the survey also contained items for other explanatory variables
38 and control variables (see phase III for details of these variables).

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3 Researchers recommend collecting data from both alliance partners because such data allows
4 assessing the perceptual agreement and validity testing (Anderson, Zerrillo Sr., & Wang, 2006).
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6 Moreover, alliance outcomes are contingent upon each partner's behavior. Accordingly, we tried
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8 to collect data from both partners. However, out of 457 focal firms that were part of our study,
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10 only 109 (23.85%) disclosed the details of their partners. Furthermore, out of these 109 partner
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12 firms, only 31 agreed to participate in the study. Thus, owing to the difficulty in collecting data
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14 from both the alliance partners and following other studies involving dyadic relationships (Lambe
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16 et al., 2002; Rai, 2016), we adopted the "proxy-report" approach and collected data only from the
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18 focal firm. Proxy-report implies an informant "speaking" on behalf of the partnership and
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20 answering questions about dyadic relationships (Menon, Bickart, Sudman, & Blair 1995:77).
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22 Previous studies have found theoretical and empirical support for proxy-report when there is joint
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24 participation in an event, such as alliances (Menon et al., 1995). Our approach is also consistent
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26 with several studies on alliance capability that have collected data only from one partner (e.g.,
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28 Heimeriks & Duysters, 2007; Kale et al., 2002; Lambe et al., 2002; Schilke & Goerzen, 2010).
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35 We used the key informant approach and collected data from informants responsible for
36 cooperative alliance activities (Phillips, 1981; Rai, 2016). The underlying assumption of the key
37 informant approach is that informants, because of their position in the organizational hierarchy
38 (Phillips, 1981) and the specific function they perform (Homburg et al., 2012), are able to provide
39 opinions and perceptions that are valid reflections of other key decision-makers. We assessed the
40 suitability of the key informants by asking about their self-reported knowledge about the
41 cooperative alliance activities on a 7-point Likert-type scale (1= not very knowledgeable, 7= very
42 knowledgeable) and eliminated responses of informants who reported their knowledge below 5
43 (Phillips, 1981; Rai, 2016). Since the key informants in our study were senior executives with
44 experience in managing coopetition alliances, they were well-versed with the terms used in the
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3 survey. Overall, 98.37 percent of the informants had experience in handling a cooperative alliance
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5 for two years or longer (Mean = 6.11; SD=0.85). In cases where an informant completed a survey
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7 for multiple cooperative alliances, we retained the survey for only one such alliance. Finally, we
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9 received 647 usable responses from 195 firms, reflecting a response rate of 23.42 percent, which
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11 is consistent with earlier studies using experienced managers as key informants (e.g., Rai, 2016;
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13 Schilke & Cook, 2015; Schilke & Goerzen, 2010).

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17 **Data purification.** We performed several tasks to ensure that the collected data was robust
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19 and unbiased. First, we did not detect any outliers using Hair, Black, Babin, and Anderson's (2013)
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21 univariate approach. Next, Little's (1988) Missing Completely at Random (MCAR) test showed
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23 that the missing data was completely random. Finally, we tested for non-response bias in three
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25 different ways. *One*, we used Armstrong and Overton's (1977) procedure to assess non-response
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27 bias by comparing early informants (first quartile) and late informants (last quartile) of the received
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29 surveys for significant differences across means for each theoretical construct. The results of the
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31 *t*-tests indicated no significant differences between early and late respondents ($p > 0.05$). *Two*, we
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33 used Dickson and MacLachlan's (1996) procedure to compare 223 responses received through a
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35 web-based survey with 424 responses received through e-mail, and the Mann-Whitney U tests
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37 found no significant difference between these responses ($p > 0.05$). *Three*, we followed Schilke
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39 and Cook's (2015) procedure to examine whether the non-responding firms differed from the
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41 responding firms in terms of size and industry segment using information from the CMIE database
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43 and found no significant differences ($p > 0.05$).

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49 Since surveys with self-reports as the sole method of data collection may cause common
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51 method bias (CMB), we employed both *ex-ante* and *ex-post* approaches as recommended by
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53 Podsakoff, MacKenzie, and Podsakoff (2012) to address this issue. We used several *ex-ante*
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55 approaches. *First*, as noted earlier, we excluded ambiguous, vague, and unfamiliar terms during
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3 the survey design. *Second*, we clearly defined the terms used in the survey but took care not to
4 offer any clues about the actual relationships under investigation. *Third*, each informant received
5 a letter from both the CEO/MD and us assuring full confidentiality. We also assured informants
6 that there were no right or wrong answers and that they should answer the questions as honestly
7 as possible. *Fourth*, we used reverse coded (negatively worded) items. *Finally*, we provided clear
8 guidelines and changed the order of the survey items.
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11 We also used three *ex-post* approaches to assess CMB. *First*, we conducted Harman's single
12 factor test and found that the highest variance explained by the single factor was 41.70 percent.
13 *Second*, following Williams and Anderson (1994), we conducted the common latent factor test,
14 which showed the unstandardized regression coefficient from the common latent factor as 0.27,
15 indicating that common shared variance is 7.29 percent. *Finally*, we applied Lindell and Whitney's
16 (2001) correlation marker procedure and used the tenure of alliance managers as the marker
17 variable. The correlations between the marker variable and items of other latent constructs were
18 non-significant and less than one percent. All these tests showed that CMB is not an influencing
19 factor in the study.
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23 **Scale construction and refinement.** We randomly split the 647 usable responses into two
24 parts: the calibration sample (300 cases) and the validation sample (347 cases) (Hair et al., 2013).
25 We used the calibration sample for scale construction and refinement (Churchill, 1979). We
26 followed the procedures outlined by Rai (2016) to examine dimensionality and reliability. We first
27 conducted the exploratory factor analysis (EFA) at the individual construct level (using varimax
28 rotation and extraction criterion of eigen value greater than 1.00), which showed that the first-
29 order dimensions of the coopetition capability construct provided a single factor solution,
30 explaining variances in the range of 68.63 to 79.60 percent. We deleted four items [coopetition
31 mindset (two items) and analytical acumen (two items)] as their loadings on the designated
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construct was less than 0.5. Second, we aggregated the retained measurement items and conducted EFA again to verify that the cross-loading of items was not equal to or higher than 0.35 on two or more factors (Hinkin, 1995). All the items appropriately loaded on their respective designated construct. Ultimately, we retained a total of 15 items. Online Supplementary Material: Table A5 presents the results of EFA at the individual construct level and on aggregated items.

Next, we assessed the reliability of the set of indicators at the construct level by examining internal consistency reliability, i.e., whether the Cronbach's alpha (α) is greater than 0.70 (Nunnally, 1978). The reliability of all dimensions of coopetition capability show values above the required thresholds of 0.7 (all were ≥ 0.87) (see Supplementary Material: Table A5) (Fornell & Larcker, 1981; Nunnally, 1978). Therefore, the scales demonstrate internal reliability.

Study 4: Scale Validation

Construct validity of the first-order constructs. We used the remaining 347 cases as a validation sample to validate the scale. The confirmatory factor analysis (CFA) results showed that the fit indices for each measurement model of the first-order constructs of coopetition capability were within the acceptable limits, and the factor loadings of the items were above the threshold limit of 0.5 (all were ≥ 0.81) (Bagozzi et al., 1991). In addition, the composite reliability (CR) of all the first-order constructs was above 0.60 level (all were ≥ 0.89) (Bagozzi et al., 1991) and CR > average variance extracted (AVE) (Fornell & Larcker, 1981). Thus, the first-order constructs demonstrated adequate convergent validity.

We then assessed the discriminant validity of all the first-order constructs in two ways. *First*, we calculated the AVE and shared variance between the constructs for each multi-item construct and found that AVE was above the threshold value of 0.5 for all the three dimensions (all were ≥ 0.61), as reported in Figure 1 (Fornell & Larcker, 1981; Hair et al., 2013). We also found that the AVE measure of each construct is larger than the squared correlation of that construct with other

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3 constructs. *Second*, we assessed discriminant validity by running pairwise χ^2 -difference tests for
4 the multi-item factors (Anderson & Gerbing, 1988). These tests compared a model in which the
5 factor correlation is fixed at 1 with an unrestricted model. Every restricted model exhibited a
6 significantly worse fit compared to the unrestricted model. Overall, our results demonstrate
7 adequate discriminant validity for each first-order construct.
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14 **Construct validity of the second-order construct.** Next, we tested the hypothesized structure
15 of the coopetition capability construct by estimating another CFA model with the three first-order
16 constructs (coopetition mindset, analytical acumen, and executional skills) as indicators of
17 coopetition capability (Byrne, 2001). The loadings of the second-order construct on its three
18 respective dimensions are coopetition mindset (0.70), analytical acumen (0.82), and executional
19 skills (0.86), all of which are higher than the threshold value of 0.4 (as depicted in Figure 1). The
20 global fit criteria indicated a good overall model fit for the measurement model of the second-
21 order reflective-reflective Type I construct of coopetition capability: $\chi^2/df=2.17$, GFI =0.93, NFI
22 =0.95, TLI =0.97, CFI =0.97, RMSEA =0.06, SRMR =0.03 (Hair et al., 2013). Furthermore, its
23 composite reliability of 0.84 coupled with AVE of 0.64 indicates that coopetition capability as a
24 higher-order construct has good construct validity. Thus, the conceptualization of coopetition
25 capability as a reflective-reflective Type I construct is valid.
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44 Insert Figure 1 and Table 3 about here
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47 The newly constructed psychometrically valid multi-dimensional scale for coopetition
48 capability consisted of 15 items: coopetition mindset = 5, analytical acumen = 5, and executional
49 skills = 5 items. Table 4 presents the final coopetition capability scale.
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53 **Additional analyses.** We conducted two tests to confirm the validity of the new scale. First,
54 we compared the validity of the hypothesized measurement model with rival measurement models.
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3 Following Rai (2016), we adopted a three-step approach to evaluate the suitability of the three-
4 dimensional model in comparison to four competing models. We present the results in Online
5 Supplementary Material: Table A6. In step 1, we compared various fit indices, including χ^2/df , p-
6 value, GFI, NFI, TLI, CFI, RMSEA, SRMR, Akaike information criterion (AIC), and Bayesian
7 information criterion (BIC) (Bollen, 1989). The three-dimensional model (Model 1) fits the data
8 better than the unidimensional and two-dimensional models (χ^2/df for all the rival models was
9 greater than 3), and the values for AIC and BIC are lesser than all rival models, suggesting that
10 Model 1 is the optimal choice (Burnham & Anderson, 2004). In step 2, we determined whether
11 the hypothesized model achieved a better fit regardless of the probably acceptable overall fit in
12 step 1 by using the chi-square difference test (Bollen, 1989; Hair et al., 2013). Again, Model 1 is
13 a better fit than Models 2, 3, 4, and 5. Finally, we examined component fit (factor loadings) of
14 measurement models (Bollen, 1989). Factor loadings of the items are significant for all the
15 competing measurement models, indicating that this criterion is not useful for assessing the
16 hypothesized model. Overall, the results indicate that a three-dimensional construct (Model 1) is
17 more valid than other models proposed in prior studies such as (i) a unidimensional construct
18 (Model 2) (e.g., Bengtsson et al., 2016; Bengtsson et al., 2020); or (ii) single construct (Model 3)
19 that does not distinguish coopetition mindset and analytical acumen as two distinct constructs
20 (Gnyawali et al., 2016).
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44 Next, we used the focal construct's existing nomological network to assess the validity of
45 multidimensionality. In the coopetition literature, top management commitment (TMC)
46 (Bengtsson & Kock, 2000; Lado et al., 1997) and coopetition experience (Park, Srivastava, &
47 Gnyawali, 2014) are regarded as important drivers of coopetition capability (Bengtsson & Kock,
48 2000; Lado et al., 1997). Since we used coopetition experience to examine the focal construct's
49 nomological validity, we used TMC to assess the validity of multidimensionality. Following the
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3 procedure outlined by MacKenzie et al. (2011), we examined whether TMC has direct effects on
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5 the sub-dimensions of coopetition capability over and above the indirect effects that TMC has
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7 through the focal construct. We measured TMC using four items from Lambe et al. (2002). The
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9 results show that the direct path coefficient of TMC to the coopetition capability is higher ($\beta = 0.59$;
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11 $p \leq 0.001$) than the path coefficients of TMC to individual lower-order dimensions of coopetition
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13 capability [coopetition mindset: $\beta = 0.11$; $p \leq 0.01$; analytical acumen: ($\beta = -0.03$; n.s.); and
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15 executional skills $\beta = -0.09$; $p \leq 0.01$]. The indirect path coefficient of TMC to the individual lower-
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17 order dimensions of coopetition capability were significant [coopetition mindset: $\beta = 0.43$; $p \leq 0.01$;
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19 analytical acumen: ($\beta = 0.51$; $p \leq 0.01$); and executional skills $\beta = 0.55$; $p \leq 0.001$].
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24 **PHASE III: COOPETITION CAPABILITY AND ITS SEMANTIC RELATIONSHIPS**

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26 Construct clarity also involves identifying the focal construct's semantic relationships with
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28 other related constructs (Suddaby, 2010). Following procedures outlined by MacKenzie et al.
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30 (2011), we accomplish this in two steps. *First*, we established the nomological validity of the focal
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32 construct (i.e., the new conceptualization of coopetition capability). *Second*, we extended the
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34 existing nomological network of the focal construct by examining a previously unexplored
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36 relationship. In doing so, we advance theoretical understanding of the critical role of coopetition
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38 capability in value creation. Equally important, we also demonstrate the usefulness of developing
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40 a new scale beyond merely helping to confirm existing relationships (Anderson, Eshima, &
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42 Hornsby, 2019). Such an empirical examination would not have been possible in the absence of
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44 the new psychometrically valid scale. Given the space constraints, we present the summary of
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46 theoretical arguments, methods, and results here and discuss the details in the Online
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48 Supplementary Material: Appendix B.
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Nomological Validity

To establish nomological validity, we examined whether the focal construct relates in a similar way to previously established relationships among other theoretically related constructs (MacKenzie et al., 2011). We identified two variables: (i) coopetition experience—a key antecedent variable; and (ii) value creation—a key outcome variable, whose relationships with coopetition capability are well-established in the coopetition literature. We then tested the association between the focal construct and the two variables. We found that the relationships were as predicted, which establishes the nomological validity (for a detailed explanation and results, see Online Supplementary Material: Appendix B).

Examining New Relationships: Extending the Existing Nomological Network

MacKenzie et al. (2011) recommend that besides establishing nomological validity, researchers should also demonstrate the utility of the newly conceptualized construct by examining previously unexplored relationships, and thereby extend its existing nomological network. To this end, we proposed that coopetition paradox—an index capturing the intensity of cooperation and competition—positively impacts value creation and that coopetition capability positively moderates the relationship between coopetition paradox and value creation (for a detailed theoretical explanation about the proposed relationships between coopetition paradox, value creation, and the coopetition capability construct, see Online Supplementary Material: Appendix B). Accordingly, we specified a structural equation model integrating the proposed relationships of coopetition capability with coopetition experience, coopetition paradox, and value creation (Figure 2).

Insert Figure 2 about here

We collected data on value creation (outcome variable) after a lag time of three years in February 2018 to May 2018 through a separate survey of the same firms considered in Studies 3 and 4. We introduced a three-year lag for data collection for two reasons. *First*, such a design helps to examine the causal effect of explanatory variables on outcome variables (Rindfleisch, Malter, Ganesan, & Moorman, 2008). *Second*, a three-year lag is likely to mitigate the potential CMB hazard because we avoid collecting data for explanatory and dependent variables at the same time (Podsakoff et al., 2012). We received 536 matched usable surveys from 176 firms belonging to four high-technology sectors—pharmaceuticals, power & energy, information technology, and telecommunication—across the time span of surveys 1 and 2. We ensured that each key informant completed only one survey, and only one survey was used for each alliance (see Online Supplementary Material: Appendix B for more details about data collection efforts, sample characteristics (Table B1), and measures used to operationalize the theoretical constructs). Table 4 presents the measurement items and validity assessment, and Table 5 presents the means, standard deviations, and bivariate correlations for all variables.

Insert Table 4 and Table 5 about here

We applied the covariance-based SEM (CB-SEM) maximum likelihood (ML) procedure using AMOS 25.0 software to examine the latent variables within their causal structure. The fit measures for our structural equation model showed satisfactory values: $\chi^2/df = 2.41$; GFI = 0.99, NFI = 0.99, TLI = 0.97, RMSEA = 0.05; and SRMR = 0.04. Our results confirm the focal construct's nomological validity as we find that coopetition experience has a significant positive effect ($\beta = 0.31$; $p \leq 0.001$) on coopetition capability. Similarly, we also find that coopetition capability has (i) a significant positive effect ($\beta = 0.36$; $p \leq 0.001$) on common benefit; (ii) a significant positive

effect ($\beta = 0.38$; $p \leq 0.001$) on private benefit_{cooperation}; and (iii) a significant positive effect ($\beta = 0.14$; $p \leq 0.001$) on private benefit_{competition}.

Our results also confirm the positive moderating effect of coopetition capability on the relationship between coopetition paradox and value creation. We find that coopetition paradox has a significant positive effect on all three dimensions of value creation: (i) common benefit ($\beta = 0.47$; $p \leq 0.001$); (ii) private benefit_{cooperation} ($\beta = 0.45$; $p \leq 0.001$); and (iii) private benefit_{competition} ($\beta = 0.64$; $p \leq 0.001$). We also find a significant positive effect of the interaction term (coopetition paradox x coopetition capability) on all three dimensions of value creation: (i) Common Benefit ($\beta = 0.37$, $p < 0.001$); (ii) Private Benefit_{Cooperation} ($\beta = 0.37$, $p < 0.001$); and (iii) Private Benefit_{Competition} ($\beta = 0.40$, $p < 0.001$). Figure 3 presents the results of the full model estimation. Further, the interaction plots (Figure 4) illustrate that firms with higher coopetition capability have a greater impact on all the components of value creation when the coopetition paradox is high.

 Insert Figure 3 and Figure 4 about here

We also assessed the strength of the moderating effect of the focal construct on all three dimensions of value creation by using Cohen's (1988) formula $f^2 = (R^2_{\text{model with moderator}} - R^2_{\text{model without moderator}}) / (1 - R^2_{\text{model with moderator}})$. We found that the moderating effect of coopetition capability on all dimensions of value creation is large (Common Benefit = 0.58, Private Benefit_{Cooperation} = 0.39, and Private Benefit_{Competition} = 0.55).

DISCUSSION AND IMPLICATIONS

Coopetition research focuses on understanding the paradoxical nature of coopetition, resultant tensions, and impact on value creation (Gnyawali et al., 2006; Gnyawali & Ryan Charleton, 2018; Hoffmann et al., 2018; Rai, 2016). As Ketchen and colleagues (2004:787) argue, "co-opetition potentially can lead to competitive advantages if it is designed in such a way that its negatives are

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3 minimized.” At the heart of this discussion is coopetition capability, which helps to address
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5 paradoxical tensions and realize benefits from coopetition. Despite some existing research,
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7 coopetition capability lacks construct clarity and validity, both of which are critical for theory
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9 building and empirical research (Suddaby, 2010; Bacharach,1989). We motivate our study to
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11 address this important gap.
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14 15 **Contributions and Implications**

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17 Our paper contributes to the literature in three ways. *First*, our systematic development of the
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19 construct with a clear definition, boundary conditions, and relationships with related constructs
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21 provides much needed construct clarity. Conceptually, we explain how coopetition capability helps
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23 integrate contradictory elements into a holistic approach to dealing with paradoxical tension. We
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25 articulate how firms can not only realize greater benefits by exploring interdependencies,
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27 complementarities, and synergies between cooperation and competition but also alleviate the risks
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29 by managing the resultant tensions. Accordingly, we explain how coopetition capability is a
30
31 necessary complement to alliance capability for creating superior value in coopetition.
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35 *Second*, by developing a psychometrically valid scale, we help coopetition researchers
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37 overcome three key challenges that confront them in empirical research. One, developing and
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39 operationalizing new constructs that “capture similar nomological relationships to the existing
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41 constructs” but do so with more accurate and reliable measures that “are easier to specify in causal
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43 models” (Anderson et al., 2019: 200). Two, isolating causal relationships and building predictive
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45 theories that require alignment between what has been theoretically conceptualized and what is
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47 being measured (Anderson et al., 2019; Bagozzi, 2011). Three, our reliable, valid, and ready-to-
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49 use scale provides a concrete basis for empirically examining coopetition capability, saving time
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51 and effort for future researchers. Overall, our paper establishes a common ground for synthesizing,
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3 integrating, and meaningfully comparing previous empirical research that will enable more robust
4 and impactful future research on the topic (Boyd et al., 2013).

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8 *Third*, the newly conceptualized construct is useful beyond revisiting relationships in the
9 existing nomological network; it is an opportunity to examine previously under-researched
10 relationships of the construct (MacKenzie et al., 2011). We demonstrate such utility by showing
11 that coopetition capability serves as a moderator between coopetition paradox and value creation.
12 Further, we show that coopetition experience is an important antecedent of coopetition capability.
13 Consequently, future researchers can use our conceptualization of coopetition capability to
14 distinguish it *a priori* from its antecedents or consequences in their research design (Eisenhardt,
15 1989), thereby pushing the boundary of the construct's nomological network.

26 **Limitations and Directions for Future Research**

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28 Like most studies, our study has a few limitations that future research may address. *First*, we
29 use the proxy-report approach to account for alliance partners' perceptions. Future researchers may
30 collect data from alliance partners, calibrate the perceptions of both sides, and generate richer
31 insights. *Second*, we have developed our scales in the context of dyadic alliances. Future
32 researchers may adapt these scales for other cooperative relationships such as project, alliance
33 portfolio, network, or industry ecosystem levels, ensuring that the specific items accurately capture
34 these contexts' unique characteristics. *Third*, despite the growing interest and publication of
35 several studies, there is no consensus yet on measuring alliance performance or success (Ariño,
36 2003; Schilke & Goerzen, 2010). Although we have used a well-established measure for value
37 creation as an indicator of alliance success (Rai, 2016), future research may examine how the
38 coopetition capability construct relates with other such indicators. *Finally*, our empirical context
39 was high technology firms in India, and it is unlikely that the construct will be unique to the Indian
40 context. Since our research design and methods are replicable and the survey is adaptable to
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3 different settings, we encourage researchers to test the scale in other locations (MacKenzie et al.,
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5 2011).

6 7 8 **Implications for Practice**

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10 Our study informs managerial practice in three ways. *First*, we illuminate how coopetition can
11 be a double-edged sword for managers as it can be both rewarding and challenging. Accordingly,
12 we provide a basis for managers to understand and build coopetition capability, enabling firms to
13 effectively navigate the simultaneity—to achieve an appropriate level of intensity of cooperation
14 and competition for maximizing the benefits from each opposing element (Gnyawali & Ryan
15 Charleton, 2018) and to counterbalance the challenges of the opposing elements (Das & Teng,
16 2000; Lado et al., 1997). *Second*, we describe the processes and routines for building these
17 capabilities. Equipped with this knowledge, managers will understand how to foster the
18 coopetition mindset, analytical acumen, and executional skills necessary for managing coopetition
19 alliances effectively. *Finally*, since our study shows that coopetition experience leads to
20 coopetition capability, we demonstrate how firms can benefit from intentionally engaging in
21 coopetition and gain experience, thus enhancing their readiness for future coopetition and
22 subsequent value creation.
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40 In conclusion, our theory-based conceptualization, well-specified measurement model, and
41 psychometrically valid scale provide much needed construct clarity and validity to the coopetition
42 capability construct. Since the conceptually broad multi-dimensional construct allows researchers
43 to better articulate theories and investigate broader questions (MacKenzie et al., 2011), our paper
44 provides a strong foundation for more rigorous and robust theoretical and empirical research
45 (Boyd, Gove, & Hitt, 2005; Eisenhardt, 1989) on coopetition. We believe that our paper equips
46 researchers to build more refined and nuanced predictive theories in coopetition and conduct in-
47 depth empirical research with more rigor and confidence.
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Table 1
Index of Online Supplementary Material

Appendix A	
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Table 2
Items Retained After Studies 1 and 2

Coopetition mindset	
	In this relationship,
1a	... we understand when and why it is beneficial to cooperate and compete simultaneously.
1c	... we understand the inconsistencies and contradictions in this relationship.
1d	... partner firm obstruct us from the pursuit of our interests in this relationship. ^R
1h	... constructive conflicts between the partner firm and us make the outcomes more efficient.
1i	... conflicts between the partner firm and us inspire us to find effective solutions.
1j	... conflicts between the partner firm and us have negative impact on the relationship. ^R
1k	... we understand that moderate tensions and conflict are important for success of this relationship.
Analytical acumen	
	In this relationship,
2a	... we have formalized the mechanism for analyzing tensions with the partner firm.
2d	... we analyze and develop alternative strategies to respond to contradicting demands.
2e	... we continuously review our systems and procedures to assess our vulnerability with respect to the partner firm.
2g	... we are flexible in introducing new methodology, tools and techniques depending on our analysis of tensions with the partner firm.
2h	... we have suitable performance standards to monitor the quality of relationship with the partner firm.
2k	... we develop alternative strategies to balance tension with our partner firm.
2l	... we develop alternative strategies to manage both cooperation and competition.
Executorial skills	
	In this relationship,
3a	... we are able to change the scope and content of the relationship as and when required.
3b	... we are able to effectively manage the contradictions and dualities.
3e	... we are able to execute the formalized and codified relationship management rules properly.
3h	... we are able to effectively manage the tensions with our partners.
3k	... we develop routines to adapt to the changing scope and content of the relationship.

^R Reverse Coded Items. We use reverse coded items to control for "acquiescence response bias" (Herche & Engelland, 1996: 336) and response pattern biases (Churchill, 1979; Idaszak & Draszak, 1987).

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3a	... we are able to change the scope and content of the relationship as and when required.	3.32	1.06	0.91
3b	... we are able to effectively manage the contradictions and dualities.	3.41	1.04	0.90
3e	... we are able to execute the formalized and codified relationship management rules properly.	3.52	0.98	0.92
3h	... we are able to effectively manage the tensions with our partners.	3.28	1.06	0.87
3k	... we develop routines to adapt to the changing scope and content of the relationship.	3.55	1.02	0.90
Value Creation (<i>a three-dimensional construct; each construct is a first order reflective scale</i>)				
Common Benefit (<i>first-order reflective scale</i>) $\alpha = 0.88$; $CR = 0.89$; $AVE = 0.68$				
Within the alliance boundary, this alliance has led to:				
4a	... more effective exploitation of existing resources leading to improved cost effectiveness.	5.56	0.89	0.81
4b	... the development of new knowledge leading to increased innovation.	5.53	0.97	0.78
4c	... more effective exploitation of existing knowledge leading to greater efficiency.	5.63	0.88	0.85
4d	... more efficient deployment and utilization of resources leading to continuous improvement of the quality of products and services.	5.56	0.95	0.85
Private Benefit _{Cooperation} (<i>first-order reflective scale</i>) $\alpha = 0.82$; $CR = 0.84$; $AVE = 0.63$				
Because of this relationship, our firm has				
5a	... used the new ideas and skills acquired from the partner to create value by improving its products and services.	5.55	0.93	0.83
5b	... used the R&D skills acquired from the partner to create value by engaging in greater innovation.	5.40	1.11	0.84
5c	... used the knowledge of systems and processes acquired from the partner to create value by enhancing its organizational effectiveness.	5.26	1.07	0.71
Private Benefit _{Competition} (<i>first-order reflective scale</i>) $\alpha = 0.89$; $CR = 0.89$; $AVE = 0.68$				
In this relationship, we have been able to create more value because we have:				
6a	... leveraged the jointly developed processes better than the partner	5.36	1.09	0.87
6b	... leveraged the jointly developed technology better than the partner.	5.27	1.10	0.88
6c	... leveraged the jointly developed intellectual property better than the partner.	5.10	1.21	0.82
6d	... differentiated the product and services jointly developed by us better than the partner.	5.12	1.22	0.71
Intensity of Competition (<i>first-order reflective scale</i>) $\alpha = 0.89$; $CR = 0.91$; $AVE = 0.76$				
In this relationship,				
7a	... our firm compete directly with the partner for the customer firm's business.	4.49	1.78	0.86
7b	... our firm's target markets are similar to those of the partner.	4.52	1.77	0.89
7c	... our firm considers the partner a major competitor in various product markets.	4.56	1.65	0.87
Intensity of Cooperation (<i>first-order reflective scale</i>) $\alpha = 0.92$; $CR = 0.92$; $AVE = 0.66$				
In this relationship,				
8a	... we actively cooperate with our partner in R&D and exchange of know-how.	4.49	1.87	0.83
8b	... we frequently discuss common problems with our partner.	4.54	1.87	0.82
8c	... we share close ties and social relationship with people in our partner's firm	4.54	1.88	0.80
8d	... we share our production facilities with our partner.	4.46	1.85	0.81
8e	... we cooperate with our partner in developing new products.	4.46	1.84	0.80
8f	... we share our complementary resources with our partner.	4.53	1.88	0.82
Cooperation Experience $\alpha = n.a.$; $CR = n.a.$; $AVE = n.a.$				
9a	Please indicate the number of cooperative alliances your firm has had in the last 5 years.	8.72	3.99	

^R Reverse Coded Item

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Table 5
Correlations and Square Roots of AVE

		Scale Range	Mean	SD	AVE	1	2	3	4	5	6	7	8	9	10	11	12
1	Coopetition mindset	1-7	2.88	.90	.61	.78											
2	Analytical acumen	1-7	3.38	.76	.69	.61	.83										
3	Executorial skills	1-7	3.64	.92	.81	.61	.78	.90									
4	Common benefit	1-7	4.81	.67	.68	.43	.53	.56	.82								
5	Private benefit _{Cooperation}	1-7	4.55	.69	.63	.45	.55	.58	.83	.80							
6	Private benefit _{Competition}	1-7	5.14	.90	.68	.36	.43	.47	.77	.84	.82						
7	Intensity of competition	1-7	4.67	1.44	.76	.39	.50	.51	.58	.56	.58	.87					
8	Intensity of cooperation	1-7	4.83	1.47	.66	.40	.52	.52	.61	.62	.59	.74	.81				
9	Coopetition experience	-	8.72	3.99	n.a.	.26	.25	.24	.03	.04	-.02	.01	-.02	n.a.			
10	Firm size	-	6198.76	14942.81	n.a.	-.02	-.05	-.07	-.05	-.03	-.03	-.09	-.07	.00	n.a.		
11	Firm age	-	28.45	6.42	n.a.	.04	.11	.05	.25	.24	.20	.36	.37	.00	.03	n.a.	
12	Coopetition alliance age	-	7.96	1.66	n.a.	.03	-.04	-.05	-.02	.02	.01	-.10	-.05	.09	.17	-.02	n.a.

N = 536; numbers on the diagonal show square roots of AVE; Numbers below the diagonal show the factor correlations; AVE not available for the single-item measures.

Figure 1
Confirmatory Factor Analysis of the Validation Sample (study 4)

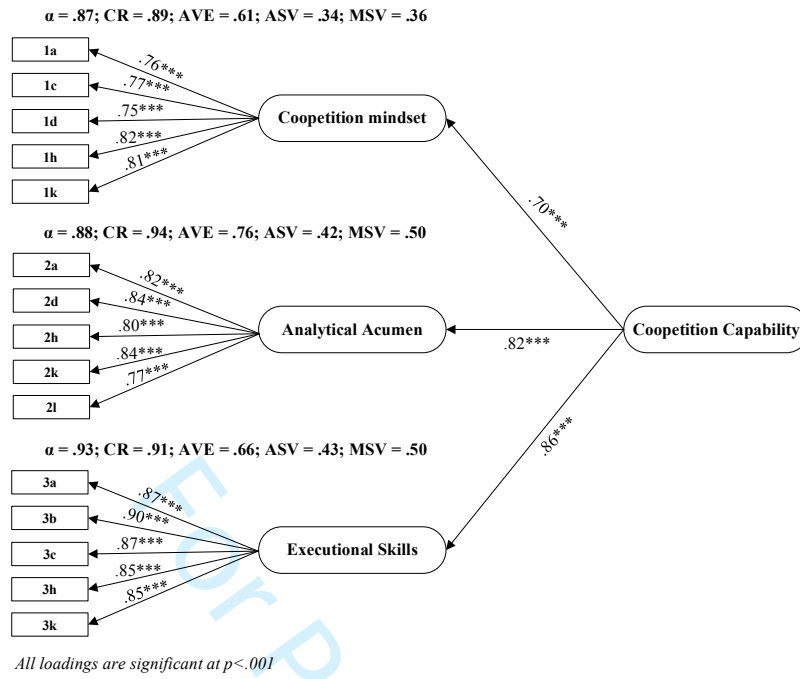


Figure 2
The Conceptual Framework

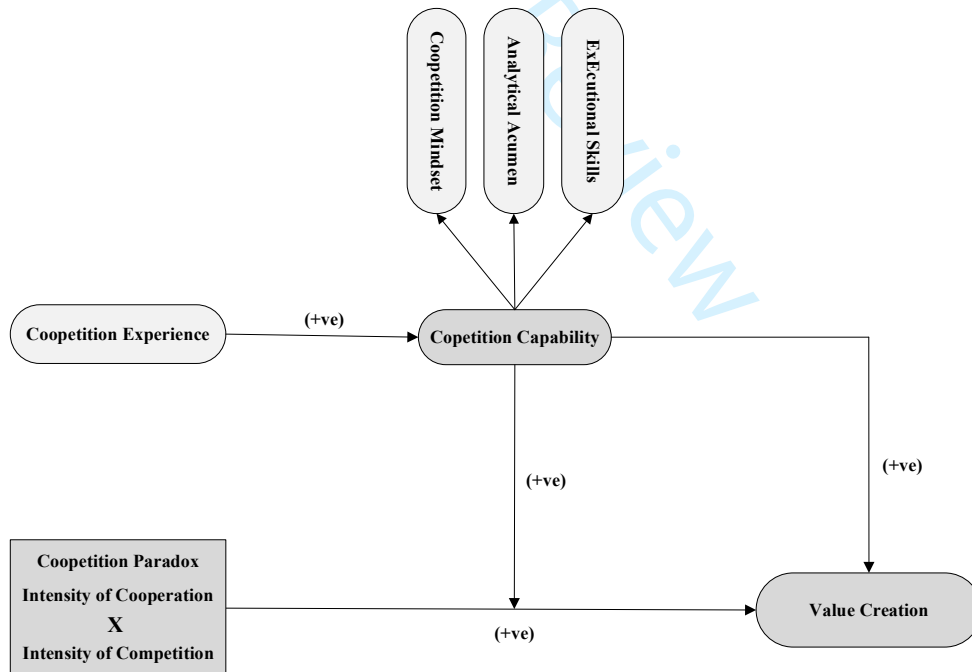


Figure 3
Result of Model Estimation

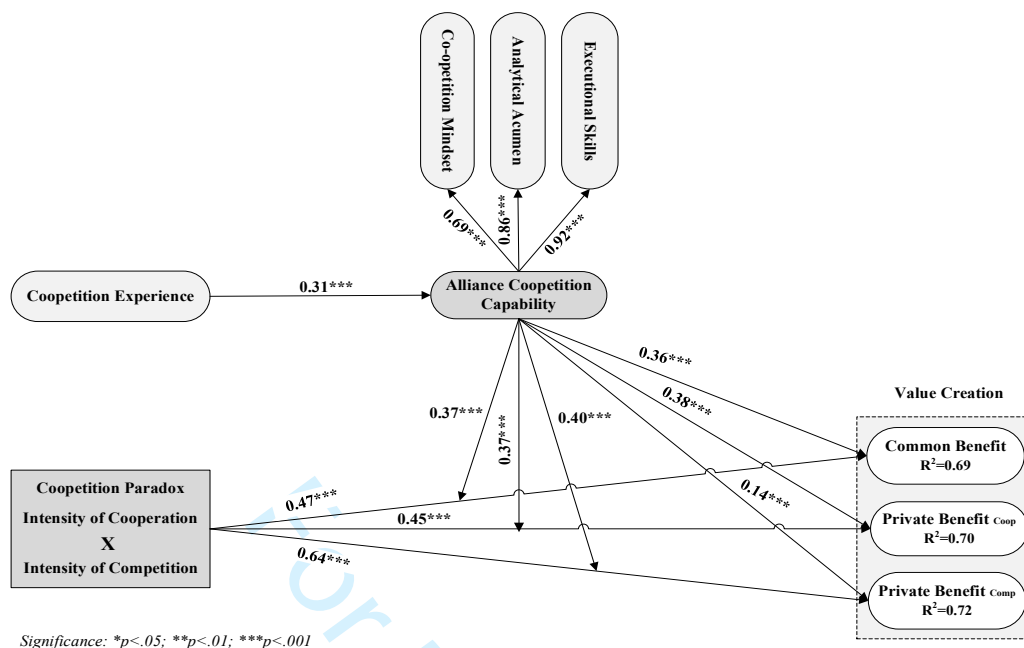
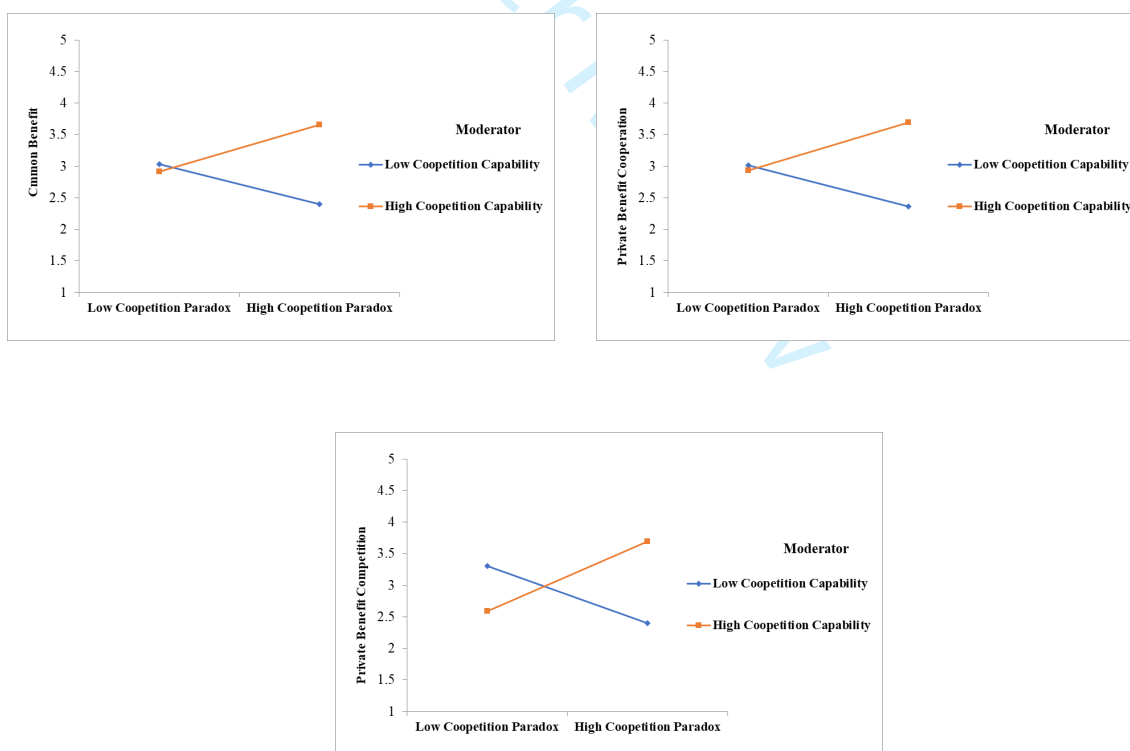


Figure 4
Hypothesized Cooperation Paradox and Cooperation Capability Interaction Plot



ONLINE SUPPLEMENTARY MATERIAL

APPENDIX A

Table A1
Summary of Studies on Coopetition Capability

Study	Name of the Capability	Theoretical Perspective	Definition	Dimensionality	Scale Items
1	2	3	4	5	6
Gnyawali and Park (2011)	Coopetition Capability	Coopetition	“Capability of firms to effectively manage coopetition.”	Three-dimensional <ul style="list-style-type: none"> • Coopetition mindset • Coopetition experience • Complementary resources and capabilities 	Not developed
Gnyawali et al. (2016)	Paradox Management Capability	Coopetition and Paradox	“Firm’s capacity to perceive and analyze key issues and challenges in inter-firm relationships and to devise appropriate managerial responses.”	Two-dimensional <ul style="list-style-type: none"> • Analytical capability “Firm's capacity to obtain a clear and accurate understanding of the coopetition situation, including how specific contradictions and dualities differentially impact the relationship.” • Executional capability “Firm’s ability to manage the tension in a coopetition relationship productively” consisting of three elements: “the ability to develop the routines themselves, to 	Not developed

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Study	Name of the Capability	Theoretical Perspective	Definition	Dimensionality	Scale Items
1	2	3	4	5	6
Bengtsson et al. (2016)	Coopetition Capability	Coopetition, Paradox and Ambidexterity	“Ability to think paradoxically and to initiate processes that help firms attain and maintain a moderate level of tension, irrespective of the strength of the paradox.”	Uni-dimensional implement processes of constructing and assembling routines into capability, and to utilize the routines and the capability.”	<ul style="list-style-type: none"> • Understand when and why it is a benefit to cooperate and compete? • Develop alternative strategies to manage both cooperation and competition? • To continuously change the scope content of the relationship? • To balance contradicting demands without jeopardizing the relationship?
Song, Lee, and Khanna (2016)	Internal Coopetition Capability	Dynamic Capability	“The ability to manage co-opetition–simultaneous forces of competition and cooperation within the business group–is a particular dimension of dynamic capability”	Three-dimensional <ul style="list-style-type: none"> • Sensing • Seizing • Reconfiguration 	Not developed

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Study	Name of the Capability	Theoretical Perspective	Definition	Dimensionality	Scale Items
1	2	3	4	5	6
Raza-Ullah, Bengtsson, and Vanyushyn (2018)	Coopetition Capability	Paradox and Emotion	“Ability to think paradoxically and to initiate processes that help firms attain and maintain a moderate level of tension, irrespective of the strength of the paradox.” (borrowed the definition of Bengtsson et al. (2016))	Three-dimensional <ul style="list-style-type: none"> Analytical capability (consists of paradoxical thinking; coopetition mindset) Balancing capability (consists of routines and processes (both ostensive and performative)) Emotional capability (consists of acceptance of ambivalent emotions; regulation of emotions through deep acting and surface acting) 	Not developed
Bengtsson et al. (2020)	Coopetition Capability	Coopetition, Paradox and Ambidexterity	“A firm's ability to <ul style="list-style-type: none"> (i) understand the paradoxical nature of coopetition (ii) develop a repertoire of alternative strategies, and (iii) make timely and accurate strategic decisions to balance the 	Uni-dimensional	<ul style="list-style-type: none"> The cognitive complexity that enables managers to understand when and why it is beneficial to engage in cooperation and competition. The ability to develop alternative strategies or behavior repertoires in order to respond appropriately to contradicting demands. The ability to balance contradicting demands related to cooperation and competition. The ability to manage content and scope of relationships.

COOPETITION CAPABILITY AND VALUE CREATION

Study	Name of the Capability	Theoretical Perspective	Definition	Dimensionality	Scale Items
1	2	3	4	5	6
Raza-Ullah (2020)	Organization-wide Capability	Paradox and Emotion	contradictory demands.” Capabilities that are especially rooted in the context of coopetition “to facilitate individuals (firms) working with simultaneous contradictory demands and the resultant emotional ambivalence.”	Two-dimensional <ul style="list-style-type: none"> Emotional capability “The organizational ability to recognize, accept, and embrace conflicting emotions” Balancing Capability “The organizational ability to balance competing demands without jeopardizing the common objectives” 	<ul style="list-style-type: none"> Understand why complex feelings such as trust and distrust arise in such relationships Realize that positive and negative feelings are inherent in such relationships Accept and allow the simultaneous existence of contradictory feelings Embrace rather than avoid conflicting emotions <p>In terms of managing all coopetitive relationships, in general, we ...</p> <ul style="list-style-type: none"> Balance the contradictory demands without jeopardizing the common objectives Develop alternative strategies to deal with the changing demands of such relationships Have routines and processes to pursue conflicting demands in such relationships Have an organizational context that supports working with competing demands

Table A2
Illustrative Thematic Analysis of the Interviews and Focus Group

Central Theme	Data/excerpts/quotations
<p>Coopetition mindset <i>Recognizing and accepting that the cooperative relationships are filled with contradictions and tensions but it is beneficial for us</i></p>	<p>“Initially, the team members had serious doubts about the feasibility of this project ... they were not sure whether to collaborate or compete. However, our top management was fully convinced that collaboration with this particular competitor offers us advantages even though there may be greater risks ... collaboration with other non-competitor firms could not offer such advantages. The CMD asked us to be prepared to face the tensions that would come up in this alliance.”</p> <p>“We know that there are risks in this relationship ... we have a strategic conflict ... But our value proposition will be eroded in the next few years if we do not collaborate and make this alliance successful.”</p> <p>“Obviously, there is some distrust and tension, and issues keep cropping up ... but we want this relationship to succeed. The success of the R&D project will add huge value to both of us.”</p>
<p>Analytical acumen <i>Examine the tensions that prevail in a cooperative relationship and developing strategies to deal with them</i></p>	<p>“In this project, we are collaborating with a competitor on an innovation project. we entered into this relationship knowing well that it is ridden with tensions and difficulties. However, there is no point in merely appreciating that tensions exist...we realized early on that it was better to constantly analyze why these tensions emerged and how to address them.”</p> <p>“Tensions are never static ... they emerge in unexpected ways at the most inopportune times ... We constantly analyze why these tensions emerged and how to address them.”</p> <p>“... tensions are inevitable in this relationship ... the only way to deal with it is to be honest and regularly monitor it ... we constantly evaluate whether the project is making headway or not and suggest how to resolve problems ...”</p>
<p>Executorial skills <i>If required, change the scope of the alliance, choose right strategy to address the tension and implement it successfully by developing routines and processes</i></p>	<p>“We are not used to such relationships ... we experience high tensions and conflicts. We have different routines and processes. So, we developed new organizational routines and formalized processes to work together. It involved both formal and informal processes ... Sometimes because of unforeseen situation, we choose new value creating strategies. We even modified the scope of our relationship ...”</p> <p>“Only having strategies to deal with tensions does not work ... sometimes top management immediately alter the strategy to keep relationship on track ... we deploy new ways to ensure success of the relationship.”</p> <p>“Sometimes because of unforeseen situation, we develop new routines and formalize processes to implement new strategies. Improving coordination involves a lot of hard work. It involves both formal and informal processes.”</p>

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Table A3
Initial Pool of Items Generated in Study 1

Coopetition mindset	
	In this relationship,
1a	... we understand when and why it is beneficial to cooperate and compete simultaneously.
1b	... we are able to identify and screen potential partners.
1c	... we understand the inconsistencies and contradictions in this relationship. ^a
1d	... partner firm obstruct us from the pursuit of our interests in this relationship. ^R
1e	... cross-firm teams are set up between partner firm and us to manage this relationship.
1f	... we are unable to do business with partner firm because of conflicts. ^R
1g	... conflict resolution between opinions of partner firm and us is a part of our business.
1h	... constructive conflicts between partner firm and us make the outcomes more efficient.
1i	... conflicts between partner firm and us inspire us to find effective solutions.
1j	... conflicts between partner firm and us have negative impact on the relationship. ^R
Analytical acumen	
	In this relationship,
2a	... we have formalized the mechanism for analyzing tensions with the partner firm.
2b	... we understand the key challenges and develop alternative strategies to overcome them.
2c	... we are able to reduce mistrust, misperception and miscommunication with our partner firm.
2d	... we analyze and develop alternative strategies to respond to contradicting demands.
2e	... we continuously review our systems and procedures to assess our vulnerability with respect to the partner firm.
2f	... we use feedback systems for analyzing tensions with the partner firm.
2g	... we are flexible in introducing new methodology, tools and techniques depending on our analysis of tensions with the partner firm.
2h	... we have suitable performance standards to monitor the quality of relationship with the partner firm.
2i	... we are able to analyze emerging patterns of our relationships with the partner firm.
2j	... we have detailed procedures for responding to tensions with the partner firms.
2k	... we develop alternative strategies to balance tension with our partner firm..
Executorial skills	
	In this relationship,
3a	... we are able to manage the scope and content of the relationship as and when required.
3b	... we are able to effectively manage the contradictions and dualities.
3c	... we conduct formal periodic review of the progress of the relationship.
3d	... coopetition alliance managers are largely free to determine interim schedule targets.
3e	... we are able to execute the formalized and codified relationship management rules properly.
3f	... we planned the relationship carefully before we started executing it.
3g	... coopetition alliance managers are largely free to determine the relationship management approach.
3h	... we are able to effectively manage the tensions with our partners.
3i	... the nature of the project modules involved in the relationship are largely novel.
3j	... we largely deploy novel technologies in the relationship.

^RReverse coded items.

Table A4
Results of Study 2 (Professional Review and Assessment of Content Validity)

Coopetition mindset	
	In this relationship,
1a*	... we understand when and why it is beneficial to cooperate and compete simultaneously.
1b	... we are able to identify and screen potential partners. ^c
1c*	... we understand the inconsistencies and contradictions in such relationships.
1d*	... partner firm obstruct us from the pursuit of our interests in this relationship. ^R
1e	... cross-firm teams are set up between partner firm and us to manage this relationship. ^b
1f	... we are unable to do business with partner firm because of conflicts. ^{R, c}
1g	... conflict resolution between opinions of partner firm and us is a part of our business. ^c
1h*	... constructive conflicts between partner firm and us make the outcomes more efficient.
1i*	... conflicts between partner firms and us inspire us to find effective solutions.
1j*	... conflicts between partner firms and us have negative impact on the relationship. ^R
1k*	... we understand that moderate tensions and conflict are important for success of this relationship. ^a
1l	... we build close ties with people in partner firm. ^{a, c}
1m	... we are able to recognize and accept the simultaneous existence of cooperation and competition. ^{a, c}
Analytical acumen	
	In this relationship,
2a*	... we have formalized the mechanism for analyzing tensions with the partner firm.
2b	... we understand the key challenges and develop alternative strategies to overcome them. ^c
2c	... we are able to reduce mistrust, misperception and miscommunication with our partner firm. ^c
2d*	... we analyze and develop alternative strategies to respond to contradicting demands.
2e*	... we continuously review our systems and procedures to assess our vulnerability with respect to the partner firm.
2f	... we use feedback systems for analyzing tensions with the partner firm. ^b
2g*	... we are flexible in introducing new methodology, tools and techniques depending on our analysis of tensions with the partner firm.
2h*	... we have suitable performance standards to monitor the quality of relationship with the partner
2i	... we are able to analyze emerging patterns of our relationships with the partner firm. ^b
2j	... we have detailed procedures for responding to tensions with the partner firm. ^c
2k*	... we develop alternative strategies to balance tension with our partner firm.
2l*	... we develop alternative strategies to manage both cooperation and competition. ^a
2m	... we are able to actively analyze the information and anticipate the future developments. ^{a, c}
Executorial skills	
	In this relationship,
3a*	... we are able to change the scope and content of the relationship as and when required.
3b*	... we are able to effectively manage the contradictions and dualities.
3c	... we conduct formal periodic review of the progress of the relationship. ^b
3d	... coopetition alliance managers are largely free to determine interim schedule targets. ^b
3e*	... we are able to execute the formalized and codified relationship management rules properly.
3f	... we planned the relationship carefully before we started executing it. ^c
3g	... coopetition alliance managers are largely free to determine the relationship management
3h*	... we are able to effectively manage the tensions with our partners.
3i	... the nature of the project modules involved in the relationship are largely novel. ^b
3j	... we largely deploy novel technologies in the relationship. ^c
3k*	... we develop routines to adapt to the changing scope and content of the relationship. ^a
3l	... we are able to derive greater value from this relationship. ^{a, c}

*Indicates that the item was retained from the initial pool of items after study 2; ^aIndicates that the item was added by the professional reviewers; ^bIndicates that the item was dropped after the professional review; ^cIndicates that the item was dropped after the content validity test; and ^RReverse coded items.

COOPETITION CAPABILITY AND VALUE CREATION

Table A5
Results of EFA at Individual Component Level and With All Items Together (Study 3)

#	Construct/ items	Mean	SD	EFA at individual component level		EFA with all items together		
				Factor loadings				
				1	2	1	2	3
Coopetition mindset		(KMO=0.83, variance explained=68.63%,						
In this relationship,								
1a	... we understand when and why it is beneficial to cooperate and compete	2.92	1.06	0.73		0.73		
1c	... we understand the inconsistencies and contradictions in this relationship.	2.80	1.11	0.77		0.71		
1d	... partner firm obstruct us from the pursuit of our interests in this relationship. ^R	2.70	1.07	0.88		0.85		
1h	... constructive conflicts between partner firm and us make the outcomes more	2.85	1.15	0.81		0.79		
1i ^a	... conflicts between partner firm and us inspire us to find effective solutions.	2.50	1.13	-0.03	0.87			
1j ^a	... conflicts between partner firm and us have negative impact on the relationship. ^R	2.63	1.13	0.17	0.83			
1k	... we understand that moderate tensions and conflict are important for success of this relationship.	2.68	1.16	0.85		0.82		
Analytical acumen		(KMO=0.86, variance explained=71.76%,						
Cronbach's $\alpha=0.88$)								
In this relationship,								
2a	... we have formalized the mechanism for analyzing tensions with the partner firm.	3.69	0.95	0.80			0.77	
2d	... we analyze and develop alternative strategies to respond to contradicting demands.	3.73	0.95	0.83			0.85	
2e ^a	... we continuously review our systems and procedures to assess our vulnerability with respect to the partner firm.	3.54	1.01	0.12	0.88			
2g ^b	... we are flexible in introducing new methodology, tools and techniques depending on our analysis of tensions with the partner firm.	3.55	1.03	0.20	0.86			
2h	... we have suitable performance standards to monitor the quality of relationship with the partner firm.	3.70	0.95	0.82			0.75	
2k	... we develop alternative strategies to balance tension with our partner firm..	3.71	0.91	0.83			0.70	
2l	... we develop alternative strategies to manage both cooperation and competition.	3.70	0.99	0.79			0.71	
Executorial skills		(KMO=0.90, variance explained=79.60%, Cronbach's						
$\alpha=0.93$)								

COOPETITION CAPABILITY AND VALUE CREATION

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#	Construct/ items	Mean	SD	EFA at individual component level						
				EFA with all items together			Factor loadings			
				1	2	1	2	3		
	In this relationship,									
3a	... we are able to change the scope and content of the relationship as and when required.	3.40	1.02	0.92						0.86
3b	... we are able to effectively manage the contradictions and dualities.	3.45	1.03	0.87						0.76
3e	... we are able to execute the formalized and codified relationship management rules properly.	3.63	0.92	0.91						0.83
3h	... we are able to effectively manage the tensions with our partners.	3.32	1.01	0.88						0.83
3k	... we develop routines to adapt to the changing scope and content of the relationship.	3.63	0.99	0.89						0.81

Factor loadings greater than or equal to 0.50 appear in bold
^aIndicates the items that were dropped due to low factor loading during EFA at individual component level
^bIndicates the items that were dropped due to high cross loading
^RReverse coded item

COOPETITION CAPABILITY AND VALUE CREATION

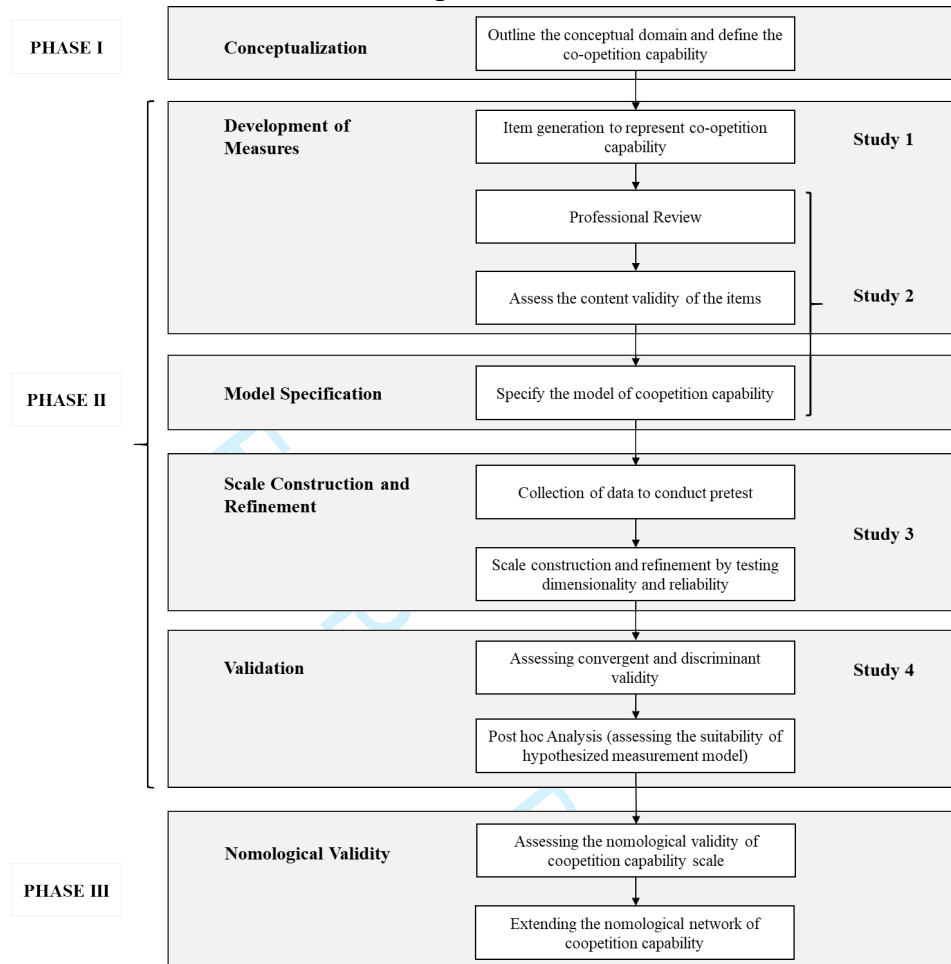
Table A6
Comparison Between the Competing Models

			Model 1	Model 2	Model 3	Model 4	Model 5
1a	<---	Coopetition mindset	0.76***	0.72***	0.57***	0.76***	0.61***
1c	<---	Coopetition mindset	0.77***	0.61***	0.53***	0.77***	0.62***
1d	<---	Coopetition mindset	0.75***	0.58***	0.52***	0.75***	0.58***
1h	<---	Coopetition mindset	0.82***	0.59***	0.52***	0.82***	0.61***
1k	<---	Coopetition mindset	0.81***	0.62***	0.54***	0.81***	0.63***
2a	<---	Analytical acumen	0.82***	0.75***	0.82***	0.69***	0.79***
2d	<---	Analytical acumen	0.84***	0.73***	0.84***	0.67***	0.81***
2h	<---	Analytical acumen	0.80***	0.72***	0.80***	0.66***	0.76***
2k	<---	Analytical acumen	0.84***	0.75***	0.84***	0.70***	0.79***
2l	<---	Analytical acumen	0.77***	0.74***	0.77***	0.70***	0.74***
3a	<---	Executorial skills	0.87***	0.85***	0.86***	0.84***	0.87***
3b	<---	Executorial skills	0.89***	0.89***	0.89***	0.88***	0.89***
3e	<---	Executorial skills	0.87***	0.84***	0.85***	0.85***	0.87***
3h	<---	Executorial skills	0.85***	0.82***	0.84***	0.81***	0.85***
3k	<---	Executorial skills	0.85***	0.83***	0.83***	0.82***	0.85***
Fit indices							
		Chi-square	189.58	1181.77	753.26	660.94	672.90
		Df	87	91.00	89	89	89
		Chi-square/df	2.18	12.99	8.46	7.43	7.55
		GFI	0.93	0.58	0.70	0.72	0.71
		NFI	0.95	0.70	0.81	0.83	0.83
		TLI	0.97	0.67	0.79	0.82	0.82
		CFI	0.97	0.71	0.83	0.85	0.85
		RMSEA	0.06	0.19	0.15	0.14	0.14
		SRMR	0.03	0.13	0.11	0.78	0.81
		AIC	255.58	1239.77	815.27	722.94	734.09
		BIC	258.78	1242.58	818.27	725.95	737.10
Chi-square difference test							
		Model 1 vs. Model 2	$\Delta\chi^2 = 992.20$	$\Delta df = 4$			Sig p < .001
		Model 1 vs. Model 3	$\Delta\chi^2 = 563.69$	$\Delta df = 2$			Sig p < .001
		Model 1 vs. Model 4	$\Delta\chi^2 = 471.36$	$\Delta df = 2$			Sig p < .001
		Model 1 vs. Model 5	$\Delta\chi^2 = 482.51$	$\Delta df = 2$			Sig p < .001

*** significant at 0.001 level

Model 1: the hypothesized three-dimensional model; Model 2: a unidimensional model implying that all underlying dimensions converge into one dimension; Model 3: a two-dimensional model where coopetition mindset and analytical acumen converge into one dimension and executorial skills forms another dimension; Model 4: a two-dimensional model where coopetition mindset and executorial skills converge into one dimension and analytical acumen forms another dimension; and Model 5: a two-dimensional Model where analytical acumen and executorial skills converge into one dimension and coopetition mindset and forms another dimension.

Figure A1
Overview of Scale Development and Validation Procedure



Adapted from MacKenzie, Podsakoff, and Podsakoff (2011)

APPENDIX B**PHASE III: COOPETITION CAPABILITY AND ITS SEMANTIC RELATIONSHIPS**

Construct clarity also involves showing the focal construct's semantic relationships with other related constructs (Suddaby, 2010). We first establish the focal construct's (i.e., newly conceptualized coopetition capability construct) nomological validity by assessing whether the new scale relates to other constructs in a similar way to the relationships already established in the coopetition literature (MacKenzie et al., 2011). Next, following the recommendations of MacKenzie et al. (2011), we go beyond just confirming the focal construct's existing relationships and instead examine a previously unexplored relationship between coopetition capability, coopetition paradox, and value creation. In doing so, we demonstrate the usefulness of developing a new scale as such an empirical examination would not have been possible without the new psychometrically valid scale for coopetition capability (Anderson, Eshima, & Hornsby, 2019).

Nomological Validity

To assess nomological validity, we first identified two variables: (i) coopetition experience (a key antecedent); and (ii) value creation (a key outcome) that are theoretically related to the focal construct and then examined whether the new scale relates with them in ways that is consistent with its existing nomological network. Past research on strategic alliances identifies alliance experience—defined as “lessons learned, as well as the know-how generated through a firm's former alliances” (Heimeriks & Duysters, 2007: 29)—as a key organizational-level antecedent of alliance capability (Anand & Khanna, 2000; Heimeriks & Duysters, 2007; Kale, Dyer, & Singh, 2002; Schilke & Goerzen, 2010). Similarly, research also shows that performance varies substantially among firms (Anand & Khanna, 2000), suggesting that firms possess specific

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3 capabilities (commonly known as alliance capabilities) that help them in managing the alliances
4 effectively and create superior value (Heimeriks & Duysters, 2007; Kale et al., 2002; Schilke &
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6 Goerzen, 2010). Extending the same logic, we expect coopetition capability to relate similarly
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8 with coopetition experience (antecedent variable) and value creation (outcome variable), and we
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10 test these expectations empirically to establish nomological validity.
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14 **Examining New Relationships: Extending the Nomological Network**

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17 **Coopetition paradox and value creation.** Previous research describes four types of
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19 coopetition alliances archetypically: balanced-strong coopetition (i.e., when both cooperation and
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21 competition are intense or strong); cooperation-dominant coopetition (i.e., when cooperation is
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23 more intense than competition); competition-dominant coopetition (i.e., when competition is
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25 more intense than cooperation); and weak coopetition (i.e., when intensity of both cooperation
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27 and competition is low) (Lado, Boyd, & Hanlon, 1997; Park, Srivastava, & Gnyawali, 2014).
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29 Among these, balanced strong coopetition entails the strongest coopetition paradox (Bengtsson et
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31 al., 2016). Moreover, it is the most promising for value creation because it can lead to “efficient
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33 and innovative application of resources, enhanced access to valuable resources, and superior
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35 governance through self-enforcing safeguards” (Gnyawali & Ryan Charleton, 2018: 2522).
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37 While high cooperation would encourage partners to strive to maximize common benefits, high
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39 competition would motivate firms to extract more private benefits (Gnyawali & Park, 2011;
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41 Lado et al. 1997; Park et al., 2014). Besides, balance in the opposing logics of cooperation and
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43 competition helps create stability by keeping opposing forces in check (Chen, 2008; Das & Teng,
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45 2000; Lado et al. 1997). As such, the joint sum of common and private benefits created in such
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47 an alliance would be greater than the benefits realized by emphasizing only one or the other logic
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COOPETITION CAPABILITY AND VALUE CREATION

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3 in the other types of coopetition alliances. Thus, we posit that strength of coopetition paradox
4 and value creation by the focal firm in coopetition alliances are positively related.
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8 **Moderating role of coopetition capability.** Although balanced-strong coopetition
9 relationships have the potential to create superior value, they are also very challenging to manage
10 because they are paradoxical and involve higher levels of tension compared to unbalanced
11 coopetition (cooperation-dominant coopetition and competition-dominant coopetition) (Ansari,
12 Garud, & Kumaraswamy, 2016; Hannah & Eisenhardt, 2018; Lado et al., 1997). However,
13 paradoxical tensions are not always undesirable. Tension may put pressure on the firms to seek
14 ways to improve cooperative performance and realize more positive outcomes (Bengtsson et al.,
15 2016; Chen, 2008; Das & Teng, 2000; Park et al., 2014). As a result, firms need to modulate the
16 tension and its effect to leverage the positive effect of tension on value creation from cooperative
17 alliances; while excessively high tension can cripple decision making, lower tension anyhow has
18 low value creation potential (Gnyawali & Park, 2011; Park et al., 2014). Firms which can
19 navigate the simultaneity both in terms of intensity of cooperation and competition at appropriate
20 level and balance the intensity of these forces can manage the tensions effectively (Gnyawali &
21 Ray Charleton, 2018).
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40 We suggest that firms with more developed competition capability—as reflected in each of its
41 sub-dimensions—would be able to navigate the simultaneity and thus modulate the tension
42 arising out of coopetition paradox and consequently its effect on value creation. When two firms
43 face similarly high paradoxical situation or tension, the firm with high competition capability will
44 better understand and evaluate the situation and leverage competition engagement for value
45 creation compared to the firm with low competition capability. Competition capability enables the
46 firm to develop a more holistic understanding of the situation and devise appropriate responses
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COOPETITION CAPABILITY AND VALUE CREATION

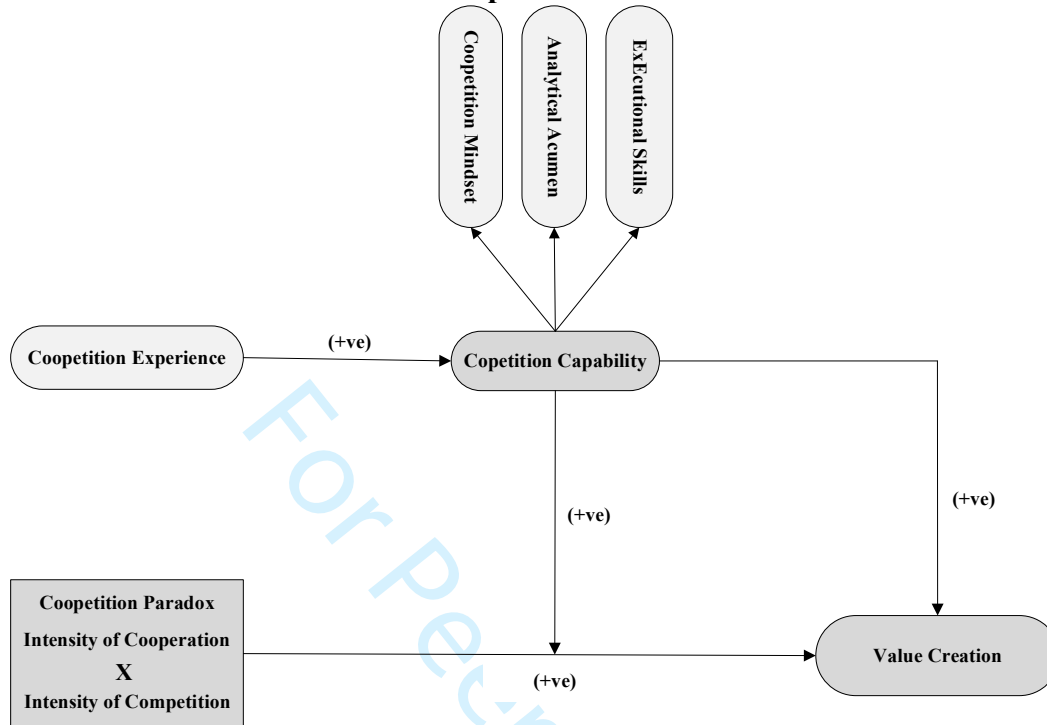
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3 and subsequently create more value. Specifically, coopetition mindset helps to understand why it
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5 is advantageous to pursue the seemingly contradictory logics of cooperation and competition
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7 simultaneously (Bengtsson et al., 2016) and accordingly accept the paradoxical situation (instead
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9 of being crippled by it) and help devise actions that lead to value creation. Similarly, analytical
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11 acumen would be instrumental in analyzing the paradoxical situation and in devising ways of
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13 addressing the coopetition paradox or leveraging the opportunities through appropriate strategies
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15 (Gnyawali et al., 2016). Finally, executional skills may help in developing, using, and modifying
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17 organizational routines such that the firm may address or even thrive on the paradoxical
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19 conditions (Gnyawali et al., 2016). Executional skills may also help in increasing the lower level
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21 of paradoxical tension (in unbalanced coopetition situations) to a moderate level by changing the
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23 scope and content of the coopetition relationship (Bengtsson et al., 2016).
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28 In sum, a firm with cognitive ability to recognize and accept the contradictory situation,
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30 analytical acumen to deeply analyze the situation and develop strategies to address it, executional
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32 skills to develop and implement routines and processes to navigate and manage the coopetition
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34 paradox and change the content and scope of the coopetition relationship would help in
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36 modulating the negative effect of high tension, enabling the firms to create superior value from
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38 competition (Bengtsson et al., 2016; Eisenhardt, Furr, & Bingham, 2010; Gnyawali et al., 2016).
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40 Thus, we posit a positive moderating effect of coopetition capability on the relationship between
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42 coopetition paradox and value creation by the focal firm in coopetition alliances.
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47 To examine the nomological validity and extension of the nomological network, we specified
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49 a structural equation model in which we integrated the proposed relationships of coopetition
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51 capability with coopetition experience, coopetition paradox and value creation (Figure B1)
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COOPETITION CAPABILITY AND VALUE CREATION

Figure B1
The Conceptual Framework



Methods

We collected data for value creation (outcome variable) from February 2018 to May 2018 after a lag time of three years in February 2015 to May 2018 through a separate survey of the same queried firms from whom we had collected the data in Studies 3 and 4. We introduced a three-year lag between the collection of data for explanatory and dependent variables for two reasons. *First*, such a research design is likely to have a superior ability to examine the causal effect of explanatory variables on outcome variables (Rindfleisch, Malter, Ganesan, & Moorman, 2008). In other words, it is likely that in three-years, firms would have deployed comprehensively the organizational processes and routines reflecting coopetition capability, leading to noticeable value creation (Schilke & Goerzen, 2010). *Second*, a three-year lag is likely to mitigate the potential CMB hazard due to the simultaneous collection of both sets of data—explanatory and dependent variables (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Of the 195 firms that completed the first survey in 2015, 19 had ceased to exist. These 19 firms had completed 31 questionnaires in the first stage. We contacted the same key informants (616) of the remaining 176 firms who had participated in the first stage of data collection. We adopted similar protocols for the collection of data as in Phase II. Out of the 616 informants who had completed the survey in January – April 2015, 41 were no longer working with the said firms. We requested the CEOs/MDs of these firms to nominate appropriate alternative key informants for completing the surveys corresponding to the cooperative alliances. After several efforts, we received 536 usable responses from these informants. Thus, the study's final sample consisted of 536 matched questionnaires across the time span of surveys 1 and 2. Table B1 presents the sample characteristics.

Table B1
Sample Characteristics

Informant and firm characteristics			
Industry	N = 176	Informants	n = 536
Pharmaceuticals	41.18	Pharmaceuticals	33.92
Power & energy	17.59	Power & Energy	25.24
Information technology	21.48	Information Technology	18.97
Telecommunication	19.75	Telecommunication	21.87
Position of informants		Functional scope of alliances	
CEO/Managing Director	19.45	Exchange of know	27.49
Director, Alliance	28.3	Research & Development	34.73
Director/VP, R&D	22.51	Product development	26.85
CSO/CTO/COO	25.56	Other(s)	7.56
Others	4.18	Not made public	3.37
Informant's alliance experience (yrs.)		Alliance age (years)	
2 > AE of the informant	1.63	2	0
2 < AE of the informant ≤ 3	9.34	2 < Alliance age ≤ 3	0
3 < AE of the informant ≤ 4	15.43	3 < Alliance age ≤ 4	0
4 < AE of the informant ≤ 5	13.89	4 < Alliance age ≤ 5	49.13
5 < AE of the informant ≤ 6	14.34	5 < Alliance age ≤ 6	16.21
6 < AE of the informant ≤ 7	15.68	6 < Alliance age ≤ 7	34.66
AE of the informant > 7	29.69	Alliance age >7	0
Firm age (yrs.)		Firm size (M USD)	
< 5	0.3	< 5	12.9
5 < Firm age ≤ 10	12.6	5 – 50	22.1
10 < Firm age ≤ 20	18.2	50 – 10	8.4
20 < Firm age ≤ 30	37.29	100 – 250	3.5
> 30 years	31.61	> 250	53.1
Alliance governance type			

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Joint Venture	23.8
Equity Alliance	44.7
Non-Equity Alliance	31.5

N = no. of firms participated in the study; n = no. of informants and coopetition alliances; for each alliance, one unique informant reported.

Measures. We formulated all measurement items, except for coopetition experience, firm size, firm age, coopetition alliance age, industry type, and alliance governance type, as Likert-type statements anchored by a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We adapted pre-established scales used in prior studies to reflect the specific context of our study (Dillman, 2011).

Value creation. It refers to the total sum of value created during alliance activities (Rai, 2016). *Value creation* in coopetition has three distinct dimensions—Common Benefit, Private Benefit_{Cooperation}, and Private Benefit_{Competition} (for details, see Rai, 2016). We adapted the abbreviated version of the three-dimensional scale developed by Rai (2016) to measure value creation in coopetition with Common Benefit having four items, Private Benefit_{Cooperation} having three items and Private Benefit_{Competition} having four items. We preferred this scale as unlike other measures of cooperative performance (e.g., Lavie, Haunschild, & Khanna, 2012), this scale enables us to assess the effect of coopetition capability on all three dimensions of value creation. We clearly explained the meaning of these benefits in the survey.

Coopetition capability. We modeled coopetition capability as a three-dimensional second-order reflective-reflective Type-I construct. We used the scales constructed and refined in this study to measure coopetition capability's first-order constructs, namely, coopetition mindset, analytical acumen, and executional skills.

Coopetition paradox. Following Bengtsson et al. (2016), we operationalized the coopetition paradox as an index that captures the intensity of both cooperation and competition. We constructed the *coopetition paradox intensity* measure by multiplying the two variables

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3 pertaining to the *intensity of cooperation* and *intensity of competition* between the alliance
4 partners. The intensity of cooperation refers to the extent to which the alliance partners cooperate
5 in alliance related activities, such as sharing complementary resources, new product
6 development, R&D activities, and knowledge-creating activities. Drawing from similar studies
7 (e.g., Cannon & Perreault Jr, 1999; Luo, Slotegraaf, & Pan, 2006), we developed a new six-item
8 reflective scale for measuring the intensity of cooperation. The intensity of competition refers to
9 the extent to which a focal firm and its alliance partners overlap or compete in their product and
10 geographic markets (Park et al., 2014). We measured the intensity of competition intensity
11 between the alliance partners by using Ho and Ganesan's (2013) three-item reflective scale.
12 Hence, we specify the intensity dimension of cooperation paradox intensity as an increasing
13 function of both cooperative and competitive interaction (e.g., Bengtsson et al., 2016; Luo et al.,
14 2006). The multiplicative nature of the cooperation paradox results in an increase in the intensity
15 of the cooperation paradox if either or both cooperation and competition dimension increase
16 (Bengtsson et al., 2016).
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35 *Cooperation experience.* It refers to the extent to which a firm has previously been involved in
36 cooperative alliances. Based on the previous studies (e.g., Schilke & Goerzen, 2010), we
37 measured cooperation experience by a single item: the number of cooperative alliances that a firm
38 formed in the last five years. We chose the cut-off five years as this is the average period in
39 which an alliance can still contribute to the experience level of firms (Schilke & Goerzen, 2010).
40 Since cooperation experience skewed positively, we used logarithmic transformation of
41 cooperation experience for hypothesis testing (Schilke & Goerzen, 2010).
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51 *Control variables.* Following prior alliance research, we introduced five variables, namely,
52 firm size, firm age, cooperation alliance age, industry sector, and alliance governance mode, in
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our model to control for the possible confounding effects (e.g., Heimeriks & Duysters, 2007; Kale, Singh, & Perlmutter, 2000; Kale et al., 2002; Schilke & Cook, 2015; Schilke & Goerzen, 2010). Isolating the effect of *firm size* is particularly important as larger firms may typically have more coopetition experience because of engaging in a larger number of alliances and investing greater financial and human resources for alliance management (Kale et al., 2002; Schilke & Goerzen, 2010). We measured *firm size* as the natural log of annual sales turnover (Heimeriks & Duysters, 2007). We controlled for *firm age* because older firms are likely to enter into a greater number of coopetitive relationships (Rothaermel & Deeds, 2006) and thus affect coopetition experience and coopetition capability. We measured age as the number of years since the incorporation of the firm (Schilke & Cook, 2015). We also controlled for *coopetition alliance age* as it is expected to affect value creation in coopetitive relationships through accumulated experience of managing coopetitive alliances. We measured coopetition alliance age as the number of years for which it existed at the time of measurement (Kale et al., 2000; Schilke & Cook, 2015) and used a logarithmic transformation to adjust for skewness (Schilke & Cook, 2015). We controlled for industry effects because coopetitive alliances in certain industries may systematically perform better than coopetitive alliances in other industries due to differences in industry structure (e.g., Heimeriks & Duysters, 2007; Schilke & Goerzen, 2010). We used three dummy variables (pharmaceuticals, power & energy, information technology) in the model to control for *industry effects* (Heimeriks & Duysters, 2007; Schilke & Goerzen, 2010; Schilke & Cook, 2015). Finally, we controlled for the alliance governance structure as it not only provides a basis for monitoring the behavior of alliance partners but also significantly influences protection of proprietary assets, the nature of interaction in terms of learning and exchange of information, know-how and tacit knowledge, etc., thereby, influencing value creation (e.g., Kale et al., 2000).

We asked the respondents to specify the *alliance governance* type as (i) joint venture (coopetitive alliance is a separate entity; both partners have share in); (ii) equity alliance (no separate entity; partners have mutual equity stakes); and (iii) non-equity alliance (no separate entity; no mutual equity stakes) (Schilke & Cook, 2015). Table B2 presents the measurement items used to operationalize our theoretical constructs (please see Table 3 for the final scale for coopetition capability).

Table B2
Measurement Scales and Validity Assessment

		Mean	SD	SFL
Coopetition Capability (a second-order reflective-reflective Type I scale)				
Coopetition mindset		$\alpha = 0.87$; CR = 0.93; AVE = 0.61		
	In this relationship,			
1a	... we understand when and why it is beneficial to cooperate and compete simultaneously.	2.86	1.12	0.71
1c	... we understand the inconsistencies and contradictions in this relationship.	2.86	1.21	0.77
1d	... partner firm obstruct us from the pursuit of our interests in this relationship. ^R	2.70	1.17	0.81
1h	... constructive conflicts between partner firm and we make the outcomes more efficient.	2.75	1.19	0.80
1k	... we understand that moderate tensions and conflict are important for success of this relationship.	2.69	1.18	0.83
Analytical Acumen				
	In this relationship,	$\alpha = 0.90$; CR = 0.95; AVE = 0.69		
2a	... we have formalized the mechanism for analyzing tensions with the partner firm.	3.65	1.02	0.83
2d	... we analyze and develop alternative strategies to respond to contradicting demands.	3.66	1.02	0.85
2h	... we have suitable performance standards to monitor the quality of relationship with the partner firm.	3.55	1.03	0.82
2k	... we develop alternative strategies to balance tension with our partner firm.	3.58	0.97	0.85
2l	... we develop alternative strategies to manage both cooperation and competition.	3.62	1.01	0.81
Executional Skills				
	In this relationship,	$\alpha = 0.94$; CR = 0.97; AVE = 0.81		
3a	... we are able to change the scope and content of the relationship as and when required.	3.32	1.06	0.91
3b	... we are able to effectively manage the contradictions and dualities.	3.41	1.04	0.90
3e	... we are able to execute the formalized and codified relationship management rules properly.	3.52	0.98	0.92
3h	... we are able to effectively manage the tensions with our partners.	3.28	1.06	0.87

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3k	... we develop routines to adapt to the changing scope and content of the relationship.	3.55	1.02	0.90
	Value Creation (<i>a three-dimensional construct; each construct is a first order reflective scale</i>)			
	Common Benefit (<i>first-order reflective scale</i>)	$\alpha = 0.88; CR = 0.89; AVE = 0.68$		
	Within the alliance boundary, this alliance has led to:			
4a	... more effective exploitation of existing resources leading to improved cost effectiveness.	5.56	0.89	0.81
4b	... the development of new knowledge leading to increased innovation.	5.53	0.97	0.78
4c	... more effective exploitation of existing knowledge leading to greater efficiency.	5.63	0.88	0.85
4d	... more efficient deployment and utilization of resources leading to continuous improvement of the quality of products and services.	5.56	0.95	0.85
	Private Benefit _{Cooperation} (<i>first-order reflective scale</i>)	$\alpha = 0.82; CR = 0.84; AVE = 0.63$		
	Because of this relationship, our firm has			
5a	... used the new ideas and skills acquired from the partner to create value by improving its products and services.	5.55	0.93	0.83
5b	... used the R&D skills acquired from the partner to create value by engaging in greater innovation.	5.40	1.11	0.84
5c	... used the knowledge of systems and processes acquired from the partner to create value by enhancing its organizational effectiveness.	5.26	1.07	0.71
	Private Benefit _{Competition} (<i>first-order reflective scale</i>)	$\alpha = 0.89; CR = 0.89; AVE = 0.68$		
	In this relationship, we have been able to create more value because we have:			
6a	... leveraged the jointly developed processes better than the partner	5.36	1.09	0.87
6b	... leveraged the jointly developed technology better than the partner.	5.27	1.10	0.88
6c	... leveraged the jointly developed intellectual property better than the partner.	5.10	1.21	0.82
6d	... differentiated the product and services jointly developed by us better than the partner.	5.12	1.22	0.71
	Intensity of Competition (<i>first-order reflective scale</i>)	$\alpha = 0.89; CR = 0.91; AVE = 0.76$		
	In this relationship,			
7a	... our firm compete directly with the partner for the customer firm's business.	4.49	1.78	0.86
7b	... our firm's target markets are similar to those of the partner.	4.52	1.77	0.89
7c	... our firm considers the partner a major competitor in various product markets.	4.56	1.65	0.87
	Intensity of Cooperation (<i>first-order reflective scale</i>)	$\alpha = 0.92; CR = 0.92; AVE = 0.66$		
	In this relationship,			
8a	... we actively cooperate with our partner in R&D and exchange of know-how.	4.49	1.87	0.83
8b	... we frequently discuss common problems with our partner.	4.54	1.87	0.82
8c	... we share close ties and social relationship with people in our partner's firm	4.54	1.88	0.80
8d	... we share our production facilities with our partner.	4.46	1.85	0.81
8e	... we cooperate with our partner in developing new products.	4.46	1.84	0.80
8f	... we share our complementary resources with our partner.	4.53	1.88	0.82
	Coopetition Experience	$\alpha = \text{n.a.}; CR = \text{n.a.}; AVE = \text{n.a.}$		
9a	Please indicate the number of coopetitive alliances your firm has had in the last 5 years.	8.72	3.99	

Data Analysis and Results

We subjected the matched sample of 536 cases across the time span of surveys 1 and 2 to the same tests as in Phase II: Studies 3 and 4, namely, missing values at random, identification of outliers, estimation of non-response bias, and CMB. All these tests confirmed that there were no problems regarding these issues.

Construct validity. We first carried out exploratory factor analysis, which confirmed the unidimensionality of the reflective constructs. We assessed the reliability, convergent, and discriminant validities of multiple-item constructs by specifying a full CFA model. The fit measures for our full CFA model showed satisfactory values: $\chi^2/df = 1.61$; GFI = 0.91, NFI = 0.93, TLI = 0.97, RMSEA = 0.03; and SRMR = 0.05. The loadings of all indicators on their factors were greater than 0.71 and significant ($p < 0.001$), which is above the recommended threshold value of 0.50 (Netemeyer et al., 2003). Similarly, all constructs show good internal consistency (Cronbach's alpha ranging from 0.82 to 0.94), which is above the recommended threshold value of 0.70 (Nunnally, 1978). In addition, composite reliability values range from 0.84 to 0.97, exceeding the generally accepted threshold 0.60 (Bagozzi, Yi, & Phillips, 1991). The AVE for all constructs was greater than the threshold value of 0.5 (estimates ranged from 0.63 to 0.76). Thus, the first-order constructs demonstrated adequate convergent validity (see Table B2). We examined the discriminant validity using the following criteria (i) construct's AVE is greater than the squared correlation for each pair of constructs (Fornell & Larcker, 1981); and (ii) $MSV < AVE$ (Hair, Black, Babin, & Anderson, 2013). All the constructs met this requirement, as presented in Table B3. Table B3 also presents the means, standard deviations, and bivariate correlations for all variables.

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Table B3
Correlations and Square Roots of AVE

		Scale	Mean	SD	AVE	1	2	3	4	5	6	7	8	9	10	11	12
		Range															
1	Coopetition mindset	1-7	2.88	.90	.61	.78											
2	Analytical acumen	1-7	3.38	.76	.69	.61	.83										
3	Execuational skills	1-7	3.64	.92	.81	.61	.78	.90									
4	Common benefit	1-7	4.81	.67	.68	.43	.53	.56	.82								
5	Private benefit _{Cooperation}	1-7	4.55	.69	.63	.45	.55	.58	.83	.80							
6	Private benefit _{Competition}	1-7	5.14	.90	.68	.36	.43	.47	.77	.84	.82						
7	Intensity of competition	1-7	4.67	1.44	.76	.39	.50	.51	.58	.56	.58	.87					
8	Intensity of cooperation	1-7	4.83	1.47	.66	.40	.52	.52	.61	.62	.59	.74	.81				
9	Coopetition experience	-	8.72	3.99	n.a.	.26	.25	.24	.03	.04	-.02	.01	-.02	n.a.			
10	Firm size	-	6198.76	14942.81	n.a.	-.02	-.05	-.07	-.05	-.03	-.03	-.09	-.07	.00	n.a.		
11	Firm age	-	28.45	6.42	n.a.	.04	.11	.05	.25	.24	.20	.36	.37	.00	.03	n.a.	
12	Coopetition alliance age	-	7.96	1.66	n.a.	.03	-.04	-.05	-.02	.02	.01	-.10	-.05	.09	.17	-.02	n.a.

N = 536; numbers on the diagonal show square roots of AVE; Numbers below the diagonal show the factor correlations; AVE not available for the single-item measures.

Analytical approach. We applied the covariance-based SEM (CB-SEM) maximum likelihood (ML) procedure using AMOS 25.0 software to examine the latent variables within their causal structure. We considered ML estimation procedure appropriate as the skewness and kurtosis in the data were well below the common cut-offs of 2 and 7, respectively (Curran, West, & Finch, 1996). The advantage of CB-SEM is that it allows factoring the measurement error and enables simultaneous estimation of the measurement model and structural model, resulting in more accurate conclusions about the relationship between the latent constructs (Bollen, 1989).

Results. To test the hypotheses, we merged the measurement models of coopetition capability, coopetition experience, coopetition paradox, value creation, and the control variables into a structural model. The fit measures for our conceptual model showed satisfactory values: $\chi^2/df = 2.41$; GFI = 0.99, NFI = 0.99, TLI = 0.97, RMSEA = 0.05; and SRMR = 0.04.

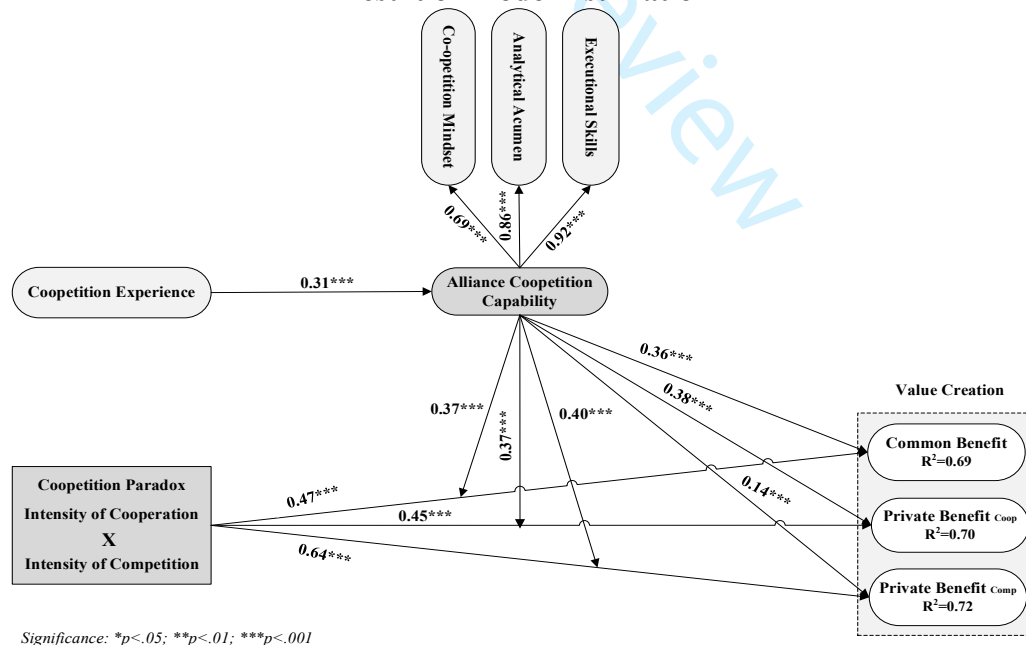
To assess the nomological validity, we tested the expectation that coopetition experience would have a positive relationship with coopetition capability. A positive and significant path coefficient ($\beta = 0.31$; $p \leq 0.001$) from coopetition experience to coopetition capability supports the expectation. Similarly, we expected a positive relationship between coopetition capability and

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value creation. The coefficients of the path from coopetition capability to the three dimensions of value creation show that coopetition capability influences value creation positively and significantly [coopetition capability to common benefit ($\beta = 0.36$; $p \leq 0.001$); coopetition capability to private benefit_{cooperation} ($\beta = 0.38$; $p \leq 0.001$); and coopetition capability to private benefit_{competition} ($\beta = 0.14$; $p \leq 0.001$)]. Taken together, these results confirm the focal construct's nomological validity.

We predicted that the intensity of cooperation paradox positively affects value creation by the focal firm in coopetition alliances. The path coefficients from cooperation paradox to the three dimensions of value creation are positive and significant [cooperation paradox to common benefit ($\beta = 0.47$; $p \leq 0.001$); cooperation paradox to private benefit_{cooperation} ($\beta = 0.45$; $p \leq 0.001$); and cooperation paradox to private benefit_{competition} ($\beta = 0.64$; $p \leq 0.001$)], thereby, providing support for the prediction.

Figure B2
Result of Model Estimation



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Similarly, we also predicted a positive moderating effect of coopetition capability on the relationship between the intensity of coopetition paradox and value creation. To test this hypothesis, we first examined the direct effects of coopetition capability on the three dimensions of value creation. We have reported the results of direct effects while testing for nomological validity; the path coefficients of the direct effects were significant on all the three dimensions of value creation. To eliminate the issue of collinearity, we then employed the orthogonalizing approach using the residual centering technique in two steps to examine the interaction effect of coopetition capability with coopetition paradox on value creation (Little, Bovaird, & Widaman, 2006). We found a significant positive effect of the interaction of coopetition capability with coopetition paradox on all the three dimensions of value creation [Common Benefit ($\beta = 0.37$, $p < 0.001$), Private Benefit_{Cooperation} ($\beta = 0.37$, $p < 0.001$), and Private Benefit_{Competition} ($\beta = 0.40$, $p < 0.001$)], thus, the results support the proposed moderating effect. Figure B2 presents the results (R-square value shown in Figure B2 are values that were obtained after entering the interaction term). These results take into account the effect of the control variables. However, we report the specific effects of control variables separately in Table B4 in order to streamline Figure B2.

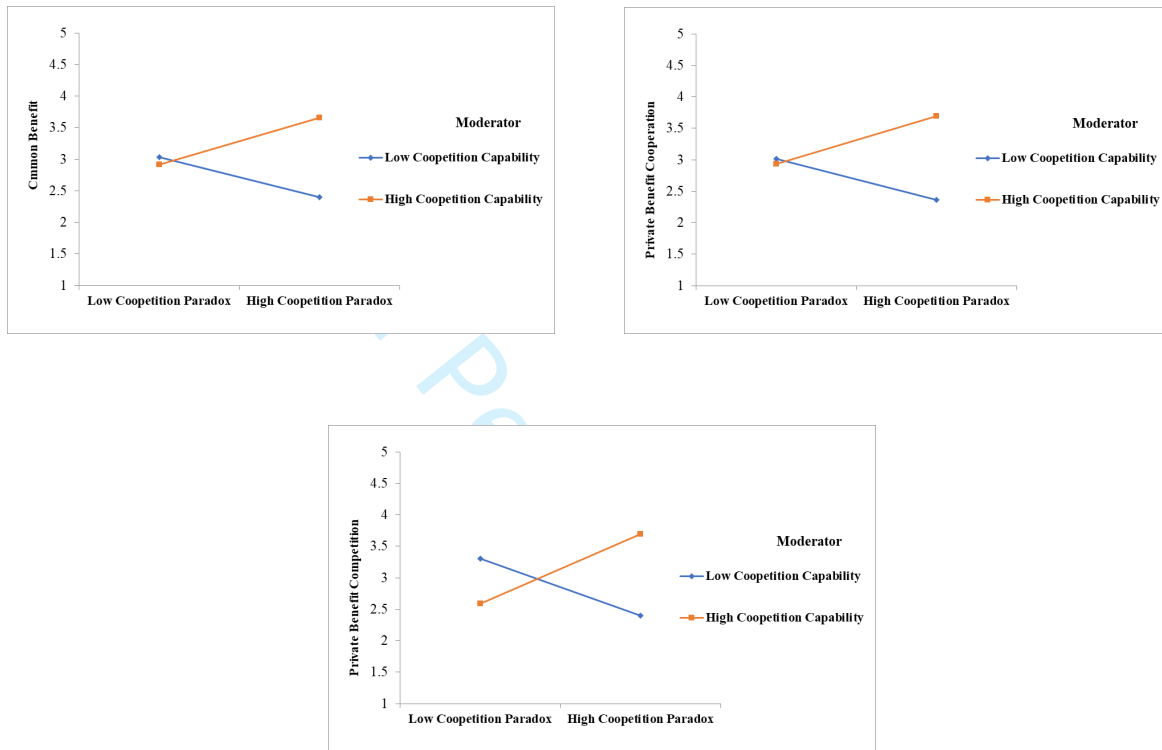
Table B4
Effect of Control Variables

	Common Benefit	Private Benefit _{Coop}	Private Benefit _{Comp}
Firm Size	-0.04	-0.04	-0.04
Firm Age	0.01	0.01	-0.09
Coopetition Alliance Age	0.04	0.08	0.07
Telecom	-0.06	0.10	-0.17
Information Technology	-0.069	0.05	-0.204
Pharmaceuticals	-0.05	0.13	-0.19
Joint Venture	0.03	-0.05	-0.03
Equity Alliance	-0.03	-0.06	-0.04

+ $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Furthermore, the interaction plots presented in Figure B4 illustrate that firms with higher cooperation capability are able to increase all the components of value creation further when the cooperation paradox is high.

Figure B3
Hypothesized Cooperation Paradox and Cooperation Capability Interaction Plot



Post hoc analysis. We assessed the strength of the moderating effect of the focal construct on the three dimensions of value creation by using Cohen's (1988) formula $f^2 = (R^2_{\text{model with moderator}} - R^2_{\text{model without moderator}}) / (1 - R^2_{\text{model with moderator}})$. We used the f^2 values of 0.02, 0.15, and 0.35, respectively, as guidelines for small, medium, and large effect sizes of the predictive variables (Cohen, 1988). We found that the moderating effect of cooperation capability on Common Benefit is large (0.58), Private Benefit Cooperation is large (0.39), and Private Benefit Competition is large (0.55).

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