Trust and opportunism as paradoxical tension: Implication for achieving sustainability in buyer-supplier relationships

1. Introduction

The organization of the global economy has changed in significant ways during the past few decades, with huge implications for the relative fortunes of countries, industries, and firms (Dicken, 2014). Many firms have embarked on a process of vertical disintegration; instead of producing in-house they have outsourced a growing range of 'non-core' functions (Gereffi, Humphrey, & Sturgeon, 2005). As a consequence, for many firms, in particular large manufacturers, their overall environmental and social impact is largely determined not by their internal operations but their suppliers (Miemczyk, Johnsen, & Macquet, 2012). Relatedly, the typical governance structure of the value creation process has shifted from internal coordination to an often complex combination of contractual arrangements and trust-based relational governance (Poppo & Zenger, 2002).

These developments are of utmost importance as supply chains are not only involving key locales where many of the gravest occurrences of environmental pollution or labor standard violations happen (Hofmann, Schleper, & Blome, 2018); many firms have also expended huge efforts to reduce the impact their buyer-supplier relationships have on the natural environment as well as on the well-being of stakeholders (Dahlmann & Grosvold, 2017; Jira & Toffel, 2013). Firms can reap a range of benefits from a better management of sustainability in their buyer-supplier relationships, including cost savings and stronger brand recognition (Brammer & Walker, 2011). In order to realize these benefits, prior literature on managing sustainability in buyer-supplier relationships (Paulraj & Blome, 2017; Vachon & Klassen, 2008) has identified two core mechanisms firms can use: On the one hand, there is collaboration for sustainability between supply partners; collaboration is a core requisite to establish trusting and long-term relationships which are often needed to drive attention to sustainability in buyer-

supplier relationships (Hoejmose, Brammer, & Millington, 2012). On the other hand, there is the evaluation of supplier sustainability efforts by the buying firm through a range of processes and tools (Klassen & Vereecke, 2012), such as third-party certifications to ISO 14001 and SEDEX (Boyd, Spekman, Kamauff, & Werhane, 2007).

Collaboration-based mechanisms emphasize shared values, norms, and standards of expected behavior between firms, wherein the buying firm works collaboratively with its supply partners to reduce their environmental impact as well as improve their suppliers' capabilities (Bowen, Cousins, Lamming, & Farukt, 2001; Preuss, 2005). Evaluation-based mechanisms manage the relationship through monitoring and assessing of the environmental performance of the supply partner (Grosvold, Hoejmose, & Roehrich, 2014). However, here the danger of opportunism looms large: as firms find it difficult to monitor, let alone control the sustainability impacts of their suppliers across the supply chains, there is an incentive for suppliers to shirk on their commitments to environmental and labor standards (Soundararajan, Wilhelm, & Crane, 2021; Wilhelm, Blome, Bhakoo, & Paulraj, 2016). For example, Wilmar International, a Singaporean agribusiness company and major palm oil producer, who was amongst the first to pledge that it would end deforestation was at the time of writing accused by WWF to shirk on its commitments (Jong, 2020).

We suggest that the relationship between opportunism and trust, as well as their respective roles in ensuring sustainability collaboration and evaluation, can be fruitfully explored from the perspective of paradox theory. We argue that trust and opportunism indeed constitute a paradoxical contradiction, especially in the context of buyer-supplier relationships when seeking to achieve sustainability, as they pull the relationship in irreconcilable directions: the former stresses joint benefits that can be derived by the parties from the relationship taking a longer-term outlook, which leads to expectations of mutual interests being met and an increase in performance (Tangpong, Hung, & Ro, 2010); by contrast, the latter points out that

suppliers have an incentive to shirk, in particular where it is difficult for the buying firm to monitor their efforts and/or where the buyer requires suppliers to invest substantially in and/or improve/develop specific operational processes to meet sustainability requirements (Paulraj & Blome, 2017).

Early paradox studies used to focus on how contradictory tensions could be resolved (Poole & Van de Ven, 1989). Extended to our topic, trust and opportunism are seen as substituting for each other in the achievement of sustainability objectives in the buyer-supplier relationship. In other words, such a paradox resolution strategy would recommend the buying firm to either invest in trust-building mechanisms, such as taking an equity stake, or strengthening social ties between buyers and suppliers (Dahlmann & Roehrich, 2019), or, where this is not feasible, to demand adherence to more stringent monitoring tools of the supplier, like demanding their certification to (additional) sustainability standards or certification schemes (Grosvold et al., 2014). A newer strand in paradox theory, however, explicitly encourages managers and firms to instead embrace the tensions and to accept the underlying paradox (Lewis & Smith, 2014; Lüscher & Lewis, 2008). Extended to our topic, the question then becomes whether trust and opportunism could complement each other in the achievement of sustainability objectives; such a paradox acceptance strategy would seek to explore synergies that may arise from the continued coexistence of trust and opportunism.

In the context of the economic dimension of buyer-supplier relationships, Lado, Dant, and Tekleab (2008) indeed investigated the tension between trust and opportunism. In particular, they zoom in on the interaction effects between the two, showing that, for instance, trust can contain the potentially destructive effects of opportunism. We propose that the management of this tension is also of crucial importance for the management of sustainability challenges in buyer-supplier relationships. While trust has been positioned as vital in buyer-supplier relationships to drive collaboration as well as sustainability initiatives across the

supply chain (Paulraj & Blome, 2017), prior studies also pointed out that opportunism experienced in these relationships will have a detrimental effect on sustainability performance (Cheng & Sheu, 2012; Wilhelm et al., 2016).

Following from this line of argumentation, we pose the following research question: Do trust and opportunism in a buyer-supplier relationship act as substitutes or complements in realizing sustainability? We propose to answer this question by extending prior work on paradox theory to the management of sustainability challenges in buyer-supplier relationship, a timely topic for academia and practice alike. Thus, this study extends prior studies in two ways. First, this is one of the first empirical studies to investigate not only the separate, but also the joint effects of trust and opportunism, in inter-firm relationships. We build on the work by Lado et al. (2008), yet our study focusses specifically on the context of sustainability-related mechanisms as opposed to relationalism in general. Our study contributes to the literature that the trust and opportunism paradox unfolds differently in the sustainability domain, as opposed to the generalist view offered by Lado et al. (2008). In the area of sustainability, paradoxes of trust and opportunism have to be addressed differently due to a higher level of behavioral uncertainty. Second, the study utilized an under-researched perspective by adopting paradox theory to the management of sustainability challenges in buyer-supplier relationships. While much extant research has examined paradox at the level of the organization (Poole & Van de Ven, 1989), or the level of its (senior) management (Jarzabkowski, Lê, & Van de Ven, 2013), this paper pays heed to the fact that paradoxical tensions can critically appear at other levels too, not least at the inter-firm level.

2. Conceptual background

2.1 Sustainability management in buyer-supplier relationships

The severity of many environmental and social challenges is increasingly acknowledged; whether this applies to concern over poor labor standards of suppliers (Soundararajan & Brammer, 2018), or the effects of climate change in the form of intense storms, floods, fires or a sea level rise (Winn, Kirchgeorg, Griffiths, Linnenluecke, & Günther, 2011). Being characterized by tensions and trade-offs between various sustainability dimensions that operate at different levels in the buyer-supplier relationships as well as at different time scales (Hahn, Pinkse, Preuss, & Figge, 2015), such issues have been called 'grand challenges' (George, Howard-Grenville, Joshi, & Tihanyi, 2016), or 'wicked problems' (Reinecke & Ansari, 2016) that escape easy solutions. Firms' multiple stakeholders, including, for example, employees (Carter & Jennings, 2004) and governments (Amann, Roehrich, Eßig, & Harland, 2014), expect firms to address these sustainability challenges.

The literature on sustainability has over the last decades expended considerable effort on examining the conditions under which firms are willing to address sustainability challenges in their strategy and operations, such as capabilities (Paulraj, 2011) and business models (Freudenreich, Lüdeke-Freund, & Schaltegger, 2020) that foster engagement with sustainability or the role of pro-sustainability change agents within and beyond the firm (Dahlmann & Grosvold, 2017). With regard to (industrial) marketing, a strong research focus has been on identifying and targeting sustainability-minded consumers and customers (see e.g., Balderjahn, Peyer, Seegebarth, Wiedmann, & Weber, 2018; Kotler, 2011; Sheth, Sethia, & Srinivas, 2011). By contrast, the role of marketing in making supply chains more sustainable has received less attention. Here, Sharma, Iyer, Mehrotra, and Krishnan (2010) suggest that firms can follow two major objectives to make their value or supply chains more sustainable, to develop products that can be repaired or remanufactured or to manufacture only the exact amount of units that are required, i.e. they do not over-supply their markets in the first place. Operations and supply chain management (OSCM) as well as industrial marketing studies alike

have explicated that collaboration among partnering firms (e.g., between buyer and supplier) could help in realizing sustainability (Ellram & Murfield, 2019; Seuring & Müller, 2008).

2.2 Managing sustainability in buyer-supplier relationships: Trust and opportunism

Sustainability in buyer-supplier relationships has been examined in terms of two major mechanisms: (i) evaluation processes and tools (Klassen & Vereecke, 2012) firms deploy in order to manage and monitor sustainability-related practices and performance of their suppliers, not least to counter possible opportunism (Awaysheh & Klassen, 2010); and (ii) collaboration which may help to create more trusting relationships characterized by information sharing, flexibility, and solidarity (Bowen et al., 2001; Dahlmann & Roehrich, 2019; Preuss, 2005). While opportunism and trust in buyer-supplier relationships have been discussed in some detail on their own (Hawkins, Wittmann, & Beyerlein, 2008; Smeltzer, 1997; Villena & Craighead, 2017), in our study we explore the effect of the complex interaction of these two fundamental aspects on sustainability collaboration and evaluation.

Opportunistic behavior, which can be, for instance, examined theoretically through the lens of transaction cost economics (Williamson, 1979) and principal-agent theory (Eisenhardt, 1989), is defined as a firm exploiting its superior position to gain unilateral benefits at the expense of its partners (Das & Kumar, 2011). Opportunistic behavior, involving behavior such as lying, cheating, distorting information, and an active intention to violate contracts (Seggie, Griffith, & Jap, 2013; Wathne & Heide, 2000), is particularly relevant for buyer-supplier relationships, as buyer and supplier interests and/or information are rarely perfectly aligned (Aben, van der Valk, Roehrich, & Selviaridis, 2021; Handley, de Jong, & Benton Jr, 2019). In other words, partnering firms often have different and incompatible goals, which render opportunistic behavior likely (Bai, Sheng, & Li, 2016; Wang, Zhang, Wang, & Sheng, 2016). Prior work on inter-firm relationships has drawn out the negative effects of opportunism

(Lumineau & Oliveira, 2020) on performance and particularly sustainable performance (Wang, Li, Ross, & Craighead, 2013).

Alternatively, as espoused by relational exchange theory (Dyer, 1997; Macneil, 1980), trust is considered critical to the development of value-enhancing inter-firm relationships (Wang, Yeung, & Zhang, 2011). Indeed, greater trust can lead to significant performance benefits for both buyers and suppliers as they are incentivized to work more efficiently due to increases in information sharing and joint training (Zajac & Olsen, 1993). Prior studies on supply relationships have drawn out the overwhelmingly positive effects of trust on performance and especially sustainability performance (Gold, Seuring, & Beske, 2010; Vachon & Klassen, 2006b). More specifically, trust in buyer-supplier relationships supports sustainability collaboration (Gualandris & Kalchschmidt, 2016) and facilitates suppliers' sustainability evaluation (Grosvold et al., 2014). In other words, trust improves the adoption, management, and evaluation of sustainable practices in buyer-supplier relationships, because it ensures the willingness of suppliers to engage in sustainable practices (Canning & Hanmer-Lloyd, 2007).

Over the last two decades, prior studies have started to explore the interplay of control and trust (contractual and relational governance mechanisms) as two distinct, but possibly complementary, governance mechanisms in inter-firm relationships (Nooteboom, 1996; Poppo & Zenger, 2002; Roehrich, Selviaridis, Kalra, Van der Valk, & Fang, 2020; Yang, Zhou, & Jiang, 2011). The relationship and interaction between control and trust has been debated in prior studies with proponents arguing for a more substitutional or complementary relationship (Cao & Lumineau, 2015). It was not least the conceptual work by Das and Teng (1998) and the empirical study by Poppo and Zenger (2002) that led management scholars to adopt the argument that control and trust in relationships may actually complement each other. For example, contractual control may enhance trust to collaborate, and trust may support 'learning

to contract' as contracting parties learn to develop more effective contracts (Mayer & Argyres, 2004). Here, contracts support trust development through reducing information asymmetry between partnering firms (Aben et al., 2021; Poppo & Zenger, 2002).

2.3 Paradox theory and its applications

A paradox has been defined as "persistent contradictions between interdependent elements" (Schad, Lewis, Raisch, & Smith, 2016, p. 6). It consists of tensions between various aspects that "seem logical in isolation but absurd and irrational when appearing simultaneously" (Lewis, 2000, p. 760). In order to address these paradoxes, Poole and Van de Ven (1989) distinguished between four strategies: spatial separation, temporal separation, synthesis, and opposition. Using separation, firms seek to separate the competing yet co-existing demands or processes into different organizational sub-units, or address them one at a time (Miron-Spektor & Beenen, 2015). Applying a synthesis approach, they created a novel perspective, or solution, that unifies both elements of the paradox (Adler, Goldoftas, & Levine, 1999). However, since it is a defining aspect of a paradox that the tension between the competing elements is persistent, these three strategies – all aimed at resolving the paradox – may be thwarted when the paradoxical tension breaks open again. Hence a fourth strategy aims to "accept the paradox and learn to live with it" (Poole and Van de Ven, 1989, p. 566). Indeed, there has arguably been an evolution on the paradox literature from a focus on resolving tensions to the explicit encouragement that firms and managers should accept the tension and work through it (Gölgeci, Karakas, & Tatoglu, 2019). Overall, it has been widely established that firms can reap a high and long-lasting performance from embracing multiple, opposing forces simultaneously (Lewis & Smith, 2014).

Prior literature has applied paradox theory to both buyer-supplier relationships and the management of sustainability challenges (see the literature review by Zhang, Yalcin, and Hales

(2021)). For example, Gnyawali, Madhavan, He, and Bengtsson (2016) discussed the paradox of competition and cooperation in inter-firm relationships. Lado et al. (2008) investigated the tension between trust and opportunism in supply chains. While often seen as counteracting each other, these authors in particular hone in on the interaction effects between the two, showing that, for instance, trust can contain the potentially destructive effects of opportunism.

With regard to corporate sustainability, Hahn, Figge, Pinkse, and Preuss (2018) distinguished between a currently dominant business case approach to sustainability and a paradox perspective. They developed how environmental and social concerns only translate into corporate strategy and action when they promise to result in positive economic effects for the firm. In contrast to this reductionist logic, a paradox perspective seeks not to emphasize any dimension of sustainability over any other; rather, it invites firms to address competing sustainability objectives simultaneously. Hahn, Preuss, Pinkse, and Figge (2014) honed in on the cognitive foundations of the differences between the business case and the paradoxical logics and develop how managers with a paradoxical frame rather generate more ambivalent interpretations of sustainability issues as opposed to others that interpret such issues univalently as either conducive or not for their business. Case study research by Ozanne et al. (2016) provided empirical evidence to confirm these arguments; indeed, they found that the firms that were most successful in achieving triple-bottom-line results indeed applied the acceptance strategy, as suggested by paradox theory.

By comparison with corporate sustainability, the application of a paradox perspective to the management of sustainability challenges in supply relations is a "relative newcomer to supply chain management research" (Carter, Kaufmann, & Ketchen, 2020, p. 1859). Preuss and Fearne (2021) transposed the distinction in managerial cognition between the business case and the paradox logic to the management of supplier relations. They developed how various antecedents, such as working experience in different functional areas or in different industries,

leads managers to develop different cognitive framings of sustainability challenges. Regarding empirical studies into sustainability management in supplier relations, Zehendner, Sauer, Schöpflin, Kähkönen, and Seuring (2021) identified a number of paradoxical tensions surrounding sustainability management in supply relationships in the electronics industry, including a tension between the varying monitoring approaches OEMs require of their suppliers and the difficulties suppliers face in deploying all these standards or diverging understandings of sustainability between OEMs based in Europe or North America and, in particular, smaller suppliers in developing countries.

2.4 Trust-opportunism as a paradoxical tension

While these studies have made important contributions, there is one paradoxical tension that becomes very visible at the firm's boundary, the tension between trust and opportunism. The importance of this tension was stressed by Lado et al. (2008) in the context of economic performance in inter-firm relationships. Extending their argument, we suggest that this tension also has a crucial impact on the management of sustainability within buyer-supplier relationships. Specifically, when it comes to sustainability practices in buyer supplier relationships, the trust-opportunism tension is particularly salient due to high levels of both behavioral uncertainty and measurement ambiguity (Paulraj & Blome, 2017) – for example, product quality can be easily tested and monitored whereas standards for sustainability are less tangible (Wilhelm et al., 2016). While trust has been positioned as vital in buyer-supplier relationships to drive collaboration as well as sustainability initiatives across the supply chain (Grosvold et al., 2014; Paulraj & Blome, 2017), prior studies also pointed out that opportunism experienced in these relationships will have a detrimental effect on sustainability in supplier relationships (Cheng & Sheu, 2012; Wilhelm et al., 2016).

Though these two broader aspects and their individual impact on performance are well understood, what has not been rigorously evaluated are their joint effects. Therefore, we suggest that the impact of trust and opportunism on sustainable buyer-supplier relationships can fruitfully be analyzed from the perspective of paradox theory. Prior work on inter-firm relationships and sustainability has often positioned opportunism and trust as opposing concepts, and thus neglected to explore their possible interactions (an exemption is the study by Lado et al. (2008)). More recently, however, the literature on paradox has evolved from an emphasis on resolving the tension between trust and opportunism to stressing the potentially beneficial outcomes of paying attention to both at the same time. Extended to our topic, firms were previously encouraged to resolve the tension between opportunism and trust in buyer-supplier relationships; whereas our paper aims to encourage them to embrace the tensions instead and to accept the underlying paradox (Lewis & Smith, 2014).

A crucial first step is to understand whether firms and managers acknowledge a tension and then decide to embrace it (Hahn et al., 2015). Actors clearly have choices; even if they decide to forego opportunistic behavior in a high-trust scenario (or, for that matter, hold back on trust in a high-opportunism scenario), this does not mean that the paradox has ceased to exist. On the contrary, given the dynamic fashion in which paradoxical tensions are constructed and enacted, a tension can easily resurface again; in the long run, it may prove impossible to resolve it (Lewis & Smith, 2014). Taking into consideration the pervasive, ever-present nature of a paradox, the tension may eventually reappear with renewed intensity; in many cases it is not possible, perhaps not even desirable to resolve the tension, rather the underlying paradox requires ongoing active management (Abdallah, Denis, & Langley, 2011). In summary, prior studies position "the conventional view […] that within principal-agent exchange relationships, trust and opportunism tend to counteract each other" (Lado et al., 2008, p. 405); however, by

building on paradox theory we aim to also examine their joint effects on managing sustainability in buyer-supplier relationships.

3. Hypotheses Development

Since we are interested in studying the coexistence of trust and opportunism, our hypotheses do not focus on their individual effects. Our view of the interaction of these two factors does not follow the traditional contingency approach as well; instead, we adopt the response surface approach to hypothesize about their coexistence as this approach allows us to better understand the underlying synergies (see Lambert, Edwards, and Cable (2003) and Edwards (1994) for detailed reviews). We derive our hypotheses by focusing on the symmetry and the asymmetry lines given in Figure 1. As shown in Figure 1, along the asymmetry line, trust is initially low and opportunism is high (at the left end); they move in opposite directions when proceeding to the right of the asymmetry line and finally trust is high and opportunism is low. In other words, the asymmetry line reflects an increase in trust and a simultaneous decrease in opportunism – adhering to the widely held notion that trust and opportunism are two ends of the continuum. In terms of paradox theory, this signifies a resolution strategy; the existence of the paradox is ignored and/or resolved. By contrast, along the symmetry line, trust and opportunism are both low at the beginning and increase as we move along this line. In effect, there is a simultaneous increase in trust and opportunism along the symmetry line – wherein the coexistence of trust and opportunism are accepted and firms attempt to live with it through the adoption of appropriate management practices. In terms of paradox theory, this reflects an acceptance strategy.

[Please insert Figure 1 about here]

3.1 Sustainability collaboration

The complex nature of many supply chain transactions, especially when trying to address sustainability issues, requires the formation of long-term, collaborative buyer-supplier relationships (Roehrich, Hoejmose, & Overland, 2017). The effect of the traditional "continuum" view of opportunism and trust has been extensively documented by TCE and relational exchange theory respectively. As espoused by TCE, an increasing level of opportunism could expose the exchange partners to increased uncertainty as well as exchange risks. Accordingly, high levels of opportunism could proscribe the use of relational mechanisms such as sustainability collaboration (Lado et al., 2008). Alternatively, high levels of trust could provide a conducive climate for the development of value-enhancing collaborative relationships between supply partners (Lewicki, McAllister, & Bies, 1998). In effect, when trust increases and opportunism decreases, there will be a corresponding increase in sustainability collaboration. It can be argued that the increasing level of trust along the asymmetry line could outweigh any negative effects that might arise from any minor opportunistic behavior by the supply partner. This is likely to be the case where trust already exists as it will facilitate more sustainability collaboration; in other words, an abundance of trust will ensure that relational rents do not dissipate through opportunistic behavior. From a transaction cost perspective, reduced opportunism would also mean increasingly repeated transactions over time, thereby leading to long-term collaborative exchanges between the supply partners.

We argue that trust and opportunism can have joint effects on sustainability collaboration. Due to the complexity of supply chains as well as the multitude of sustainability practices, we suggest that sustainability collaboration will emerge in particular at the extreme ends of the trust/opportunism spectrum (i.e., symmetry line), when trust and opportunism are either both low or both high in the buyer-supplier partnership. When trust and opportunism are both high, the presence of trust – which has emerged over time – can make a commercial

collaboration relatively robust against opportunistic behavior (Lumineau & Oliveira, 2020), and one would expect a similar constellation for sustainability collaboration. Following a relational exchange theory perspective, shared values, norms and standards of expected behavior between firms, which have developed through social interactions (Liu, Luo, & Liu, 2009), might nonetheless play a significant balancing role at higher levels of trust, thereby leading eventually to an increase in collaboration for sustainability as both trust and opportunism increase. This could be attributed to the fact that higher levels of trust may create common goals as well as shared interests which then helps the exchange partners to increasingly tolerate intermittent periods of inequity in the relationship (Wilkins & Ouchi, 1983). In other words, if a solid level of trust is reached, opportunism might no longer have a dissipating effect on relational mechanisms. Having said this, when trust and opportunism are at moderate levels, trust might not be robust enough to overcome the detrimental effects of even moderate levels of opportunism. Accordingly, as conjectured by Lado et al. (2008), such a situation could make it extremely difficult for partners to maintain an increased level of sustainability collaboration. On the contrary, it is quite possible that more collaborative behavior could emerge when neither trust nor opportunism are present, as is typically the case at the relationship outset. Given that both trust and opportunism are low, in this situation the focal firm might simply rely on the partner not only given the fact that there are low levels of opportunism, but also since this reflects a "normal working relationship" (Lado et al., 2008). Additionally, in such a situation, supply partners need not be watchful of each other (Lewicki et al., 1998). Based on these arguments, we hypothesize the following:

> H_{1a}: *"As trust increases and opportunism decreases, sustainability collaboration will increase. Thus, there will be a linear effect (positive slope) along the asymmetry line."*
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> H_{1b}: *"As trust and opportunism both increase, sustainability collaboration will initially decrease, then it will increase. Thus, there will be a U-shaped curvature along the symmetry line."*

3.2 Sustainability evaluation

Extant research has highlighted valuable business opportunities (Dahlmann & Roehrich, 2019), but also stressed the significant legal, strategic, and operational barriers in terms of engaging partners in sustainability activities (Hoejmose, Roehrich, & Grosvold, 2014; Vachon & Klassen, 2006a). SSCM is concerned with processes and tools deployed by firms to implement sustainability practices along their supply chains. Among others, these tools include codes of conduct (Preuss, 2010), certifications, rewards and penalties (Pedersen & Andersen, 2006).

Prior research has yet to offer a clear understanding of the joint effects of trust and opportunism on how supplier initiatives to engage with sustainability are evaluated by the buying firm. As for the asymmetry line, when opportunism is high and trust is low, the focal firm might be extremely wary of the exchange partner's behavior. Accordingly, it will put appropriate monitoring mechanisms in place to ensure satisfactory sustainability behavior and performance. Alternatively, as trust increases with the simultaneous reduction in opportunism, supply partners will start to know each other "sufficiently well so that the other's behavior is anticipatable" (Lewicki & Bunker, 1996, p. 121). When trust is high, partners tend to understand each other's desires and intentions, and are more than likely to look even beyond some minor acts of opportunism in sustainability practices (Lewicki & Bunker, 1996). In other words, the need to monitor and evaluate the supply partner will be reduced; rather than relying on monitoring, the intentions of the partner, as gleaned from the interaction history, will become a predictor for how serious the partner is about sustainability (Paulraj, Chen, & Blome, 2017).

When trust and opportunism both increase (along the symmetry line), one expects that sustainability evaluation will increase initially, as supply partners want to ensure that sustainability targets are met and that the partner does not engage in shirking behavior with regard to their environmental and social performance. While the argument here almost mirrors

that of sustainability collaboration, we suggest that the opposite effect occurs in the case of sustainability evaluation. In other words, as trust and opportunism both increase, monitoring will initially increase before the level of trust is sufficient enough to overcome the negative effects of opportunism. At moderate levels of trust and opportunism, the practice of sustainability evaluation could be at its peak as this situation may create a dilemma in the minds of the supply partners as the extent of trust would not be sufficient to overcome the negative effects of opportunism (Lado et al., 2008). This dilemma could be further exacerbated by the presence of behavioral uncertainty and measurement ambiguity related to sustainability practices (Paulraj & Blome, 2017). Accordingly, the lack of shared norms, belief, and values in the relationship may increase caution, and even create suspicion, thereby mandating a higher level of sustainability evaluation. Alternatively, as trust and opportunism both increase further, the relationship between the partners will become increasingly resilient in that the partners will overlook acts of opportunism with the ambition to focus on building value-enhancing relationships through trust and cooperation instead (Lewicki & Bunker, 1996). Additionally, higher levels of trust may further widen the "band of tolerance" for periodic acts of opportunism, thereby reducing the need to increase evaluation (Ouchi, 1980). Thus, we hypothesize:

> H_{2a}: *"As trust increases and opportunism decreases, sustainability evaluation will decrease. Thus, there will be a linear effect (negative slope) along the asymmetry line."*
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> H_{2b}: *"As trust and opportunism both increase, sustainability evaluation will initially increase, then it will decrease. Thus, there will be an inverted U-shaped curvature along the symmetry line."*

3.3 The moderating impact of relationship length

Following Levin et al. (2006), relationship length is a key contingency variable that shapes relationships in general, but particularly buyer-supplier relationships (Krause, Handfield, & Tyler, 2007; Terpend & Krause, 2015; Wagner, 2011). For example, relational norms take time

to emerge and do not take effect immediately. Additionally, as espoused by relational exchange theory, the length of the relationships has the unique ability to cast a "shadow of the past" wherein the history of prior interactions could create an environment within which various sustainable practices could thrive (Granovetter, 1985). In other words, relationship length could significantly influence the development of relational characteristics such as cooperation, commitment, as well as information sharing (Jap & Ganesan, 2000). Due to this "shadow of the past" firms can develop a better understanding on how the supply partner might behave in the future (Lewicki & Bunker, 1996), making it more likely that a trusting relationship continues. This provides theoretical arguments that trust can be sustained more easily in longer (mature) relationships, even in case of significant levels of opportunism, as the supply partners already know each other. However, in case of a shorter (younger) buyer-supplier relationship, trust can only be sustained in cases of relatively smaller levels of opportunism. On the same account, in younger relationships opportunism will not be able to overshadow out trust (Puranam & Vanneste, 2009).

Alternatively, mature relationships also have the unique ability to create a "shadow of the future" that is reflective of the expectation that the interactions could continue way into the future (Heide & Miner, 1992). Such an expectation could overshadow any ambitions of self-gain and facilitate cooperation that is focused more on mutual benefits. The expectation of a long window of future exchanges could also facilitate increased information exchange; the supply partners will not be wary of sharing private as well as tacit knowledge if it could benefit the partnership (Dyer & Singh, 1998; Poppo, Zhou, & Ryu, 2008). Therefore, the effects of trust and opportunism could be significantly different when a relationship experiences the "shadow of the future" (Heide & Miner, 1992; Poppo et al., 2008). In other words, given the role that the "shadow of the past" and the "shadow of the future" could play, we conjecture that the impact of trust and opportunism on sustainability collaboration and evaluation will be

significantly different for shorter (younger) and longer (mature) buyer-supplier relationships. Therefore, we hypothesize:

> H_{3a}: *"The length of the relationship will moderate the combined effects of trust and opportunism on sustainability collaboration."*
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> H_{3b}: *"The length of the relationship will moderate the combined effects of trust and opportunism on sustainability evaluation."*

4. Methodology

4.1 Data collection

Data were collected using a web-based survey targeting firms in Germany. More specifically, this study benefitted from communities of procurement and supply chain executives on Linkedin and Xing, two widely used business and employment-oriented online websites. These groups were chosen in order to generate a sample that contains executives of sufficient seniority and knowledge. At the time of writing, these groups had 16,000 German speaking members. As the questionnaire included firm-specific as well as relationship-specific factors, the study sampled individuals holding strategic positions within the purchasing function at a firm level (e.g., strategic procurement specialist, but not buyer). We restricted our sample to firms in the manufacturing and services sectors (SIC codes 31-33 and 47-49) as they represent the German industry very well (e.g., manufacturing, logistics). When collecting firm--specific information, we only kept one person per firm in the final sample and deleted individuals who were listed twice, finally arriving at a sample of 8,142. We then randomly selected a sample consisting of 1,400 individuals representing 1,400 firms. As we focused on German firms, our survey was conducted in German for clarity and response rate reasons; however, we also applied a rigorous process of translation and back-translation to enhance the reliability of the scales.

Furthermore, the questionnaire was reviewed by practitioners and supply chain professors; the questionnaire was modified based on their suggestions. Responses were

captured using a 5-point Likert scale, anchored at *strongly disagree* and *strongly agree*. The respondents were instructed to answer the supplier-related indicators with regard to their most significant supplier, based on dollar amounts and importance of materials purchased.

The data collection used a modified version of Dillman's (2007) total design method so as to maximize the response rate. We sent multiple reminder emails and followed up with non-respondents through telephone calls. We received a total of 259 usable responses out of 1,400, representing a response rate of 18.5%. Table 1 provides an overview of the industries represented in our study. We ensured that the respondents were appropriate by asking them two questions that assessed their knowledge as well as their confidence in answering the survey. The average for these two questions (knowledge and confidence) were 3.64 and 3.48 respectively, where 1 indicates 'not at all' and 5 indicates 'significantly'; the median value for both these questions was 4.0. Additionally, more than 60% and 50% of the respondents answered "4" or "5" for the question related to knowledge and confidence respectively. Based on these results, we can safely conclude that we used well-informed key respondents in our data collection efforts. As additional evidence, a majority of our respondents (56%) held senior positions (e.g., (vice) president, director).

[Please insert Table 1 about here]

4.2 Measures

Even though our constructs included indicators from past research, we adopted the q sort methodology to ensure the reliability of our survey instrument. We used a total of eight supply chain researchers and practitioners for this purpose. The inter-rater reliability was assessed using Perreault and Leigh's (1989) interjudge agreement. In our case, the final score was 81.1% which was far higher than the acceptable score of 65% (Moore & Benbasat, 1991; Stratman & Roth, 2002). The indicators used to measure the constructs are fully spelled out in Table 2. The respondents were asked to refer to a specific key supplier relationship while answering the

indicators measuring the theoretical constructs related to the buyer-supplier relationship. Following Lado and colleagues (2008), we operationalized *trust* as benevolence and credibility associated with dyadic trust. Here, we adapted the indicators from past literature (Lado et al., 2008; Nooteboom, Berger, & Noorderhaven, 1997; Sako & Helper, 1998). While the first indicator was adapted from Nooteboom et al. (1997), the second one was adapted from Sako and Helper (1998). Specifically, while Nooteboom et al. (1997) and Sako and Helper (1998) focused on the customer-side of the relationship, we adapted these measures to focus on the supplier-side instead. The other three indicators of trust were adapted from Lado et al. (2008). While Lado et al. (2008) operationalized these indicators within the context of principal-agent relationships, we adapted them to the buyer-supplier relationship context. In the case of *opportunism*, the items measured the extent to which the focal firm considers the behavior of its supplier to be opportunistic in nature (Katsikeas, Skarmeas, & Bello, 2009; Lado et al., 2008). While the third indicator measuring opportunism was adapted from Katsikeas et al. (2009), all other indicators were adapted from Lado et al. (2008). Katsikeas et al. (2009) studied the context of importer-foreign supplier and Lado et al. (2008) studied the context of principal-agent relationships; we adapted these measures specifically to the buyer-supplier context.

Supply-side sustainability collaboration measured the extent to which the focal firm cooperates with its suppliers as well as assists them in achieving their environmental goals (Paulraj & Blome, 2017; Vachon & Klassen, 2006a, 2008; Zhu & Sarkis, 2004). The first two indicators were adapted from Paulraj and Blome (2017) and Zhu and Sarkis (2004); specifically, we replaced the term "environmental" with "sustainability". The third item was adapted from Paulraj and Blome (2017); we replaced the term "materials, equipment, parts, and/or services" with "products and services". The fourth and fifth indicators were adapted from Vachon and Klassen (2006a); we just replaced the term "environmental" with "sustainability". We also included a new item that captures the extent to which the focal firm

provides feedback to the supplier regarding their sustainability performance; the extent of constructive feedback could reflect the extent of collaboration between partners (Field & Meile, 2008). *Supply-side sustainability evaluation* reflected the extent to which the focal firm regularly monitors suppliers' internal operations as well as products and processes with the intent of controlling their sustainability performance (Handfield, Sroufe, & Walton, 2005; Paulraj & Blome, 2017; Walton, Handfield, & Melnyk, 1998; Zhu & Sarkis, 2004). The first two indicators were adapted from Paulraj and Blome (2017); specifically, we replaced the term "environmental" with "sustainability". The third item was adapted from Zhu and Sarkis (2004); while the related item in the Zhu and Sarkis (2004) study focuses on "environmental audits for supplier's internal management", we modified it to reflect the use of "unannounced audits to check for supplier's sustainability". The fifth item was adapted from Vachon and Klassen (2006a); while the related item in the Vachon and Klassen (2006a) study related to "requiring" the suppliers to have implemented environmental management system, we changed it to "evaluating" the supplier based on the implemented system. We also included a new item that captures the use of a formal system to track sustainability performance of the supplier; a formal system that integrates operational procedures and processes could play a major role in influencing the sustainability behavior of the supplier (Handfield et al., 2005; Walton et al., 1998). During our pre-testing process, we asked the experts to comment on the new indicators used to measure sustainability collaboration and sustainability evaluation; specifically, we asked them to assess how these items fit with the others used to measure the theoretical constructs. Based on the feedback received, we retained these new indicators in our survey.

4.3 Non-response bias

Non-response bias was assessed by comparing early and late respondents (Armstrong & Overton, 1977). The sample was split into two groups based on the receipt date of the surveys

(while the early respondents group included 129 responses, the late respondents group included 130 responses). We randomly selected ten indicators along with company size and compared the two groups. These group comparison tests suggest that the two groups are not significantly different ($p < 0.05$). Furthermore, additional tests were conducted to check whether the responding firms are different from the overall population. Specifically, we randomly selected 200 of the non-responding firms and collected annual sales volume and number of employees by contacting them. The information on these 200 firms was added to the 259 responding firms to get the overall mean value. There were no statistical differences (at $p < 0.05$) between the sample and population values. Based on these results, we conclude that non-response is not a concern in our study.

4.4 Common method variance

First, we assessed common method variance using the Harman's single-factor test (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). A total of six factors with eigenvalues above 1.0 were extracted. While the total variance explained by all these factors was 70.33%, the first factor accounted only for 37% of the variance. Additionally, we found that a single factor model had significantly worse fit indices (CFI = 0.77, NNFI = 0.75, RMSEA = 0.17) when compared to our research model (Sanchez & Brock, 1996). As an added test, we tested for common method variance using the marker variable technique (Malhotra, Kim, & Patil, 2006) in which the marker variable was the second-smallest positive correlation among the measurement items. We partialled out the correlation coefficient of the marker variable from the zero order, statistically significant, correlations among the measurement items (Lindell & Whitney, 2001). The adjusted zero order correlations were all found to be statistically significant. In sum, we believe that CMB is a not an issue for our data.

4.5 Assessment of the measurement instrument

Before testing our hypotheses, we rigorously assessed the reliability and validity of our measurement items. Additionally, we also conducted tests to assess the assumptions of normality and constant variance. Mardia's (1970) test was adopted to test for multivariate normality. Given that the Mardia coefficient for this dataset (1.08) was within the recommended limits of -1.96 and 1.96, we concluded that our data exhibited multivariate normality. We also found that the plots as well as statistics did not indicate any significant deviances from assumptions. We used confirmatory factor analysis (CFA) to check for convergent validity and unidimensionality. The model fit indices surpassed the cut-off values (please refer to Table 2), thereby indicating that the indicators are unidimensional (Hu & Bentler, 1999). Convergent validity was also ensured by looking at the standardized coefficients and their significance.

[Please insert Tables 2 and 3 about here]

Discriminant validity was established using two different approaches. First, we built a constrained CFA model for every possible pair of latent constructs; in this constrained model, we fixed the correlations between the paired constructs to 1.0. Subsequently, we compared this model to the unconstrained model wherein the constructs were allowed to correlate freely. The χ^2 difference between these pairs of CFA models showed that the indicators exhibited discriminant validity (Bagozzi, Yi, & Phillips, 1991; O'Leary-Kelly & Vokurka, 1998). In addition, we compared the average variance extracted (AVE) of the constructs to the squared correlation between them (Fornell & Larcker, 1981). Comparing tables 2 and 3, we found that none of the AVE values were found to be lower than the squared correlations between the constructs, thereby providing further support for discriminant validity. Finally, we also used the Heterotrait-monotrait (HTMT) approach (Henseler, Ringle, & Sarstedt, 2015). The HTMT

values had a range between 0.190 to 0.661; as all the HTMT values were below 0.85, thus we safely concluded that our constructs exhibit discriminant validity.

Reliability was assessed by both using coefficients alpha and omega (Deng & Chan, 2017); additionally, we also used the composite reliability (CR) score to evaluate reliability (Bagozzi & Yi, 1988). The coefficient alpha, coefficient omega, and CR values of all the constructs were found to be greater than 0.80 (Table 2), thereby establishing reliability of all theoretical constructs. As suggested by Raykov and Shrout (2002), we assessed the confidence intervals of the coefficient alpha and coefficient omega. The lower limit of all these confidence intervals were above 0.80; specifically, while the lower limits of coefficient alpha were between 0.861 and 0.906, the lower limits of coefficient omega were between 0.848 and 0.904. Additionally, all AVE values were above 0.50. In sum, the results indicated that the theoretical constructs are reliable, valid, and unidimensional.

4.6 Hypothesis testing

The summary statistics and the correlation matrix for the theoretical constructs are provided in table 3. The scores for the theoretical factors were created by averaging the scores of the underlying indicators. We used a polynomial regression analysis involving interaction as well as curvilinear effects to test the first four hypotheses (H_{1a}, H_{1b}, H_{2a}, and H_{2b}). Since our analysis involved squared and interaction terms, we centered the scores by subtracting the scale mid-point, thereby producing scores that range from -2 to +2 (Cronbach, 1987). The centering of scores also ensured that the regression models involving both squared and interaction terms were free of multicollinearity. We tested for multicollinearity by examining the variance inflation factor (VIF) for all terms. All VIF values were lower than 3, well below the recommended cut-off point of 10, thereby confirming that multicollinearity is not a problem. The polynomial regression analysis was conducted in two steps. In step 1, we entered the trust

(TR) and opportunism (OP) constructs along with the control variables. In step 2, both the interaction term and the squared terms of TR and OP were entered into the model. In this study, we assessed the significance of slopes and curvatures along the symmetry and asymmetry lines of the response surfaces (Edwards & Parry, 1993; Myers, Montgomery, & Anderson-Cook, 2009). Details of this analysis are presented in Appendix A.

We tested the contingent effect of relationship length (H_{3a} and H_{3b}) using the moderated polynomial regression analysis suggested by Edwards (2014). Basically, this procedure involves the following model:

$$Z = b_0 + b_1\,TR + b_2\,OP + b_3\,TR^2 + b_4\,TR * OP + b_5\,OP^2 + b_6\,R + b_7\,R*TR + b_8\,R*OP + b_9\,R*TR^2 + b_{10}\,R*TR*OP + b_{11}\,R*OP^2 + e \quad (1)$$

In the above equation, R represents relationship length. The slope and curvature along the symmetry and asymmetry lines are calculated by taking into account the terms that also include the moderating term. We refer interested readers to Edwards (2014) for further details pertaining to the calculation of slopes and curvatures.

5. Results

Hypothesis 1 focused on how the coexistence of trust and opportunism impacted sustainability collaboration. More specifically, hypothesis H_{1a} predicted that as trust increased and opportunism decreased, sustainability collaboration will also continue to increase. In terms of paradox theory, this indicated the operation of a resolution strategy. The slope ($b_1 – b_2$) along the asymmetry line was indeed found to be positive and significant (0.378; $p < 0.05$), providing support for Hypothesis H_{1a}. Hypothesis H_{1b} predicted a U-shaped curvature (positive curvature) along the symmetry line. In terms of paradox theory, this would indicate the operation of an acceptance strategy, meaning that collaboration – after a turning point – will increase despite higher levels of trust and opportunism. However, the results in Table 4 (Model 1) showed that

the curvature ($b_3 + b_4 + b_5$) is not statistically significant (0.062; ns). Figure 2 (response surface on the left) presented the surface for these hypotheses.

[Please insert Table 4 about here]

Hypothesis 2 focused on how the coexistence of trust and opportunism impacted sustainability evaluation. Specifically, hypothesis H_{2a} predicted that, as trust increased and opportunism decreased, sustainability evaluation will continue to decrease. In terms of paradox theory, this would again indicate the operation of a resolution strategy. The asymmetry line's slope (0.110; ns) was found to be insignificant; hence hypothesis H_{2a} was not supported. Hypothesis H_{2b} predicted an inverted U-shaped curvature (negative curvature) along the symmetry line. In terms of paradox theory, this would again indicate the operation of an acceptance strategy. The results (Model 2 in Table 4) show that the symmetry line's curvature was significant (-0.547; $p < 0.05$). The result thus provides support for Hypothesis H_{2b}. Please refer to Figure 2 for the associated response surfaces (response surface on the right).

[Please insert Figure 2 about here]

The results for the moderated polynomial regression analysis are presented in table 4 (Models 3 and 4). While the change in R^2 in the case of sustainability collaboration (ΔR^2:0.062; $p < 0.05$) was found to be significant, the change in R^2 for sustainability evaluation (ΔR^2:0.037; $p < 0.10$) was only marginally significant. In other words, while hypothesis H_{3a} was supported, hypothesis H_{3b} was only marginally supported by our results. Nonetheless, these results suggest that the effect of trust and opportunism could be different when taking the length of the relationship into account. We assessed the significance of the slopes and curvatures by substituting meaningful values for R; we substituted mean minus and plus one standard deviation to check for the significance of the slopes and curvatures at shorter and longer relationship lengths respectively. Following Edwards (2014), we used the mean and one standard deviation of relationship length to also create the response surfaces at shorter (μ-σ)

and longer (μ+σ) relationships. These response surfaces for sustainability collaboration and sustainability evaluation are given in Figures 3. The response surfaces clearly show that the impact of trust and opportunism is significantly different in the cases of shorter (younger) and longer (mature) relationships.

[Please insert Figure 3 about here]

6. Discussion

Our study offers new theoretically informed and empirically tested insights on sustainability in buyer-supplier relationships with a particular focus on the joint effects of trust and opportunism. As with any paradox, the trust-opportunism paradox can either be 'resolved', or firms and their managers can seek to live with and work through the paradox (Lewis & Smith, 2014; Poole & Van de Ven, 1989). As pointed out earlier, many studies have applied the paradox theory to inter-firm relationships and sustainability management separately. While Gnyawali et al. (2016) and Lado et al. (2008) focus on paradoxical phenomena in inter-firm relationships, Hahn et al. (2014), Hahn et al. (2018), and Ozanne et al. (2016) apply the notion of paradox within corporate sustainability. Very few studies have adopted the paradox theory at the intersection of buyer-supplier relationships and sustainability management (Preuss & Fearne, 2021; Zehendner et al., 2021); our research contributes to this line of research. At the same time, while these studies are focused on the paradoxes inherent in sustainability management, our research focuses on how the paradoxical forces of trust and opportunism could impact the management of sustainability in buyer-supplier relationships We specifically extend the paper by Lado et al. (2008) and study the combined effects of trust and opportunism on sustainability-related mechanisms – sustainability collaboration and evaluation. Based on our results, we find that the existence of paradoxes impacts the level of sustainability evaluation and collaboration differently.

6.1 Theoretical contributions

Our study contributes further insights on how trust and opportunism act as substitutes or complements in buyer-supplier relationships achieving sustainability. Hypothesis H_{1a} had predicted that as trust increased and opportunism decreased, sustainability collaboration will continue to increase (resolution strategy). In line with our expectation, we found a linear relationship along the asymmetry line, demonstrating that in the case of a high levels of trust and low levels of opportunism, sustainability collaboration is highest along the asymmetry line. On the one hand, this finding adds insights to the "classical" substitution perspective of governance that argues that either trust or opportunism can be present, and that one of the two factor crowds out the other one (Zhou, Poppo, & Yang, 2008). On the other hand, it also aligns with what was observed by Lado et al. (2008) for the case of relationalism, and adheres to the notion that high levels of trust will be instrumental in facilitating repeated sustainability-related interactions between the supply partners. Hypothesis H_{2b} which stated that as trust and opportunism increased, sustainability evaluation will initially increase, and then decrease, was also supported by our results. This result provides a very fine-grained view on when the trust-opportunism paradox will be differently managed (acceptance). It clearly demonstrate that a complementary effect of trust and opportunism is possible, but only particularly visible in very specific situations. This finding also suggests that up to a certain level of trust, firms adhere to the "trust but verify" approach in managing sustainability-related activities (Gundlach & Cannon, 2010). Beyond moderate levels of trust, the relationship becomes increasingly resilient in that the partners tend to focus on building value-enhancing relationships, thereby foregoing the need for sustainability evaluation (Lewicki et al., 1998). Overall, these findings demonstrate that firms will find different paradox resolution mechanisms for different situations. It also links well to studies on information systems outsourcing that speak in favor

for an integration of the complementarity and substitution view. Although not discussed from a paradox perspective, Huber, Fischer, Dibbern, and Hirschheim (2013) suggested a resolution of the different governance mechanisms through a process model. Lioliou, Zimmermann, Willcocks, and Gao (2014) considered a two-way causal interaction relationship between governance types.

Two of our hypotheses were not supported, namely H_{1b} and H_{2a}. These two hypotheses had suggested the opposite paradox strategies to the ones that were argued for in H_{1a} and H_{2b} respectively. We contend that this difference could be explained by the prevalence of high behavioral uncertainty as well as measurement ambiguity in the case of sustainability practices within buyer-supplier relationships (Paulraj & Blome, 2017; Wilhelm et al., 2016). The findings differ from the study by Lado et al. (2008) in which the authors observed a significant U-shaped curvature in the case of relationalism. Though the simultaneous presence of higher levels of trust could be envisioned to be resilient to negative effects of opportunism (Lado et al., 2008), in the case of sustainability-related collaborations, the risks associated with opportunism seem to outweigh the benefits of higher levels of trust, thereby ultimately resulting in reduced sustainability collaboration between partners. Furthermore, the widely held belief that increased trust is often envisioned to reduce evaluation (or monitoring) of suppliers was not supported (Paulraj & Blome, 2017). Considering these results one can see that no clear argument for the substitution or complementarity view can be rendered. This also speaks in favor of investigating further factors that can help to explain the underlying paradoxical tensions better.

Investigating the role of the relationship length in the management of sustainability in buyer-supplier relationships (H_{3a} and H_{3b}) offers further insights into the paradoxical nature of tensions (i.e., trust and opportunism) when it comes to sustainability within such relationships. In the case of sustainability collaboration, we saw that a resolution strategy is evident in

younger (shorter) relationships (slope=0.008; *ns*) along the symmetry line. Additionally, we found the inverted U-shaped curvature along the asymmetry line to be marginally significant (curvature = -0.832; $p < 0.10$). Along with the response surface presented in Panel A of Figure 3, this suggests that when the relationship is young (shorter), equal levels of trust and opportunism seem to result in the highest levels of sustainability collaboration. By contrast, as evident from Panel B of Figure 3, the response surface for sustainability evaluation is considerably different in that we find an inverted U-shaped curvature along the symmetry line (curvature = -1.259; $p < 0.05$); this result suggests that moderate levels of both trust and opportunism result in higher evaluation as opposed to other matched levels of trust and opportunism when it comes to sustainability evaluation. When taken together, we can conclude that trust, when above a certain level, is resilient and can overcome the negative aspects of opportunism in younger relationships. However, when analyzing mature relationships, we can observe that an acceptance strategy is pursued as evidenced by a positive U-shape of the curvature along the asymmetry line (curvature: sustainability collaboration = 0.439; $p < 0.05$; sustainability collaboration = 0.355; *ns*). This finding signifies that the "shadow of the past" and "shadow of the future" might provide sufficient assurance to the buyer that sustainability collaboration can still be sustained as both firms pursue joint sustainability initiatives for an extended period, thereby letting the partners believe that this will also continue well into the future (Granovetter, 1985; Heide & Miner, 1992; Lewicki & Bunker, 1996; Poppo et al., 2008). It also suggests that particularly for mature buyer-supplier relationships, firms may find it easier to implement complementary mechanisms instead of substitutive ones. Based on these findings, we can conjecture that the paradox acceptance strategies need a very certain set of prerequisites that firms can acquire only with time. In summary, our findings suggest that time is an important factor that shapes the impact of paradoxical tensions on buyer-supplier sustainability mechanisms. This also links well to the observation that temporal aspects matter

particularly in the implementation of sustainability in buyer-supplier relationships (Klassen & Hajmohammad, 2017).

6.2 Boundary conditions and further research opportunities

Our study has a number of limitations, some of which can fruitfully be explored further. For example, opportunistic behavior has been argued to range between weak and strong forms (Hawkins, Pohlen, & Prybutok, 2013) and this may have implications for our conceptual framework. Relatedly, the role of governance mechanisms may differ between types of opportunistic behavior. As such, one may expect relational mechanisms to prevail when deception and deceitfulness are the buyer's main concern. Future studies could also investigate the role of governance mechanisms in reducing opportunistic behavior from the perspective of the supplier, and the wider supply chain or network. For example, the knock-on effects of opportunistic behavior by one supplier may deter others from trading with a specific buyer. While we have investigated manufacturing and service firms in Germany, future study should investigate the role of culture, both within an industry and a country setting, which may present fruitful ways of extending this research study. As our data were collected in Germany, a country that the national business systems literature classifies as a coordinated market economy with emphasis on collaboration among economic agents (Whitley, 1999), our results may be somewhat limited in their transferability to liberal, or state-led, market economies. Furthermore, we studied dyadic relationships, but we were only able to collect data from the buying side of the relationship. Future data collection could address this issue by collecting dyadic data, and explore the impact of possible (information, perception) asymmetries between buyers and suppliers. Lastly, the systemic interconnections around sustainability point to opportunities that span several levels of analysis. For example, different combinations of collaboration with regard to sustainability in buyer-supplier relationships may be better or

worse in terms of attracting environmentally conscious consumers or fending off regulator attention. This is worth investigation in future studies.

7. Conclusions

Increasingly complex and globally dispersed supply chains, with a growing emphasis on sustainability, have created a situation where firms and managers are regularly confronted with paradoxical situations. Our research shows that embracing the paradox of trust and opportunism can add important insights to our understanding of sustainability in buyer-supplier relationships. Interestingly, accepting the paradox impacts the level of sustainability evaluation rather than the level of sustainability collaboration. Our findings show that for sustainability collaboration trust is the major factor – despite contrary theoretical support – requiring that firms have to solve the paradox, at least in the case of less mature relationships. By contrast, acceptance of paradoxical tensions seems to develop in relationships over time, potentially safeguarded by the inherent "shadow of the past" in relationships. As firms increasingly explore how they can manage temporal tensions around sustainability, our findings caution that one of the prerequisites for doing so – paradoxical management – may over time recede into the background relative to other relationship management aspects, such as trust. Overall, our results contribute important insights into how paradoxes can inform sustainability practices in buyer-supplier relationships that have only very recently attracted scholarly attention despite the far-reaching impacts they have on society.

As far as practical implications are concerned, our findings suggest that firms and managers have to analyze existing levels of trust and opportunism in relationships, specifically in the context of sustainability, in order to identify how they can solve potentially paradoxical tensions when pursuing sustainability measures successfully. Importantly, executives need to be aware that trust and opportunism can coexist and that they have to be prepared to manage

both phenomena at the same time. Addressing paradoxical tensions works differently in the two cases of sustainability evaluation and collaboration, but also when comparing less mature and mature buyer-supplier relationships. Resolution strategies for paradoxes are preferable in cases where firms or managers wish to establish sustainability collaboration with suppliers in new or less mature relationships, whereas high levels of trust and opportunism, i.e. an acceptance strategy, can be better embraced in long-term, more mature relationships.

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Tables and Figures

Table 1: Sample information

Description	SIC Code	Percent
Manufacturing	31-33	73.1
Transportation, Communications, Electric, Gas & Sanitary Services	47-49	14.6
Other Industries		12.3

Description	Percent
>250 employees	17.7
250 – 1.000 employees	22.0
1.001 – 10.000 employees	32.5
10.001 – 50.000 employees	17.7
>50.000 employees	10.1

Description of Job Level	Percent
Manager	27.2
Senior Manager	16.3
Director	15.0
Vice President	33.3
CEO	8.2

Table 2: Measurement Model

Indicator *(Coefficient Alpha, Coefficient Omega, Composite Reliability, Average Variance Extracted)*	Std.‡ Coefficient
Trust *(α = 0.931; Ω = 0.931; CR = 0.933; AVE = 0.737)*	
We have never had the feeling of being misled by the supplier.	0.75
We can always depend on the supplier to treat us fairly.	0.92
We can count on the supplier to be honest in its dealings with us.	0.92
We can rely on the supplier to keep the promises it makes to us.	0.84
The supplier is a company that we have great confidence in.	0.85
Opportunism *(α = 0.902; Ω = 0.905; CR = 0.901; AVE = 0.696)*	
In working with us, this supplier…	
is not always sincere if that helps to promote its own objectives.	0.69
alters facts in order to meet its own goals and objectives.	0.86
tries to take unfair advantage of us to further its own interests.	0.89
breaches formal or informal agreements to its benefit.	0.88
exaggerates its needs in order to get what it wants. *	
Sustainability Collaboration *(α = 0.921; Ω = 0.922; CR = 0.922; AVE = 0.704)*	
We cooperate with our supplier to achieve sustainability objectives.	0.88
We provide our supplier with design specifications that include sustainability requirements for their processes.	0.77
We collaborate with our supplier to provide products and/or services that support our sustainability goals.	0.89
We develop a mutual understanding of responsibilities regarding sustainability performance with our supplier.	0.85
We conduct joint planning to anticipate and resolve sustainability-related problems with the supplier.	0.80
We periodically provide supplier with feedback about their sustainability performance. *	
Sustainability Evaluation *(α = 0.888; Ω = 0.881; CR = 0.888; AVE = 0.671)*	
We conduct regular sustainability audits into our supplier's internal operations.	0.92
We periodically check our supplier's sustainability practices.	0.95
We use unannounced audits to check for supplier's sustainability.	0.61
We have a formal system to track whether the supplier meets our sustainability standards.	0.75
We evaluate the supplier based on an implemented environmental management system (e.g., ISO 14001). *	

Model Fit Indices: Normed Chi-Square = 3.59 (≤ 5.0); Non-Normed Fit Index = 0.94 (≥ 0.90);
Comparative Fit Index = 0.95 (≥ 0.90); Root Mean Square Residual = 0.066 (≤ 0.10);
Root Mean Square Error of Approximation = 0.098 (≤ 0.10)

Note: * items dropped during instrument development process.
‡ All CFA std. coefficients are significant at $p < 0.01$.

Table 3: Correlation Between Theoretical Constructs

Factors	Mean	S.D.	TR	OP	SC	SE
Trust (TR)	3.40	0.81	1.00			
Opportunism (OP)	2.17	0.78	-0.42	1.00		
Sustainability Collaboration (SC)	3.11	0.99	0.22	-0.21	1.00	
Sustainability Evaluation (SE)	2.42	1.08	0.23	0.11	0.59	1.00
Environmental commitment	3.86	0.94	0.21	-0.05	0.48	0.48
Asset specificity	2.95	1.08	0.06	0.02	0.19	0.21
Firm size (no. of employees	6.89	2.72	0.06	0.07	0.12	0.24

Table 4: Results of polynomial regression

Variables		Model 1 Sustainability Collaboration	Model 2 Sustainability Evaluation	Model 3 Sustainability Collaboration		Model 4 Sustainability Evaluation	
Constant		0.780	0.752	1.355		1.739	
Environmental commitment		0.418**	0.407**	0.426**		0.399**	
Asset specificity		0.079	0.128*	0.085		0.110	
Firm size (no. of employees)		0.034	0.074**	0.057*		0.087**	
Trust (TR)		0.244+	-0.011	0.122		-0.123	
Opportunism (OP)		-0.135	-0.121	-0.274		-0.252	
TR^2		-0.103	0.024	-0.049		0.023	
TR * OP		0.099	-0.250+	0.109		-0.257	
OP^2		-0.065	-0.273*	-0.038		-0.304**	
Relationship Length (R)				0.005		-0.030*	
R * TR				-0.029*		0.005	
R * OP				0.019		0.014	
R * TR^2				0.029**		0.018	
R * TR * OP				-0.013		0.011	
R * OP^2				0.0005		0.018*	
			Relationship Length	**Short (μ - σ)**	**Long (μ + σ)**	**Short (μ - σ)**	**Long (μ + σ)**
Symmetry Line	Slope $b_1 + b_2$	0.109	-0.132	0.008	-0.313	-0.669	-0.081
	Curvature $b_3 + b_4 + b_5$	0.062	-0.547*	-0.221	0.264	-1.259**	0.184
Asymmetry Line	Slope $b_1 - b_2$	0.378*	0.110	1.112**	-0.319	0.267	-0.010
	Curvature $b_3 - b_4 + b_5$	-0.137	-0.046	-0.832*	0.439*	-0.403	0.355
F		10.22**	13.03**	8.12**		11.11**	
R^2		0.309	0.366	0.387		0.417	
ΔR^2				0.062*		0.037*	
N		192	190	157		155	

*Note: ** t-values significant at $p \leq 0.01$, * t-values significant at $p \leq 0.05$, + t-values significant at $p \leq 0.10$.*
ΔR^2 for Model 3 was derived based on Model 1 that included 157 observations; ΔR^2 for Model 4 was derived based on Model 2 that included 155 observations.

Figure 1: Response Surface - Symmetry and Asymmetry Lines

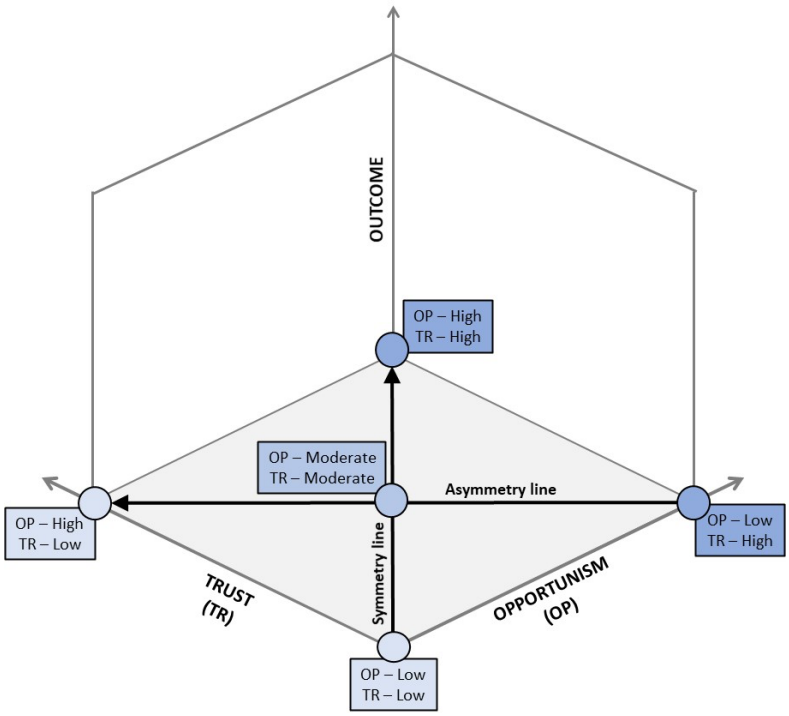


Figure 2: Joint Effects of Trust and Opportunism

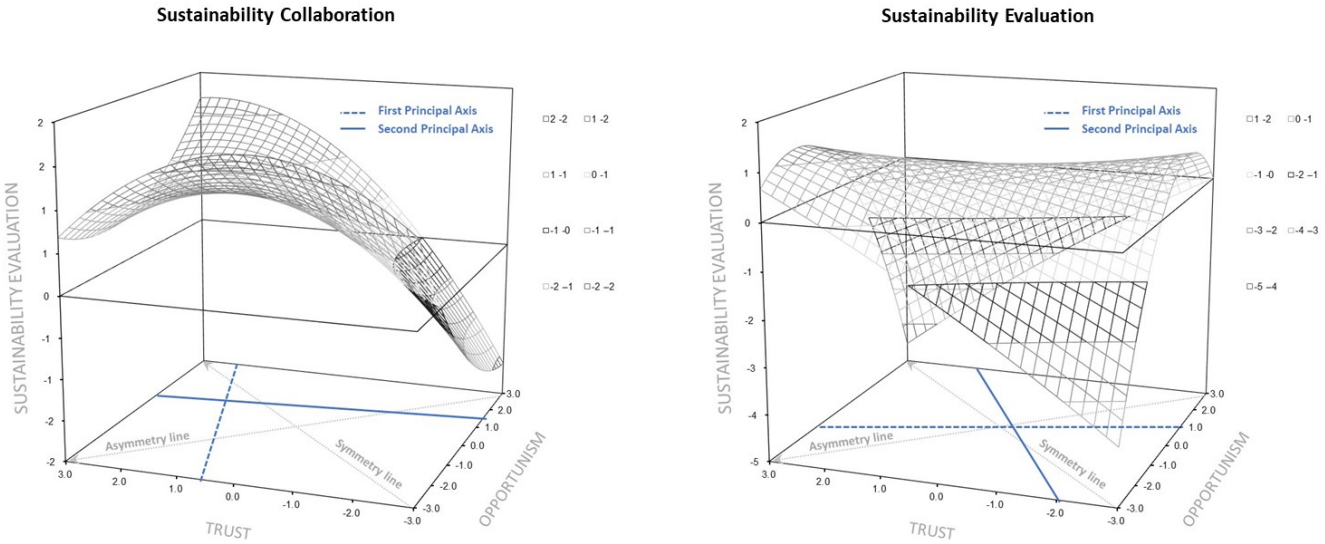
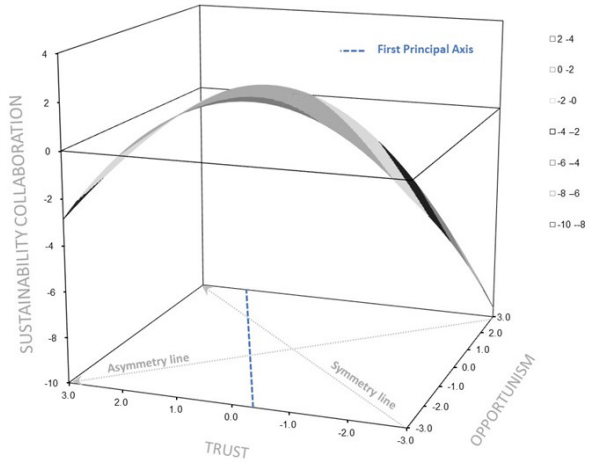


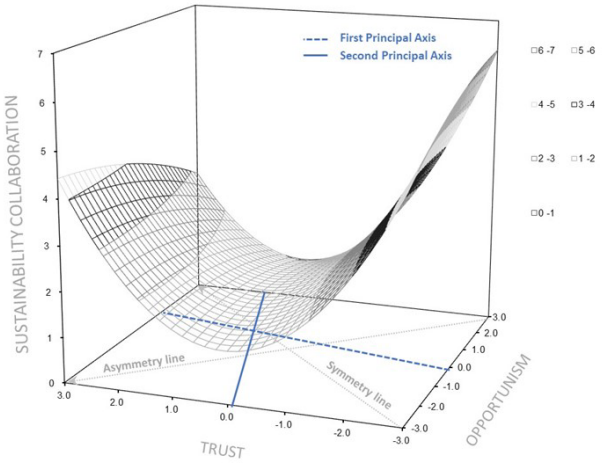
Figure 3: Contingent effect of relationship length

PANEL A

Relationship Length – Short (μ-σ)

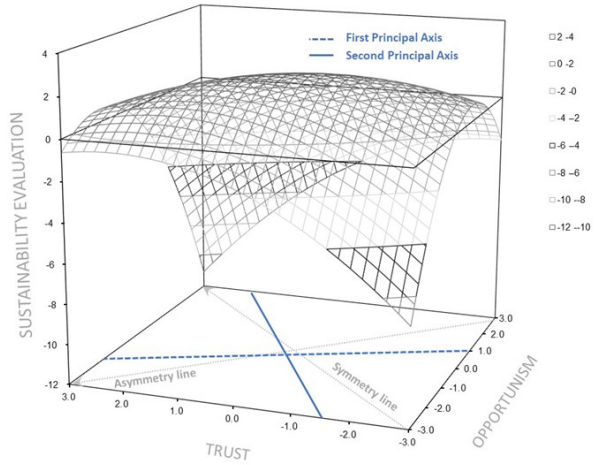


Relationship Length – Long (μ+σ)



PANEL B

Relationship Length – Short (μ-σ)



Relationship Length – Long (μ+σ)