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Embracing the paradox of inter-organisational value co-creation - value capture: A literature review towards paradox resolution

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Abstract

This study reviews literature on paradoxical tensions between value co-creation and capture in inter-organisational relationships (IORs). The purpose of this review is to make a re-evaluation of the literature by engaging a paradox theory lens (Smith and Lewis 2011), thereby identifying factors that render tensions salient and factors that lead to virtuous or vicious cycles. Our review of 143 articles reveals factors that make tensions salient; these relate to plurality (e.g. coopetition), scarcity (e.g. lack of experience with IORs), change (e.g. changes in collaboration scope) or combinations thereof (e.g. IORs in weak appropriability regimes). Results also uncover factors that resolve paradoxical tensions of value co-creation and capture, thus spurring virtuous cycles (e.g. carefully mixing trust and contracts), as well as factors which promote vicious cycles due to the emphasis on either value co-creation or capture (e.g. myopia of learning). Our review also uncovers a new category of factors that may stimulate either virtuous or vicious cycles, depending on the extent to which they are enforced. This finding expands the value co-creation-capture paradox resolution, and brings to light new dynamics in the paradox framework of dynamic equilibrium. We thus contribute by: 1) re-assessing existing literature and applying paradox theory to the well-known hazard of value co-creation and capture; 2) highlighting factors that amplify paradoxical tensions related to this hazard; and 3) outlining factors that solve the paradox by embracing its contradictory poles and factors that hinder paradox resolution by emphasizing either value co-creation or appropriation.

Introduction

Scholars have signalled inherent tensions between creating and capturing value in interorganisational settings (Lavie 2006; 2007; Ritala and Hurmelinna-Laukkanen 2009; Chowdhury *et al.* 2016). Such tensions may take nuanced shapes, which are contingent upon the primary source that generates them and the settings in which they occur. One possible source of tensions is represented by the somewhat contradictory mechanisms or strategies that are required to co-create and capture value respectively. Specifically, joint value creation calls for knowledge sharing mechanisms (see e.g. Khalid and Larimo 2012), while capturing value demands, for instance, appropriation mechanisms (see e.g. Veer *et al.* 2016). Furthermore, value co-creation occurs at an interorganisational level, yet value appropriation is done to benefit the organisational level (Capaldo and Petruzzelli 2011); the distinct levels may provide an additional onset of conflicts. Another potential source for tensions is the need to distribute limited resources between value co-creation and capture (Mizik and Jacobson 2003; Capaldo and Petruzzelli 2011), as the two require a simultaneous balance. Value appropriation is mainly aimed at dividing the resources that are shared between partner organisations, yet tensions also relate to the risk that even non-shared resources might be the source of partners' benefits (see Lavie 2006). These nuances of the value co-creation – capture tensions are not to be regarded as mutually exclusive or exhaustive; depending on the context they may overlap, and differentiating between them could be difficult. This adds a layer of complexity to both analysing and resolving such tensions.

Laursen and Salter (2014) indicate that tensions between co-creating and capturing value are deep-rooted in Kenneth Arrow's (1962) paradox of disclosure. In Arrow's (1962) *fundamental paradox* a *seller* needs to reveal information about an invention in order to commercialize it, while the potential *buyer* requires information about said invention in order to evaluate it (Arrow 1962). If the seller reveals too much information, there is the risk that the

potential buyer would have acquired the invention for free; if the seller does not provide enough information, there is a high chance that the buyer would not be willing to purchase the idea, and hence fail to capture any benefits from it. Laursen and Salter (2014) suggest that in modern contexts of growing interorganisational collaboration the tensions embedded in Arrow's (1962) paradox of disclosure surpass the mere settings of arm's length transaction (as described originally) and become even more intricate, as organisations need to co-create *and* capture value in order to maintain competitive advantage. Based on the above we argue that value co-creation and value capture (appropriation) are the two contradictory yet interrelated poles of this paradox, following the definition of paradox proposed by paradox theory scholars (see Smith and Lewis 2011; Schad *et al.* 2016).

Given the contradictory yet interrelated nature of value co-creation and value capture, these two *poles* need be balanced simultaneously in order to alleviate tensions and avoid negative outcomes. For instance, according to Smith and Lewis (2011) overemphasizing one of the paradox poles would lead to so-called vicious cycles, which in the present case would lead to failure in either co-creating or capturing value. However, the two poles are both indispensable for maintaining competitive advantage. It is therefore crucial to manage tensions between value co-creation and value capture in an effective manner, and thus to spur virtuous cycles as described in paradox theory (Smith and Lewis 2011).

Solutions for *how* to effectively manage tensions between co-creating and capturing value are dispersed in extant literature and jointly lack a holistic perspective. Moreover, *what* causes the value co-creation – capture tensions in the first place is also an issue that is not fully understood. The literature on inter-organizational relations (IORs) includes several review studies that tackle the topic of tensions in IORs (e.g. Kivleniece and Quelin 2012; Wang and Rajagopalan 2015). Although highly valuable, these studies have several limitations, i.e. either in overlooking *what* influences tensions between value co-creation and capture (Wang and

Rajagopalan 2015), or disregarding factors that complicate tension resolution (Baughn *et al.* 1997), or restricting the analysis to specific types of IORs, e.g. public-private ties (Kivleniece and Quelin 2012). The above illustrate the absence of a comprehensive framework of factors that amplify various types of tensions between value co-creation and value capture. Moreover, although tensions between value co-creation and capture are often dubbed to be paradoxical (Arrow 1962; Oxley 1997; Ritala and Hurmelinna-Laukkanen 2013; Laursen and Salter 2014), there are to date no synthesis studies that investigate the tensions through a paradox theory lens. However, Poole and Van de Ven (1989), for instance, highlight the value of paradox for “understanding how to work with theoretical contradictions and oppositions” (*ibid.*, p. 563).

The purpose of our article is therefore to re-assess existing literature on tensions in IORs by applying a paradox dynamic equilibrium framework of Smith and Lewis (2011). We review 143 studies that investigate value co-creation and value capture in IORs. The application of the paradox framework to this literature enables us to integrate factors that lead to salient paradoxical tensions in IORs, factors that resolve the paradoxical tensions, thus spurring virtuous cycles, and factors that promote vicious cycles due to the emphasis on either value co-creation or capture.

Our findings show that paradoxical tensions become salient in IORs characterized by plurality of views (e.g. coopetition), scarcity of resources (e.g. lack of experience with IORs), change (e.g. changes in the scope of the IOR), or combinations thereof (e.g. IORs in weak appropriability regimes). Results also uncover factors that resolve paradoxical tensions by effectively integrating value co-creation and appropriation, thus spurring virtuous cycles. These factors include governance mechanisms, such as contracts and joint ventures, but also organizational capabilities (e.g. alliance capabilities and absorptive capacity) and appropriation strategies (e.g. dual value appropriation and interactive revealing). Factors that promote vicious cycles, due to an emphasis on either value co-creation or capture, include, for instance, learning

paces or learning myopia. Aside from these three categories of factors that we draw from the Smith and Lewis' (2011) framework, we also find a fourth category of factors, which is not included in the original framework: certain factors, such as time, trust or R&D intensity, may spur virtuous as well as vicious cycles, depending on their intensity. From a value co-creation – value capture perspective, this finding provides an additional layer for understanding such tensions, while also confirming their increasingly intricate nature (see Laursen and Salter 2014). Viewed from a paradox theory perspective, this result advances the dynamic equilibrium framework by Smith and Lewis (2011).

Theoretical background

We start this section by defining paradox and paradoxical tensions according to seminal studies in the organisational paradox theory field. We proceed by illustrating a specific framework in this field: the one suggested by Smith and Lewis (2011). We then move to interpreting how the Smith and Lewis (2011) framework applies to value co-creation – capture tensions. By applying this framework, we outline three categories of factors linked to co-creating and appropriating value: the first category concerns factors that turn latent value co-creation-capture tensions into salient ones; the second category relates to factors that may escalate salient tensions to vicious cycles, i.e. lack of balance between the paradox poles; the third category is linked to factors that might aid in paradox resolution, thereby creating virtuous cycles.

Defining paradox and related tensions

In their seminal study Poole and Van de Ven (1989) highlight the untapped potential of studying paradox. They argue that using paradox theory as a lens allows for the investigation of multiple facets and intricacies of reality by enhancing comprehension of contradictions and

opposing elements (Poole and Van de Ven 1989). Reasons for evading the depths and complexities of paradox in management and organisation theories are linked to the need for *good theories* to be precise and narrow, therefore forfeiting any attempt to ‘cover everything’ (Poole and Van de Ven 1989, p. 562). Later studies by Lewis (2000) and Smith and Lewis (2011) point to a rapid growth in addressing paradox in the management and organisation literature; nevertheless, designating phenomena as paradoxes does not necessarily contribute to a deeper understanding of these (Lewis 2000). In their recent review, Schad *et al.* (2016) also emphasize that paradox is still largely simplified in the literature and that its dynamics are largely overlooked. This assertion converges with remarks made more than two decades ago, when paradox was dubbed to be extensively used but underspecified (Handy 1994).

In line with paradox interpretations proposed by early organisational scholars (e.g. Poole and Van de Ven 1989; Lewis 2000), a recent review of the field by Schad *et al.* (2016) defines paradox as “persistent contradiction between interdependent elements” (p. 6). Tensions arise from these contradictions between interdependent elements (Poole and Van de Ven 1989; Smith and Lewis 2011). Although often designated to be ambiguous concepts, *tensions* are generally defined as:

“*stress, anxiety, discomfort, or tightness in making choices, responding to, and moving forward in organizational situations*” (Putnam *et al.* 2016, p. 68).

Tensions emerge by defining organisational characteristics or components, which concurrently entails defining what is not included in said characteristics or components (Smith and Lewis 2011). By putting up organisational boundaries and defining what an organisation is or what its goals are, managers are simultaneously defining what the organisation is not and what it will not do or achieve; thus, by defining A, a non-A category is synchronously defined and organisational tensions arise (Smith and Lewis 2011). Examples of such tensions include global versus local, centralized versus decentralized, flexible versus controlling, or socially focused

versus financially focused in the context of a firm's CSR policies (Du *et al.* 2010; Lindgreen and Swaen 2010; Maon *et al.* 2010; Smith and Lewis 2011). Paradoxical tensions arise when contradictory but interlinked elements require simultaneous balancing, yet they may remain latent, as long as not experienced by actors (Smith and Lewis 2011; Schad *et al.* 2016). In the next section we present a framework for describing and understanding paradoxical dynamics proposed by Smith and Lewis (2011).

Dynamic equilibrium: an integrative framework by Smith and Lewis (2011)

Smith and Lewis (2011) suggest latent paradoxical tensions exist in organisations, yet an array of contextual factors, namely ones relating to plurality, scarcity and change, may make such tensions salient. Plurality refers to a variety of perspectives and emphasizes distinct objectives of actors, leading to increased uncertainty (Smith and Lewis 2011). Change spurs antagonism between short- and long-term perspectives, between present and future needs (Lüscher and Lewis 2008). Scarcity relates to a limited amount of resources, and related tensions arise due to conflicting needs and a shortage of assets and supplies. In modern environments, characterized by growing globalization, cutting edge technologies and extreme competition, the three factors meet and focalize, thus creating a category of compound factors. Combined plurality, change and scarcity place pressure on systems and compel trade-off-like decisions, where one of two opposing yet interrelated elements is chosen (Smith and Lewis 2011). A rather well-known example in the literature is the exploration-exploitation conundrum: competitive strains create severe needs for both exploration and exploitation, yet change and scarcity make it difficult for organisations to pursue both.

At the stage when tensions become salient in the dynamics framework proposed by Smith and Lewis (2011), attempts to manage such tensions may produce either vicious or virtuous cycles. Vicious cycles are results of not accepting paradox and focusing on one of its

two poles. At the organisational level, vicious cycles spawn partly from inertia. Individual and organisational strains reinforce the focus on either/or choices and fuel vicious cycles in paradox management. Examples provided by Smith and Lewis (2011) extend to focusing on outcomes while neglecting the process or stressing performance without considering ethical aspects (see also Trevino and Brown 2004).

Virtuous cycles imply acknowledging salient paradoxical tensions and resolving them by means of confrontation and integration. This approach builds on the view of tensions as opportunities, favourable to creativity (Beech *et al.* 2004, Smith and Lewis 2011). Distancing oneself from the trade-off approach, where an either/or choice between contrasting yet interrelated elements is required, enables embracing paradox and uncovering the underlying meanings in contradictions (Lüscher and Lewis 2008; Smith and Lewis 2011). The path to virtuous cycles when dealing with paradoxical tensions requires dynamic capabilities at organisational level in order to deal with high levels of complexity (Smith and Lewis 2011). This further implies complementary and interlinking strategies to deal with paradoxical tensions. Returning to the previous example of exploration-exploitation tensions, Smith *et al.* (2010) for instance, propose balancing the two demands by making dynamic managerial choices that involve (simultaneously) allotting resources to both exploiting current innovations and exploring avenues for new inventions.

The Smith and Lewis (2011) framework in itself describes a cycle-like process. A cycle begins with latent tensions becoming salient, and thus being experienced by actors due to various types of contextual factors. At this stage in the cycle, if tensions are not effectively managed and the two paradox poles become imbalanced, this would lead to vicious cycles, which in Smith and Lewis' (2011) figure tend to 'break' the cycle-like process, being drawn as an arrow exiting the cycle (see figure 1). However, if the two poles are successfully balanced salient tensions fade, shaping into virtuous cycles. This entails embracing paradox, ultimately

leading to paradox resolution (Smith and Lewis 2011). At this stage, the cycle could be repeated, because although tensions have been alleviated, they are still latent, and could thus be ‘triggered’ again by contextual factors.

Value co-creation and value capture paradoxical tensions

We apply insights from Smith and Lewis (2011) on paradoxical tensions to value co-creation and value capture in the context of inter-organisational collaboration. This is illustrated in figure 1. We define value as “the net rent earning capacity of an asset or resource, tangible or intangible” (Madhok and Tallman 1998, p. 326). Relying on the marketing literature, we argue that in an IOR value is co-created through the combined efforts and joint integration of resources of multiple actors (Lindgreen and Wynstra 2005; Vargo *et al.* 2006; Vargo and Lusch 2011; Ng and Smith 2015). Value co-creation produces “relational rents that cannot be generated independently by individual participants” (Lavie 2007, p. 1191). “We define a relational rent as a supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners” (Dyer and Singh 1998, p. 662). Relational rents are thus economic rents jointly generated by the partners in an IOR. *Value co-creation* refers to the collective processes that generate common benefits shared by all partners in an IOR (Lavie 2007). *Value capture* on the other hand is the ability of partners to unilaterally extract private benefits and appropriate relational rents (Lavie 2007). Partners may thus *capture* private and/or common benefits from IORs. Private benefits are earned unilaterally by picking up skills from partners and are unrelated to joint value creation. Partners may also extract a share of the common benefits (or relational rents) that were generated by the collective application of learning in the IOR (Khanna 1998). Partners thus capture economic rents with the former being

extracted from a partner in the IOR and the latter being extracted as a share of the relational rents co-created in the IOR.

In order to describe the paradoxical tensions that occur from a combined focus on value co-creation and value capture, we take the perspective of a focal collaboration partner who engages in an IOR with one or more other organizations. This focal partner experiences paradoxical tensions related to value co-creation and capture. The paradoxical tensions exist because value co-creation and value capture are interdependent and contradictory at the same time. The interdependence is illustrated by the fact that the focal organization needs to contribute to value creation to allow for value capture (Dyer and Singh 1998; Laursen and Salter 2014; Ritala and Tidström 2014; Bouncken *et al.* 2017). Anticipated value appropriation will determine a partner's effort and incentive to contribute to value creation (Adegbesan and Higgins 2010). The contradictory nature of value co-creation and capture is delineated by e.g. opposing strategies required to create and to capture value respectively (Capaldo and Petruzzelli 2011). Specifically, a focal partner who is mainly focused on value co-creation by committing resources to the IOR and sharing knowledge with partners, may be more susceptible to opportunistic appropriation and unintentional spillovers (Kumar 2010; Jiang *et al.* 2013) or may lack the abilities to appropriate value from the IOR (Grafton and Mundy 2017). A focal partner who focuses too much on value capture or protection against misappropriation misses out the chance to create value (Madhok and Tallman 1998; Wadhwa *et al.* 2017). As pointed out in the introduction of this study, the value co-creation – capture tensions are rather nuanced and may take many different shapes. Some further examples also include allocating limited resources between value co-creation and value capture (Mizik and Jacobson 2003; Capaldo and Petruzzelli 2011), or risks that non-shared resources (these are resources that are not shared between IOR partners) could be misappropriated by partners (see Lavie 2006).

Misappropriation is a type of opportunistic behaviour (Rahman and Korn 2010) that has been described as the opportunistic appropriation of rents (Mahnke *et al.* 2007). In the context of an IOR, misappropriation occurs when a partner extracts a disproportional share of the relational rents and thereby reduces the focal organization's share of the common benefits relative to its share in joint investments (Lavie 2007). It can also include the misappropriation of the focal organization's resources by a partner in the IOR (Wadhwa *et al.* 2017). In the marketing literature this has been described as value co-destruction (Plé, 2016), and in particular co-destruction through the intentional misuse of resources whereby one actor seeks to increase its own well-being to the detriment of the other's well-being (Plé and Chumpitaz Cáceres, 2010). Chowdhury *et al.* (2016, p. 102) refer to co-destruction as the dark side of value co-creation and argue that "this highlights a paradoxical relationship" where the actors appear to be engaging in value co-creation "but the relationship is clouded by opportunistic behaviour". Misappropriation is a possible negative outcome of the 'fundamental paradox' described by Arrow (1962). In the Smith and Lewis (2011) framework, this would be found 'at the end' of vicious cycles, particularly when the value capture pole would be overlooked. However, in our study we mainly focus on risks of misappropriation, which in the framework are categorised as salient tensions experienced by actors; we do not explicitly focus our analysis on the potential negative outcomes of the value co-creation – capture tensions being mismanaged.

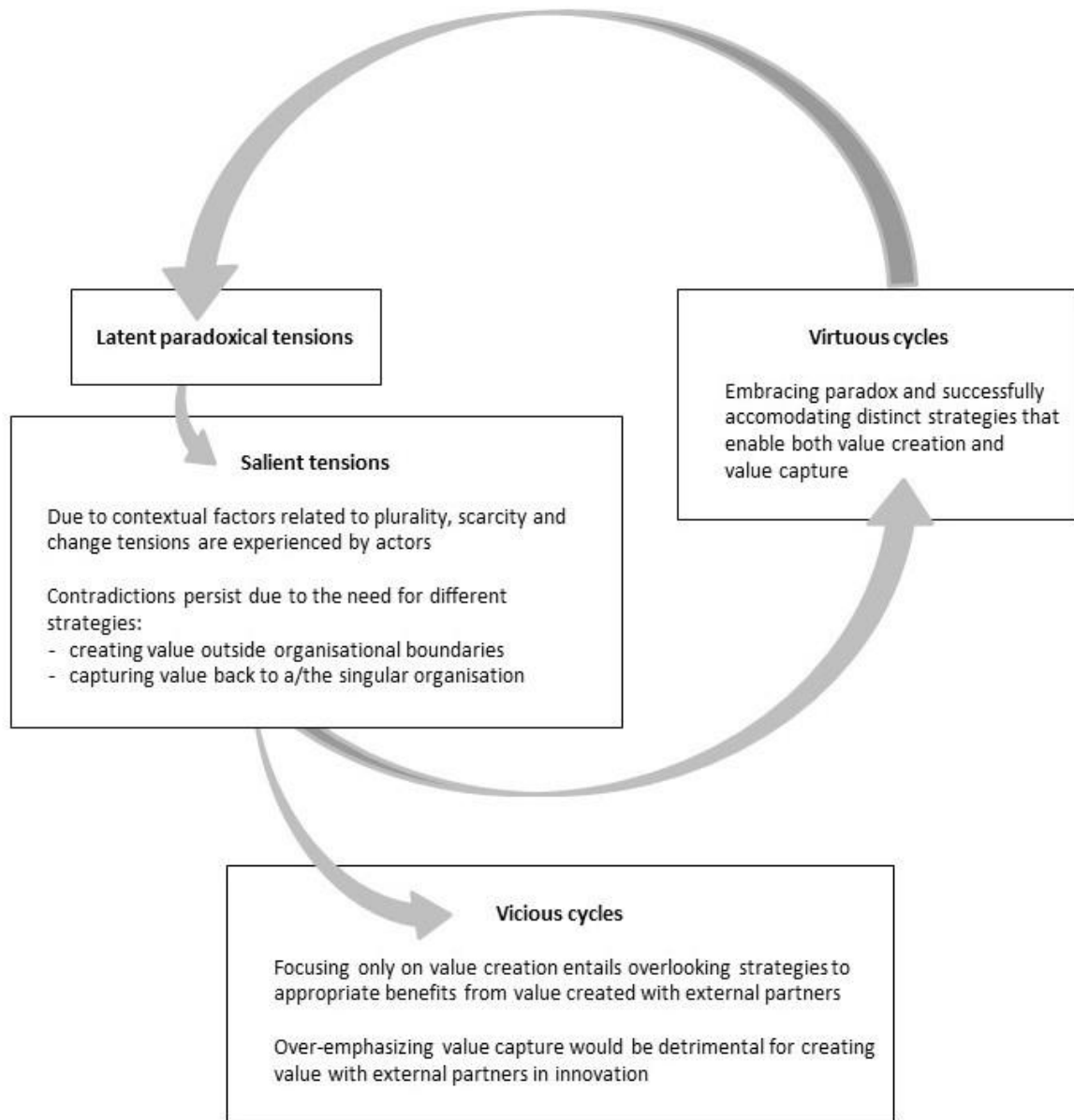


Figure 1 Dynamic equilibrium framework for value creation – value capture paradoxical tensions; adapted from Smith and Lewis (2011)

Methods

Tranfield *et al.* (2003) propose three main stages of conducting a systematic review: 1) planning the review, 2) conducting the review and 3) reporting and dissemination. Later studies apply these three stages, yet under different names: *Searching*, *Screening* and *Extraction/Synthesis* (Watson *et al.* 2018). The present review follows these stages.

Searching

In the first stage, the need for a review is identified and motivated. As mentioned in the introduction of this study, the paradox suggested by Arrow (1962) takes the shapes of more intricate inter-organisational interactions (Laursen and Salter 2014). However, in spite of many research streams having investigated such interactions, there is no unified framework of the value co-creation – value capture paradoxical tensions, and there are unanswered questions concerning this so-called paradox. One such question concerns the contextual conditions of IORs that make partners experience paradoxical tensions of value co-creation and capture. Other questions relate to the different strategies organisations use to embrace and confront paradoxical tensions, but also under which conditions firms choose to ignore such tensions and focus on either value co-creation or capture.

Having established the need for a literature review, we went on to identify various keywords and keyword combinations to use in our search for relevant articles. The identification and selection was based on literature scoping and discussions. The keyword combinations that are used to conduct searches are set out in table 1. We identified four main groups of keywords that are relevant for the present review. In table 1, columns 2-5 represent these four keyword groups, while rows 2-6 (from top to bottom) divide each group into sub-groups of stemmed/not stemmed keywords and/or keyword combinations. Between keyword groups the Boolean operator AND was used. The searches were mainly limited to the abstract; however, in some cases when the search would provide none or very few results the fourth keyword group was extended to the whole text, while the first three keyword groups remained restricted to the abstract.

The first keyword group refers to stem words that are related to the two paradox poles, i.e. “value co-creation” and “value capture”. The second keyword group contains stem words related to the notion of “organisation” or “company” and also the notion of “partner”. These

are meant to capture the focus on IORs, but even potential tensions such as “coopetition”. The second keyword group was not sufficient for limiting search results to studies on IORs, and therefore a third keyword group was used, which includes synonyms for collaboration. Keywords such as alliances, partnerships, or keywords denoting open innovation settings are encompassed in the third keyword group. A fourth keyword group was added in order to narrow down search results even more, and to put an emphasis on the novelty component of value co-creation.

Some searches contained dyadic word combinations with the Boolean operator AND, e.g. (buyer AND supplier), in order to capture commonly used dyadic combinations from the literature. However, other searches were based solely on words relating to synonyms or antonyms of one of the paradox poles, e.g. for “value capture” both appropriation and appropriability were used to better seize potential tensions between the paradox poles. The word ‘paradox’ was not included in the keywords because there are rather numerous studies that investigate the problem posed by Arrow (1962) but do not refer to it as paradox – an example is Anton and Yao (2002) who regard this as a dilemma, while others refer to it as a hazard or problem. The total number of articles based on these keyword combinations was 384.

The database used for searching peer reviewed articles is EBSCO Business Source Premier (BSP). We chose EBSCO due to its broad inclusion of 98% of bibliographic records for 25 business and management journals with the highest impact factors (Christoffersen 2013; Niesten and Jolink 2015). The searches were performed up to March 31st 2018. In parallel with the search and download process, the titles, authors and other relevant information about each search result were listed in a document that Tranfield *et al.* (2003) call an ‘extraction form’.

Table 1. Groups of keywords

	<i>First keyword group – stem words relating to one or both paradox poles</i>	<i>Second keyword group – stem words relating to the notions of organization and partner</i>	<i>Third keyword group – stem words relating to IORs</i>	<i>Fourth keyword group</i>
Stemmed keywords	cocreat* codestruct* misappropriat*	business* co-opetit* coopetit* corporation* partner*	alliance* partnership* transaction*	idea* innovation* invention* novelt*
Stemmed combinations within keywords group	"co-creat* value" "co-destruct* value" "co-innovat*" "knowledge leak*" "resource misus*" "resource misintegrat*" "value co-destruct*"			"new product*" "new process*" "new service*"
Not stemmed keywords	appropriation appropriability "knowledge spillover*" "value co-creation"	firm(s) company(ies) organisation(s) organization(s)	B2B collaboration interfirm interorganisational interorganizational openness	information knowledge
Not stemmed keyword combinations			"business-to-business" OR "joint venture" "open innovation"	"intellectual property"
Stemmed and not stemmed keyword combinations containing AND operator	("creat* value" AND "capt* value") ("creat* value" AND "value capt*") ("value creat*" AND "value capt*") ("value creat*" AND "capt* value")	(buyer AND supplier)		

Screening

During a first reading of the 384 articles, we applied several inclusion and exclusion criteria. We only included articles focused on the analysis of inter-organizational relations, and excluded articles on other types of collaboration (e.g. between students of different universities, or between companies and individual consumers). We excluded articles that did not address tensions of simultaneously co-creating and capturing value. Additionally, we excluded articles that referred to value but where value co-creation or capture was not the focus of the study, or

where the focus was exclusively on value co-creation or capture but did not address these concepts simultaneously. We only included articles published in peer-reviewed academic journals in the English language. After applying the inclusion and exclusion criteria, we retained 143 articles.

When reading and analysing the 143 articles we coded the following concepts: methods, theories (of the firm), type of IOR, IOR context (e.g. specific industry), factors rendering tensions salient (plurality, change, scarcity; globalization, technological innovation and hypercompetition), virtuous cycles (behavioural complexity, dynamic organizational capabilities and emotional equanimity), vicious cycles (anxiety, consistency, organizational inertia, denial, focused on one choice; overemphasizing control; commitment to existing strategies), and virtuous and vicious cycles occurring at the same time. These codes are all added to the extraction form for each article in our review.

By coding methods and theories of the firm we aim to make a synthesis of the different fields and various approaches used to tackle the intricate matter of tensions between value co-creation and value capture. Given the wide array of types of IORs we provide information on the type of IOR, as well as the IOR context – the latter specifically relates to the sensitivity of contextual factors that spur salient tensions in the framework proposed by Smith and Lewis (2011). Getting closer to the core of our framework, we code for contextual factors that spur salient tensions, factors that lead to vicious cycles, and factors that lead to virtuous cycles. These codes on the core of our framework are all based on the article by Smith and Lewis (2011) and are interpreted by the authors in the context of value co-creation and capture in IORs. Adopting a similar approach to other systematic literature reviews (e.g. Massaro *et al.*, 2016), the authors coded first sets of articles and then discussed the interpretation of the codes to further refine them until a clear interpretation of concepts emerged that offered a relevant application of the Smith and Lewis' framework in the IOR context.

Extraction/Synthesis

In the third stage, a descriptive analysis of the review results is provided, as well as the description of the relevant results. Table 2 indicates that 55% of the articles employ quantitative methods, 20% qualitative methods, 4% a mixed methods design, and 21% are conceptual papers or literature reviews. The articles employ and often combine different theories to analyse value co-creation and capture, such as the resource-based view and the knowledge-based view, but they also rely on specific types of literature, e.g. from the marketing or innovation field. The majority of the articles analyse relations between firms (75%), while the remaining set of articles study relations between firms and organizations, such as universities, research institutes and laboratories, governmental agencies and research facilities, NGOs, and state-owned organizations. The articles on inter-firm relations do not always offer more detail on what type of firms are included in the analysis, but sometimes they specify that it concerns relations between competitors (e.g. Bouncken *et al.* 2017) or relations between young and incumbent firms (Hallen *et al.* 2014).

Table 2. Descriptive statistics of articles in review

		<i>Nr. of articles</i>	<i>Percentages</i>
Methods	Quantitative design	79	55%
	Qualitative design	28	20%
	Mixed methods	6	4%
	Conceptual papers & literature reviews	30	21%
Theories	RBV and capabilities perspective	21	15%
	KBV and learning perspective	20	14%
	Organizational economics	39	27%
	Marketing literature	8	6%
	Innovation literature	29	20%

	Other	65	45%
Type of IOR	Inter-firm relations (incl. B2B, buyer-supplier)	107	75%
	Public-private relations	33	23%
	Unspecified	3	2%
IOR context	High-tech industries, incl. IT, software, hardware	32	22%
	Bio-tech / bio-pharma	18	13%
	Manufacturing	23	16%
	Infrastructure, incl. telecom, energy, transport	16	11%
	Other	54	38%

Results

This section discusses the results of our literature review. First, it illustrates what factors make the tensions between value co-creation and capture salient in IORs. Second, it discusses organizational responses of ignoring these tensions and focusing on either value co-creation or capture (i.e. vicious cycles). Third, it presents the organizational mechanisms and strategies that accept and resolve the tensions and enable both value co-creation and capture (i.e. virtuous

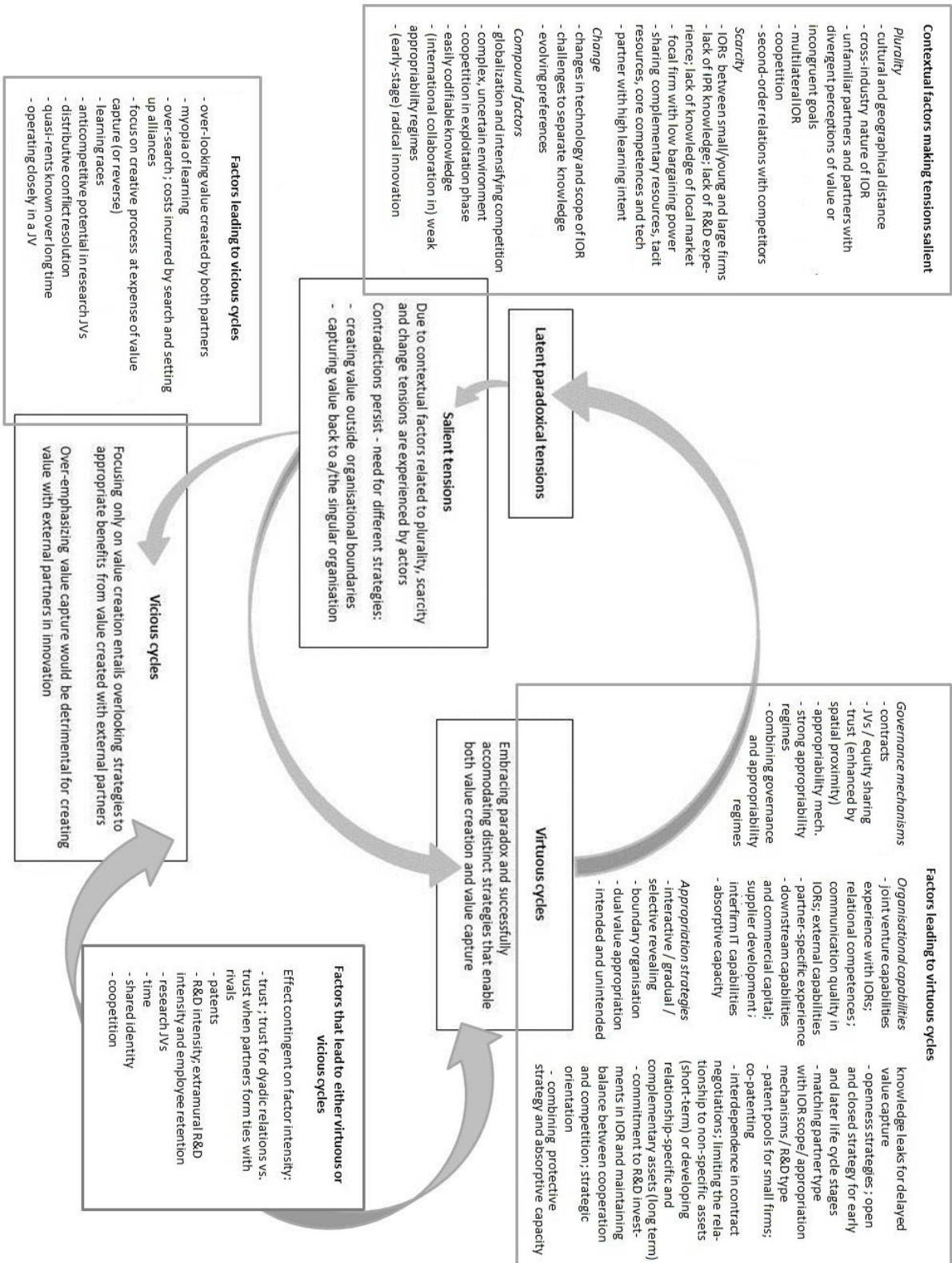


Figure 2 Dynamic equilibrium framework (adapted from Smith and Lewis 2011) listing factors that make paradoxical tensions salient, as well as those that spur vicious and virtuous cycles

cycles). Finally, our paper extends the paradox dynamics framework by highlighting that certain factors lead to either vicious or virtuous cycles depending on the extent to which the factors are enforced. Figure 2 illustrates our results and thus offers an application and extension of the Smith and Lewis framework in the context of value co-creation and capture in IORs. Tables 3 and 4 offer an overview of our findings summarizing the contribution of the articles to our expanded framework.

Factors rendering tensions salient

The literature has identified several factors as amplifying tensions between value co-creation and capture. Hence, we interpret these as factors that change paradoxical tensions from latent to salient ones. Some of these factors can be categorized as belonging to either plurality, or scarcity or change categories. Other factors are assigned under the umbrella of rising globalization, hypercompetition and technological innovation (Smith and Lewis 2011), i.e. compound factors that form a highly pressured environment due to a combination of resource scarcity, constant changes and plurality of actors' views.

Plurality of views

In our literature review, we have identified several examples that relate to plurality of views, such as collaborating with partners from different countries, cultures, industries and sectors (Colombo and Piva 2008; Perkmann and Schildt 2015; Bolivar-Ramos 2017; Niesten and Jolink 2018), or collaborating with competitors (i.e. cooptation) (Oxley and Wada 2004; Ritala and Hurmelinna-Laukkanen 2009; Hallen *et al.* 2014). Studies point out that collaborating with partners from different industries, countries and cultures may be important for novel value creation, but value capture may be complicated due to the diverse backgrounds and diverse resource and knowledge bases (e.g. Li *et al.* 2013).

Table 3. Factors rendering tensions salient

<i>Plurality of views</i>	<i>Scarcity of resources</i>	<i>Change</i>
<p>- Cultural and geographical distance (Li <i>et al.</i> 2013; Lew <i>et al.</i> 2016; Stefan and Bengtsson, 2016; Bolivar-Ramos 2017; Niesten and Jolink 2018)</p> <p>- Cross-industry nature of IOR (Colombo and Piva 2008; Leroux and Berro 2010; Niesten and Jolink 2018)</p> <p>- Unfamiliar partners and partners with divergent perceptions of value or incongruent goals (Wang and Zajac 2007; Lhuillery and Pfister 2009; Ritala and Hurmelinna-Laukkanen 2009; Giannoupuoulou <i>et al.</i> 2011; (; Grafton <i>et al.</i> 2011; Perkmann and Schildt 2015; Henttonen <i>et al.</i> 2016; Vafeas <i>et al.</i> 2016)</p> <p>- Multilateral IORs (Mitchell <i>et al.</i> 2002; Li <i>et al.</i> 2012)</p> <p>- Coopetition (Larsson <i>et al.</i> 1998; Jordan, 2004; Oxley and Sampson, 2004; Chesbrough and Appleyard 2007; Lavie 2007; Kasch and Dowling 2008; Lhuillery and Pfister 2009; Oxley and Wada 2009; Ritala and Hurmelinna-Laukkanen 2009; Ho and Ganesan 2013; Martinez-Noya <i>et al.</i> 2013; Hallen <i>et al.</i> 2014; Ritala and Tidström 2014; Jiang <i>et al.</i> 2016; Bouncken <i>et al.</i> 2017; Grafton and Mundy 2017)</p> <p>- Second-order relations with competitors (Hernandez <i>et al.</i> 2015; Martinez-Noya and Garcia-Canal 2016; 2018)</p>	<p>- IORs between small/young and large firms (O'Dwyer and O'Flynn 2005; Sawers <i>et al.</i> 2008; Kumar 2010; Diestre and Rajagopalan 2012; Hallen <i>et al.</i> 2014; Mason and Drakeman 2014; Yang <i>et al.</i> 2014; Pérez and Cambra-Fierro 2015b; Baglieri <i>et al.</i>, 2016)</p> <p>- Lack of IPR knowledge; lack of R&D experience; lack of knowledge of local market (Pisano 1990; Gattai and Molteni 2007; Rayna and Striukova 2010; Vafeas <i>et al.</i> 2016)</p> <p>- Focal firm with low bargaining power (Miranda and Kavan 2005; Lavie 2007; Leroux and Berro 2010; Adegbesan and Higgins 2010; Ritala and Tidström 2014)</p> <p>- Sharing complementary resources, tacit resources, core competences and technologies (Gulati and Singh 1998; Mitchell <i>et al.</i> 2002; Norman 2002; Jordan 2004; Daniels and Perez 2007; Cheung <i>et al.</i> 2010; Kumar 2010; Romero-Molina 2011; Diestre and Rajagopalan 2012; Ho and Ganesan 2013; Park and Lee 2015; Freel and Robson 2017; Martinez-Noya and Garcia-Canal 2018)</p> <p>- Partner with high learning intent (Norman 2002; Jordan 2004)</p>	<p>- Changes in technology and scope of the IOR (Oxley 1999) and therefore difficulty to enforce property rights (Pisano 1990; Möller <i>et al.</i>, 2008)</p> <p>- Challenges to separate knowledge (Reuer <i>et al.</i> 2002; Oxley and Sampson 2004; Li <i>et al.</i> 2012; Martinez-Noya <i>et al.</i> 2013)</p> <p>- Evolving preferences (Gillier <i>et al.</i> 2010)</p>
<p><i>Compound factors: Settings of globalization, hypercompetition and technological innovation</i></p>		
<p>- Globalization and intensifying competition (Cheung <i>et al.</i> 2010)</p> <p>- Complex, uncertain environment (Pendaries and Castaneda 2015)</p> <p>- Coopetition in the exploitation phase (Belderbos <i>et al.</i> 2014; Yami and Nemeh 2014)</p> <p>- Easily codifiable knowledge (O'Dwyer and O'Flynn 2005; Daniels and Perez 2007; Li <i>et al.</i> 2008; Allred and Swan 2014)</p> <p>- Weak appropriability regimes; international collaboration in weak regimes (Oxley 1999; Colombo and Piva 2008; Phene and Tallman, 2012; Barros 2015; Zhang <i>et al.</i> 2017; Martinez-Noya and Garcia-Canal 2018)</p> <p>- Radical innovation; early-stage radical innovation (Ritala and Hurmelinna-Laukkanen 2009; Bouncken <i>et al.</i> 2017)</p>		

A focal firm that collaborates with partners at a large cultural or geographical distance will experience information asymmetry, which increases the chance that partners will appropriate a disproportionate share of the rents or resources from the IOR (Wang and Zajac 2007; Li *et al.* 2013; Niesten and Jolink 2018). Similar difficulties have been reported for collaborations with unfamiliar partners or partners with incongruent goals (e.g. Wang and Zajac 2007; Vafeas *et al.* 2016). An example is a focal firm that collaborates with universities, highlighting conflicting incentives: researchers driven by non-monetary incentives and a willingness to publish results and the firm driven by monetary incentives and a limited willingness to reveal information to competitors (Perkmann and Schildt 2015). Heightened risks of appropriation have also been expected for multilateral IORs characterized by a large diversity in partner contributions (Mitchell *et al.* 2002).

Coopetition is the phenomenon according to which competing firms cooperate with each other in order to create value and a bigger market, and then later compete for the created value (Ritala and Hurmelinna-Laukkanen 2009). The views of the focal firm and its competing partners may be aligned when they are collaborating to create value, but these views will diverge when value has to be captured. Competition with partners thus intensifies the tensions between value co-creation and appropriation (Ritala and Hurmelinna-Laukkanen 2009), because competitors have a great incentive to appropriate relational rents (Larsson *et al.* 1998; Jordan 2004; Oxley and Wada 2004; Lhuillery and Pfister 2009; Hallen *et al.* 2014; Bouncken *et al.* 2017). Research has also shown that a focal firm is aware of the tensions between value co-creation and value capture when its partners enter into relations with the firm's competitors (i.e. second-order competitors) resulting in an enhanced risk of knowledge spillovers (Hernandez *et al.* 2015).

Scarcity of resources

In the context of IORs, the scarcity of resources also leads to salient tensions between value co-creation and capture. Our review highlights that tensions are experienced by focal actors when they are small or young firms with valuable resources and collaborate with large firms (e.g. Kumar 2010; Diestre and Rajagopalan 2012; Mason and Drakeman 2014; Yang *et al.* 2014). On one hand, the young firms need the resources provided by established firms for value creation purposes; on the other hand, these collaborations imply putting their own resources at risk of appropriation (Diestre and Rajagopalan 2012). A related example is the lack of IPR knowledge by small firms and a high IPR awareness of big companies which puts the smaller companies at risk of appropriation (Rayna and Striukova 2010).

Salient tensions related to resource scarcity also arise when a firm's lack of financial resources negatively impacts its bargaining power. Adegbesan and Higgins (2010) show that firms with limited bargaining power collaborate with firms that capture more value from the IOR. Furthermore, scarcity-related tensions are experienced by firms that have valuable technologies, tacit resources or competences and that collaborate with partners that display a high intent to learn (Norman 2002; Jordan 2004). A focal firm that perceives the high learning intent of its partner will focus on protecting its own knowledge and resources, which may harm value co-creation in the IOR (Norman 2002).

Change

While our review identifies a plethora of factors related to plurality and scarcity that spur salient tensions between value co-creation and capture, considerably fewer factors related to change emerge from our review. One such factor concerns the creation of new value in IORs. Due to the uncertain outcome of changes in technology, it becomes complicated to separate intellectual property rights: “where creation or significant modification of technology is anticipated,

delineation of property rights is particularly problematic” (Oxley 1999, p. 285). The changes in technology will have consequences for the potential to capture relational rents from the co-created value. Challenges of separating also extend to knowledge, since isolating specific knowledge that is to be transferred to a partner may prove to be difficult due to e.g. its embeddedness in various practices and routines (see e.g. Martinez-Noya *et al.* 2013). Gillier *et al.* (2010) argue that preferences of partners can evolve during a collaborative project, and that firms should endeavour to keep collective interests alive and postpone the moment when partners split up to pursue their own preferences. In other words, these evolving preferences amplify the tension between joint value creation and individual value capture.

Compound factors: Settings of globalization, competition and technological innovation

Plurality, change and scarcity converge in settings of rising globalization, hypercompetition and technological innovation that result in a business climate with a heightened awareness of tensions (e.g. Cheung *et al.* 2010; Pendaries and Castaneda 2015). Table 2 has shown that several articles in our review analyse IORs in high-tech and bio-tech industries, and thus empirical contexts characterized by technological innovations. An example of intensified environmental conditions is that competing partners are more likely to behave opportunistically when they collaborate in the exploitation phase of a technology (Belderbos *et al.* 2014; Yami and Nemeih 2014), because knowledge is codified and explicit in this phase and therefore more easily appropriated (Daniels and Perez 2007; Li *et al.* 2008). Moreover, when knowledge configuration is easier to codify, salient tensions are likely to emerge (Allred and Swan 2014). Under a weak appropriability regime (Allred and Swan 2014) or in international collaboration settings characterized by weak institutional protection in foreign countries (Oxley 1999) paradoxical tensions related to value co-creation and capture become salient. Finally, Bouncken *et al.* (2017) show that the pre-launch phase of early-stage radical innovation

projects creates additional tensions over eventual value appropriation, due to the uncertainty over outputs to be safeguarded and the inefficiency of appropriability mechanisms in radical innovation.

Factors spurring vicious cycles

This section offers an overview of the factors that spur vicious cycles, and thus emphasize one of the paradox poles. Several studies point to various types of myopia, e.g. Möller *et al.* (2008) highlight that service production processes are viewed either from the provider's or from the customer's perspective, overlooking value created by both. Laursen and Salter (2006) emphasize the myopia of learning, where firms that have previously experienced unfavourable outcomes from partnering with external actors, place a (too) high emphasis on capturing value by focusing solely on internal resources (see also Levinthal and March 1993). Laursen and Salter (2006) also signal an overemphasis on external search, which they dub 'over-search'. In a similar vein, a study on the creative industry by Vafeas *et al.* (2016) illustrates that value diminution may result from actors focusing too much on value creation. Gander *et al.* (2007) emphasize that organisations are likely to race for learning, thus overlooking the potential of collaboratively creating value (see also Henning and Saggau 2013; West and Bogers 2014). Simpson and Vonortas (1994) pinpoint that in multi-member research joint ventures, members might limit their R&D efforts due to a collective market power, which means that value co-creation might be overlooked. Miranda and Kavan (2005) also signal asset-specific transactions and distributive conflict resolution as potentially conducive to vicious cycles: while the former makes a firm susceptible to opportunism by its partner, the latter inhibits the formation of close ties between partners, which may also lead to opportunistic behaviour. Leroux and Berro (2010) indicate that in public-private partnerships known quasi-rents that are stable over time are also likely to induce opportunistic behaviour in partners. Gattai and Molteni (2007) pinpoint

that merely operating closely, e.g. in a JV, could lead to unintended spillovers and even misappropriation.

Factors spurring virtuous cycles: acceptance and resolution of paradox

Table 4. Factors spurring virtuous cycles

<i>Governance mechanisms</i>	<i>Organizational capabilities</i>	<i>Appropriation strategies</i>
<p>- Contracts (Gulati and Singh 1998; Contractor and Ra 2002; Mol 2005; Deligonul <i>et al.</i> 2006; Gander <i>et al.</i> 2007; Dekker 2008; Li <i>et al.</i> 2008; Tiwana 2008; Belderbos <i>et al.</i> 2010; Hurmelinna-Laukkanen and Ritala 2010; Giannoupoulou <i>et al.</i> 2011; Bien <i>et al.</i> 2014; Phene and Tallman 2014; Yang <i>et al.</i> 2014; Lin <i>et al.</i> 2016; Aloini <i>et al.</i> 2017; Bouncken <i>et al.</i> 2017)</p> <p>- Joint ventures / equity sharing (Simpson and Vonortas 1994; Gulati and Singh 1998; Oxley 1999; Baiman and Rajan 2002; Contractor and Ra 2002; Mitchell <i>et al.</i> 2002; Jordan 2004; Daniels and Perez 2007; Li <i>et al.</i> 2008; Aggarwal and Hsu 2009; Oxley and Wada 2009; Phene and Tallman, 2012; Ho and Ganesan 2013; Bien <i>et al.</i> 2014; Phene and Tallman 2014; Ritala and Tidström 2014; Yang <i>et al.</i> 2014; Bouncken and Fredrich 2016)</p> <p>- Trust (Norman 2002; Jordan 2004; Miranda and Kavan 2005; Daniels and Perez 2007; Dekker 2008; Li <i>et al.</i> 2008; Aggarwal and Hsu 2009; Klein and Rai 2009; Cheung <i>et al.</i> 2010; Gillier <i>et al.</i> 2010; Romero and Molina 2011; Ho and Ganesan 2013; Schertzer <i>et al.</i> 2013; Bien <i>et al.</i> 2014; Pendaries and Castaneda 2015; Pérez and Cambra-Fierro 2015b; Lew <i>et al.</i> 2016; Murthy <i>et al.</i> 2016; Vafeas <i>et al.</i> 2016; Fisher and Qualls 2018); trust enhanced by spatial proximity (Bönte 2008)</p> <p>- Appropriability mechanisms, such as patents and IPRs (Gulati and Singh 1998; Baiman and Rajan 2002; Katila and Mang 2003; Jordan 2004; Mol 2005; Lhuillery 2006; Chesbrough and Appleyard 2007; Daniels and Perez 2007; Sawers <i>et al.</i> 2008; Aggarwal and Hsu 2009; Ritala and Hurmelinna-Laukkanen 2009; Giannoupoulou <i>et al.</i> 2011; Kyläheiko <i>et al.</i> 2011; Ceccagnoli <i>et al.</i> 2012; Hsieh <i>et al.</i> 2012; Huang <i>et al.</i> 2013; Leten <i>et al.</i> 2013; Huang <i>et al.</i></p>	<p>- Joint venture capabilities; experience with IORs; relational competences; communication quality in IOR; external capabilities (Gander and Rieple 2002; Sawers <i>et al.</i> 2008; Aggarwal and Hsu 2009; Lhuillery and Pfister 2009; Gillier <i>et al.</i> 2010; Kumar 2010; Kohtamäki <i>et al.</i> 2013; Mani and Barua 2015; Walter <i>et al.</i> 2015; Hughes-Morgan and Yao 2016; Vafeas <i>et al.</i> 2016; Fisher and Qualls 2018)</p> <p>- Partner-specific experience (Katila and Mang 2003; Dekker 2008; Cheung <i>et al.</i> 2010; Yami and Nemeah 2014; Mani and Barua 2015; Grafton and Mundy 2017)</p> <p>- Downstream capabilities and commercial capital; supplier development; interfirm IT capabilities (Ceccagnoli <i>et al.</i> 2012; Huang <i>et al.</i> 2013; Hughes-Morgan and Yao 2016; Kull and Ellis 2016; Rai <i>et al.</i> 2012)</p> <p>- Absorptive capacity (Hurmelinna-Laukkanen <i>et al.</i> 2012; Wu <i>et al.</i> 2013; Hoppmann 2018)</p>	<p>- Interactive revealing (Jarvenpaa and Välikangas 2014)</p> <p>- Gradual revealing without complete disclosure; selective revealing (Henkel 2006; Hörner and Skrzypacz 2010; Miceli 2011)</p> <p>- Structuring the partnership as boundary organisation and using mediated revealing (Perkmann and Schildt 2015; Ryan and O'Malley 2016)</p> <p>- Dual value appropriation (Pérez and Cambra-Fierro 2015a; 2015c)</p> <p>- Intended and unintended knowledge leaks for delayed value capture (Pisano 2006; Yang <i>et al.</i> 2010; Alnuaimi and George 2016; Fillippetti and Dippolito 2017)</p> <p>- Openness strategies (Wu <i>et al.</i> 2013; D'Antoni and Rossi 2014); open and closed strategy for early and later stages in life cycle (Appleyard and Chesbrough 2017)</p> <p>- Matching the type of partner with scope of the IOR (Jordan 2004; Li <i>et al.</i> 2008; Liu <i>et al.</i> 2014), appropriation mechanism (Leiponen and Byma 2009; Henttonen <i>et al.</i> 2016), and type of R&D (Caloghirou <i>et al.</i> 2003)</p> <p>- Patent pools for small firms; co-patenting (Rayna and Striukova 2010; Belderbos <i>et al.</i> 2014)</p> <p>- Interdependence in contract negotiation; Limiting the relationship to independent and non-specific assets (short-term) or developing relationship-specific and complementary assets (long term) (Miranda and Kavan 2005)</p>

2014; Laursen and Salter, 2014; Park and Lee 2015; Wang *et al.* 2015; Miozzo *et al.* 2016; Rassenfosse *et al.* 2016; Veer *et al.* 2016; Aloini *et al.* 2017; Bolivar-Ramos 2017; Bouncken *et al.* 2017; Freel and Robson 2017; Zobel *et al.* 2017)

- **Strong appropriability regimes** (Kim 2004; Kasch and Dowling 2008; Lhuillery and Pfister 2009; Gallié and Roux 2010; Hurmelinna-Laukkanen *et al.* 2012; Henttonen *et al.* 2016; Bahemia *et al.* 2017)

- **Combining governance and appropriability regimes** (Gulati and Singh 1998; Barros 2015; Miozzo *et al.* 2016)

- **Commitment to R&D investments in IOR and maintaining balance between cooperation and competition** (Walters *et al.* 2011; Baglieri *et al.* 2016); **strategic orientation** (Cheng and Huizingh 2014)

- **Combination of protective strategy and absorptive capacity** (Laursen and Salter 2014)

The factors identified here as enabling virtuous cycles are ones that allow actors to focus on both value co-creation and value capture. Managers use different mechanisms and strategies to accept and resolve the paradoxical tensions of value co-creation and capture in IORs. We have categorized these into (1) formal and informal governance mechanisms; (2) organizational capabilities; and (3) appropriation strategies (see table 4).

Governance mechanisms

Firms use different formal and informal governance mechanisms to deal with the paradoxical tensions of simultaneously co-creating and capturing value. Formal governance mechanisms include contracts and joint ventures in which equity is shared between the partners (Contractor and Ra 2002; Bien *et al.* 2014; Phene and Tallman 2014). Joint ventures, for instance, promote knowledge sharing and close knowledge integration, while at the same time protecting core technologies from appropriation (Li *et al.* 2008; Yang *et al.* 2014). They are able to manage changes in the scope of an IOR, and thus resolve the tensions that these changes create (Oxley 1999). Trust, as an informal governance mechanism, improves the ability of firms to reap the

returns from innovation and to lower the chance of misappropriation and loss of strategic knowledge (Jordan 2004; Dekker 2008; Aggarwal and Hsu 2009).

Firms also rely on the protection of patents to deal with the simultaneous pursuit of value co-creation and appropriation in an IOR (Katila and Mang 2003; Lhuillery 2006; Aggarwal and Hsu 2009; Ceccagnoli *et al.* 2012; Leten *et al.* 2013; Bouncken *et al.* 2017). In circumstances of strong institutional conditions, strong appropriability regimes are found to enable virtuous cycles (Kim 2004; Kasch and Dowling 2008; Lhuillery and Pfister 2009; Gallié and Roux 2010; Hurmelinna-Laukkanen *et al.* 2012; Henttonen *et al.* 2016). Gulati and Singh (1998) show that firms make trade-offs between the appropriability regime of an industry and formal governance mechanisms, such as contracts and joint ventures. In an industry with a strong regime (i.e. patent protection is significant) firms use less hierarchical governance mechanisms, but a weak regime urges firms to choose more hierarchical forms of governance (Gulati and Singh 1998). Other studies have focused on similar trade-offs (Barros 2015; Miozzo *et al.* 2016). Miozzo *et al.* (2016) emphasize that knowledge-intensive business services generally focus on ‘modest levels of formal appropriability’, yet enforce patent protection, in spite of its low effectiveness.

Organizational capabilities

A number of scholars argue that firms with particular organizational capabilities, such as joint venture experience and capabilities, partner-specific experience, downstream capabilities, commercial capital, IT capabilities and absorptive capacity, are better able at managing the tensions between value co-creation and capture (e.g. Jordan 2004; Aggarwal and Hsu 2009; Lhuillery and Pfister 2009; Kumar 2010; Hurmelinna-Laukkanen *et al.* 2012; Hughes-Morgan and Yao 2016).

Firms with joint venture experience and capabilities can strike the right balance

between divulging knowledge on the one hand and protecting it from appropriation on the other (Kumar 2010). They are also able to anticipate various contingencies and pre-emptively prevent a partner from appropriating resources (Kumar 2010). Firms with partner-specific experience have greater knowledge of their partners' operating procedures and they share a larger amount of similar knowledge with their partners (Katila and Mang 2003). The overlapping knowledge and experience bases will help in the future absorption of each other's ideas and stimulate the sharing of tacit knowledge (Katila and Mang 2003). Prior collaborations, especially if they are still ongoing, also alleviate salient tensions in IORs; the payoffs to opportunism in the current collaboration— such as stealing tacit knowledge—are lower because the continued gains in all of the other collaborations would be at risk (Katila and Mang 2003; Dekker 2008).

In addition, firms with strong downstream capabilities or commercial capital (i.e. the capabilities to manufacture, market and distribute products) are able to co-create value and at the same time protect themselves from misappropriation, because these capabilities are specialized skills that are not easily transferred to other products (Ceccagnoli *et al.* 2012). They are difficult to codify and therefore difficult to imitate by partners (Ceccagnoli *et al.* 2012). Hughes-Morgan and Yao (2016) show that firms with commercial capital and a favourable network position are better at appropriating rents, spotting opportunistic behaviour of partners and discouraging involuntary knowledge leakage to partners.

Finally, Hurmelinna-Laukkanen *et al.* (2012) investigate the role of absorptive capacity in both IOR and firm success, with IOR success being indicative for value co-creation and firm success for value capture. Their results indicate that diverging effects emerge regarding IOR and firm success; stability and absorptive capacity are most relevant for the former, and absorptive capacity and appropriability for the latter.

Appropriation strategies

Different appropriation strategies include interactive, gradual or mediated revealing; dual value appropriation; intended knowledge leaks for delayed value capture; choosing a different scope of the IOR or appropriation mechanism for different types of partners; and patent pools.

Interactive revealing refers to using different types of knowledge sharing for creating opportunities versus appropriating value (Jarvenpaa and Välikangas 2014). Company participants may reveal the problem area but protect the company context, or they may reveal emergent solutions but protect strategic intent. They have different ways of realizing interactive revealing, such as abstracting by discussing the generic issue or distancing by taking a very long temporal perspective and stepping outside the company's view (Jarvenpaa and Välikangas 2014). Miceli (2011) proposes a gradual revealing of information about an invention, enough to incentivize external actors without complete disclosure. This resolution is possible in cases where knowledge that is disclosed is 'verifiable and divisible' (also citing Hörner and Skrzypacz 2010). In open data collaborations between firms and universities, Perkmann and Schildt (2015) show that firms employ boundary organisations to pursue a similar type of strategy with the goal of minimizing the risk of unintended knowledge spillovers. The boundary organisations engage in mediated revealing, which entails aggregating and anonymizing information before it is passed on to another party (Perkmann and Schildt 2015).

Dual value appropriation is another strategy to resolve the tensions, because it allows partners to jointly create value but each firm assumes full appropriation of a different and unique value created in the IOR (Pérez and Cambra-Fierro 2015b; 2015c).

Some studies discuss an apparent focus on value co-creation, as is illustrated by Pisano (2006) in an example of a pharmaceutical company publishing a gene sequence database together with a university. The publication of this database is in sharp contrast to the majority of pharma companies, who were trying to secure future value capture by investing heavily in

patents. Even though this example seems to point towards a vicious cycle with its apparent emphasis on value co-creation, Pisano (2006) explains that the pharma company chose this particular strategy to eliminate risks of being blocked by competitors through patents (whereas by publishing the gene sequence database, further knowledge that would build on it would remain public). These studies point out that knowledge leakage may thus be favourable for future value appropriation by the originator firm, or to establish long-term relationships with partners (Yang *et al.* 2010; Fillipetti and Dippolito 2017). Appleyard and Chesbrough (2017) also show that firms consider time when managing tensions between value co-creation and capture, relying on open strategies in the early stages of the life cycle of an innovation and closed, proprietary strategies in later stages.

Another strategy that managers use to deal with the tensions between value co-creation and appropriation is making trade-offs between scope of the IOR and partner selection (Jordan 2004; Li *et al.* 2008). When an IOR is organized between trustworthy partners, firms are more willing to engage in activities of broader scope in order to achieve a higher level of synergy. But when the scope is more focused, there is less need to select partners with strong-form trust to protect against knowledge leakage (Li *et al.* 2008). In the latter case, a clear IOR objective and a clear partitioning of tasks help facilitate joint working (Jordan 2004). Firms also use different appropriation mechanisms for different types of partners, and rely on secrecy for suppliers, on lead time for competitors, and on sharing of tacit knowledge with customers and publicly funded research organizations (Henttonen *et al.* 2016).

A further appropriation strategy signalled in our literature review is that of patent pools, which are particularly beneficial for small firms. Such firms experience lower chances of knowledge misappropriation as members of a patent pool (Rayna and Striukova 2010). In addition, Belderbos *et al.* (2014) find that co-patenting between private partners is more

difficult and challenging, in terms of co-creating-capturing value than co-patenting between private firms and universities.

Miranda and Kavan (2005) highlight that interdependence in contract negotiation enables sense-making and in turn “joint sense-making across organizational boundaries” is “likely to foster integrative efforts in resolving conflict” (ibid, p. 160). Hence, this could be seen as an appropriation strategy. The same authors also suggest a trade-off in IORs between short-term profit and long-term survival (see also Kogut and Zander, 1992). Therefore, a choice needs to be made between limiting the relationship to independent and non-specific assets (short-term) or developing relationship-specific and complementary assets (long term) (Miranda and Kavan 2005).

Further appropriation strategies include, according to Baglieri *et al.* (2016), commitment to invest in R&D from both IOR partners, as well as achieving a balance between collaboration and competition, or so-called *coopetition skills* (Baglieri *et al.* 2016). Combining a protective strategy and absorptive capacity (Laursen and Salter 2014) is also an appropriation strategy that can lead to virtuous cycles.

Factors spurring both virtuous and vicious cycles

Our literature review has identified factors, such as trust, patents, or R&D intensity that can spur virtuous and vicious cycles, depending on the extent to which these factors occur in the IOR (e.g. Bönte 2008; Li *et al.* 2008; Read *et al.* 2014; Gander *et al.* 2007; Stefan and Bengtsson 2016). The identification of this new set of factors makes a contribution to the Smith and Lewis framework by adding a new type of dynamics (see figure 2).

Even though trust encourages knowledge exchange in IORs with both competing and non-competing partners, high levels of trust increase risks of opportunistic behaviour particularly in collaboration with competitors (Jiang *et al.* 2016). The overemphasis on trust

indicates a choice to focus on value co-creation, while overlooking aspects of value capture. Therefore, trust is a factor that can spur both virtuous and vicious cycles, depending on its extent. A similar argument has been brought forward by Hernandez *et al.* (2015), who argue that trust operates as a virtuous cycle for bilateral relations, but can turn into a vicious cycle when partners in the bilateral relations begin forming ties with rivals. Longo and Giaccone (2017) also propose that trust can change from a virtuous to a vicious cycle, but only when partners in a trust relation are confronted by formal control tools that may spur opportunistic behaviour by one of the partners.

While many studies point to the beneficial effects of patents in appropriating benefits (Katila and Mang 2003; Ceccagnoli *et al.* 2012; Bouncken *et al.* 2017), there are also some that pinpoint patents in particular have weak if not negative effects in allowing firms and other organisations to benefit from innovation (Dosi *et al.* 2006). It is argued that by hindering other actors to use ideas (protected by specific patents) in environments strongly characterized by complementarity, patents slow down innovation (Dosi *et al.* 2006) thereby emphasizing a sole focus on value capture and neglecting value co-creation.

A similar argument can be made for the R&D intensity of firms, which can lead to either virtuous or vicious cycles. Firms with a high R&D intensity are more likely to create and capture value in collaboration with others and thus promote virtuous cycles (Spithoven *et al.* 2010). Katila and Mang (2003) have provided two reasons for this: in terms of value creation R&D-intensive firms are better at articulating their ideas; and in terms of value capture, these firms are more likely to devote more resources and experience to protect their core competences (Katila and Mang 2003). Protection does not have to involve formal appropriation mechanisms, but can result from inimitable firm-specific technological knowledge (Hashai and Almor 2008). On the other hand, firms with low or intermediate levels of R&D intensity are more likely to postpone collaborating with others or to integrate activities inside the firm, thus

potentially leading to vicious cycles with an emphasis on capturing value inside the firm and no collaborative value co-creation (Katila and Mang 2003; Hashai and Almor 2008). The findings by Wadhwa *et al.* (2017) on extramural R&D (i.e. investments in acquiring knowledge of a partner) and employee retention strategies are in line with the above studies. They show that when the degree of extramural R&D is low (high), the innovation benefits that accrue from extramural R&D to firms that engage in employee retention strategies are lower (higher) compared to those firms that do not (Wadhwa *et al.* 2017). This illustrates that appropriation mechanisms (such as employee retention) intended to combine value co-creation and protection against knowledge leakage may harm value capture from innovations, but only under conditions of low extramural R&D.

Simpson and Vonortas (1994) argue on one hand that research JVs aid member firms to capture value (which they would otherwise not be able to appropriate independently); on the other hand, research JVs enable firms to reduce R&D efforts, which would hamper value (co)creation.

According to Miranda and Kavan (2005) time is also a factor with contrasting roles: short-term relationships bring uncertainty and risk, yet at the same time several studies reviewed by Miranda and Kavan (2005) endorse short-term contracts between clients and providers as more successful; long-term relationships deepen the sense of commitment between partners, but they also provide more control to the provider, particularly in the case of exclusive contracts. Miranda and Kavan (2005) further pinpoint a shared identity between IOR partners as a factor with a dual role: on one hand fostering learning and collaboration, on the other hand hampering exploration. Ritala and Hurmelinna-Laukkanen (2009) emphasize both the increased risks associated with coopetition, as well as its unparalleled potential in incremental and radical innovation as another factor that may lead to either vicious or virtuous cycles.

Discussion

The main purpose of our study has been to re-assess existing literature on tensions in IORs by applying a paradox dynamic equilibrium framework of Smith and Lewis (2011). Our review responds to several calls for research related to identifying underlying causes as well as potential resolutions for value creation-value capture hazards in inter-organisational collaboration settings (Kivleniece and Quelin 2012; Jiang *et al.* 2013). By applying a paradox theory framework our literature review achieves a synthesis of factors related to salient tensions between value co-creation and capture, and factors spurring either vicious or virtuous cycles, or both, depending on their intensity. However, our findings raise some questions or issues which require further discussion. These will be considered in relation to the categories of factors that our study set out to identify. Additionally, our discussion will address the fourth category of factors that may lead to either vicious or virtuous cycles depending on the factor's intensity. We will link our discussion to future research suggestions.

A focus on change and compound factors that spur salient tensions

Smith and Lewis (2011) pinpoint factors that make tensions salient (i.e. plurality, scarcity and change, as well as settings of hypercompetition, globalization and technological innovation). Our findings point out that these four categories are rather uneven, i.e. some subcategories are studied more extensively than others. The 'change' subcategory includes very few contextual factors, linked, for instance, to the changing and uncertain nature of specifying future technological outcomes in IORs (Oxley 1999). According to Smith and Lewis (2011), the 'change' subcategory is rooted in conflicts between short-term and long-term requirements. The deficiency of change-related factors that emerge from our review may be linked to the scarcity of longitudinal studies, which might better delineate short-term and long-term needs. We therefore suggest that future research devote more attention to the way change-related

factors shape paradoxical tensions between value co-creation and value capture. The compound factors category includes slightly more factors than the change category, yet still much fewer than the first two categories, plurality and scarcity. Focusing on combinations of factors in future research would help identify potential configurations of salient scenarios, which would in turn aid in gaining a deeper understanding of value co-creation-appropriation tensions in IORs.

A focus on vicious cycles

Vicious cycles are promoted by factors that favour one of the paradox poles to the detriment of the other (Smith and Lewis 2011). Here there is a disparity, as we identify a total of nine factors that lead to vicious cycles, as opposed to 22 factors that lead to virtuous cycles. While it is positive that potential solutions for effectively managing value co-creation-capture tensions prevail, we suggest that there might also be a dark side in the scarcity of studies that investigate factors leading to vicious cycles. This shortcoming could be related to the insufficient focus on mismanagement, particularly bearing in mind that in some cases it is the *same* factors that may lead to either virtuous or vicious cycles depending on their intensity - as emerges from our review but is also pinpointed in e.g. the study by Capaldo and Petruzzelli (2011).

Future research should pay more attention to the difficulties firms face in managing tensions in IORs and what leads them to focus on one of the two paradox poles. The marketing literature on IORs is well placed to contribute to this research, given their recent focus on antecedents of value co-destruction or value diminution (e.g. Vafeas *et al.* 2016). Some examples of these antecedents are misintegration and misuse of resources (Plé and Chumpitaz Cáceres 2010; Plé 2016) and inadequate communication and coordination between partners (Vafeas *et al.* 2016).

A focus on conflicting results and links between vicious and virtuous cycles

A noteworthy issue in our findings is that some results appear contradictory. One example is that, on one hand, collaboration (specifically co-patenting) with universities appears to lead to virtuous cycles (Belderbos *et al.* 2014), on the other hand, collaborating with universities spurs conflicting incentives due to contradictory perspectives on publishing knowledge (Perkmann and Schildt 2015), thus indicating salient tensions related to plurality. We offer a tentative explanation that co-patenting may be less cumbersome with universities due to aligned incentives, but other appropriation mechanisms, such as secrecy, expose the conflicting incentives. Another example is that in our review a total of 21 studies view trust as a factor that helps alleviate tensions between co-creating and capturing value, and thus spurring virtuous cycles (e.g. Aggarwal and Hsu 2009; Li *et al.* 2008; Romero and Molina 2011), yet seven studies draw attention to the potential double role of trust, i.e. leading to either vicious or virtuous cycles, depending on its intensity. Generally speaking, the articles in our review seem to underemphasize the double role that factors may play. Other factors, such as contracts, equity or capabilities, may spur either virtuous or vicious cycles, depending on their intensity. We suggest that future research pays more attention not only to types of factors and their effects, but also to their intensities and/or extent. This could be a subtle but very important delineation that differentiates between failure and paradox resolution.

Aside contradictory findings, we also identify potential novel liaisons in the dynamic equilibrium framework by Smith and Lewis (2011). Specifically, we find a few studies that seem to indicate ways back and forth between vicious and virtuous cycles. Several point to ways of exiting vicious cycles and reaching virtuous cycles. For instance, Baiman and Rajan (2002) suggest that when confronted with high risks of opportunism in buyer-supplier IORs, buyers and/or suppliers may need to waive efficiency benefits (e.g. limiting revealed

information) to deal with potential misappropriation. Leroux and Berro (2010) show that in biotech clusters local institutions had a regulatory role and reduced opportunistic behaviour. Hernandez *et al.* (2015) demonstrate that firms embed themselves in a dense network of IORs in which social monitoring reduces the chance of misappropriation to move from vicious to virtuous cycles. Vafeas *et al.* (2016) argue that a renewed focus on value co-creation to move from vicious to virtuous cycles can be achieved by training partners and colleagues in how to manage IORs. There are also examples of pathways from virtuous to vicious cycles. Longo and Giaccone (2017) propose that trust can change from a virtuous to a vicious cycle, but only when partners in a trust relation are confronted by formal control tools that may spur opportunistic behaviour by one of the partners. Unlike the dual role factors category that we add to the Smith and Lewis' (2011) framework, the evidence on the linkages to and from vicious to virtuous cycles is too limited to add new categories of factors. However, future studies should investigate more closely potential paths from vicious to virtuous cycles, but also contingencies in which organisations might move from virtuous to vicious cycles. This avenue for future research also has implications for paradox theory.

Advancing paradox theory

Aside from making a synthesis of factors that spur salient tensions and vicious and virtuous cycles in the case of value co-creation-value capture linkages in IORs, our study unravels two ways of contributing to the general dynamic equilibrium framework suggested by Smith and Lewis (2011), thereby advancing paradox theory. First, we identify a new category of factors, which lead to either virtuous or vicious cycles, depending on their intensity. This new category opens up a discussion for further complexities surrounding paradox resolution. If there are factors that can lead to either imbalance (and possibly failure) or balance (and thus resolution) based on how they are

calibrated, paradox frameworks should take these into account in a more explicit manner. A second and related issue that our study raises is that the current Smith and Lewis (2011) dynamic equilibrium framework does not include categories of factors that may lead from vicious to virtuous cycles, or vice-versa. Future research should investigate the conditions under which factors switch from balancing paradoxical tensions to failing paradox resolution.

Conclusions and implications

A first theoretical contribution of our article relates to applying a paradox theory framework of dynamic equilibrium to value co-creation – capture tensions, thus providing a comprehensive re-evaluation of extant literature on value co-creation and appropriation, which contributes to a better understanding of the paradox and ways of managing it. A second theoretical contribution concerns the extension of the dynamic equilibrium framework of Smith and Lewis (2011) by emphasizing a new category of factors that lead to either paradox resolution or failure to resolve the paradox, contingent upon their intensity.

Managerial implications of our review are of crucial importance, as our study points to a delicate balance required for managing the intricate tensions between value co-creation and capture. First, given the wide array of factors that create salient tensions between co-creating and capturing value, managers are cautioned not to dismiss the two paradox poles by applying a trade-off approach – in the presence of such factors, it is important to increase managerial efforts towards balancing value co-creation and capture. Second, managers should be guarded that specific factors, such as trust, may require calibration, as they could lead to either virtuous or vicious cycles, depending on their

intensity. This emphasizes the frailness of the balance between value co-creation and capture.

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