

RESEARCH ARTICLE

Green supply chain management, supplier environmental commitment, and the roles of supplier perceived relationship attractiveness and justice. A moderated moderation analysis

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Abstract

A key strategic challenge for buying firms is to extend environmental management across the supply chain. This requires a strong environmental commitment on the suppliers' side. Adopting the supplier perspective, this study employs regression analysis with bootstrapping procedures to examine a contingent causal process model of the influence that two major green supply chain management practices widely adopted by buying firms in their relationships with suppliers, environmental assessment and environmental collaboration, exert on supplier environmental commitment, and the moderating effects of supplier perceived relationship attractiveness and supplier perceived justice. Results from a survey of 237 Chinese suppliers across multiple industries reveal that, while environmental collaboration positively influences supplier environmental commitment, the impact of environmental assessment is not significant. However, our moderation analysis shows that supplier perceived relationship attractiveness has a positive moderating effect on the influence exerted on supplier environmental commitment by both environmental assessment and collaboration, and our moderated moderation analysis reveals that both the above moderating effects are in turn positively moderated by supplier perceived justice. Focusing on the role of suppliers' perceptions, the study sheds light on the psychological context of the suppliers' choice to commit to the environmental management initiatives of their buying counterparts.

KEYWORDS

environmental assessment, environmental collaboration, supplier environmental commitment, supplier perceived relationship attractiveness, supplier perceived justice, conditional moderation

Abbreviations: AVE, average variance extracted; CFA, confirmatory factor analysis; CMB, common method bias; CR, composite reliability; EAS, environmental assessment; EC, environmental collaboration; GSCM, green supply chain management; IPE, Institute of Public and Environmental Affairs; OEMs, original equipment manufacturers; PJ, perceived justice; PRA, perceived relationship attractiveness; SEC, supplier environmental commitment; SMEs, small and medium enterprises.

The authors contributed equally to the paper.

1 | INTRODUCTION

In September 2017, Schaeffler Group, a world-renowned first-tier supplier of the automotive industry, was forced to suspend production of rolling element bearings because of the shutdown, by the

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Chinese environmental law enforcement teams, of the metal wiredrawing plant of the firm's only supplier of needle roller raw materials, located in China, due to repeated violations of environmental regulations. In the wake of the incident, Schaeffler declared that the out of stock of the needle roller might cause "more than 200 models of 49 auto OEMS to be completely discontinued (...) which is equivalent to a loss of 300 billion Yuan [about \$45.53 billion] in output value". Although Schaeffler asked for a three-month grace period for its supplier, local authorities denied the request and warned the firm to monitor more carefully the environmental compliance status of its suppliers in China. Years before, several popular fashion brands had risked consumer boycott after Greenpeace revealed that they were selling clothing designed for men, women, and even children containing hazardous chemicals that contributed to toxic water pollution. Zara, in particular, ended up in the spotlight since traces of a cancer-causing amine, used by one of its suppliers, was found in two products of the Spanish retailer.

These anecdotal examples suggest that, due to increasing supply chain integration, any environmental problems in the upstream of the supply chain not only threaten the normal operation of the buying firm but may also trigger a tremendous "butterfly effect" throughout the overall supply chain and entire industries, even at a global level (Kong et al., 2021). Moreover, consumers and other stakeholders hardly differentiate between supply chain members when it comes to environmentally harmful behavior and tend to hold the buying firm responsible for everything that occurs in the supply chain (the so-called "chain liability effect") (Hartmann & Moeller, 2014), so exposing the firm's reputation at great risk. Hence, a key strategic challenge for buying firms is extending environmental management logics and practices to upstream supply chain members (Hajmohammad & Vachon, 2016). This, in turn, requires suppliers' support and cooperation to their customers' green initiatives (Acosta et al., 2015; Saghiri & Mirzabeiki, 2021). Only when suppliers actively adopt green practices, the effectiveness and goals of green supply chain management can be achieved (Alghababsheh & Gallea, 2020). This makes supplier environmental commitment become a key driver of environmentally sustainable supply chains (Sancha, Wong, & Gimenez Thomsen, 2016; Simpson et al., 2007). Environmentally committed suppliers are indeed more willing to expand their environmental expertise and improve the manufacturing process of existing products and new products, thereby sustaining the environmental performance and reputation of both the buying firm and the overall supply chain.

Extant literature focuses on two kinds of activities performed by buying firms in their attempts at "greening" their supply chain partners, that is, environmental assessment and collaboration (Alghababsheh & Gallea, 2020; Tachizawa et al., 2015). The environmental assessment of suppliers consists of monitoring and evaluating suppliers' environmental performance by enforcing third-party regulations or imposing codes of conduct to achieve the purpose of reducing environmental risks in the supply chain. For example, Ford's "Supply Chain Carbon Information Disclosure Project" requires suppliers to disclose carbon emission information and sets carbon emission targets for them. Environmental collaboration with suppliers is

seen by buying firms as a strategic opportunity to partner with suppliers in order to extend environmental management across the supply chain, and as a means to explore new business opportunities or achieve sustainable innovation by cooperating with suppliers in the development of green products or processes (Seuring & Müller, 2008).

The implementation of green supply chain management initiatives is expected to make suppliers accept the environmental concept of buying firms and improve their environmental management capabilities. This is not necessarily the case, however, as the "Schaeffler Incident" demonstrates. Although Schaeffler Group requires suppliers to comply with environmental guidelines and conducts regular inspections, one of its suppliers repeatedly violated environmental laws. This suggests that buying firms' green supply chain management initiatives may have low or no influence on the motivation of suppliers to commit to their customers' environmental objectives. In fact, buyers' and suppliers' perspectives on supply chain relationships and their outcomes differ to some extent (Nyaga et al., 2010). Nevertheless, extant research on green supply chain management has typically adopted the perspective of buying firms (e.g., Danese et al., 2018; Mani et al., 2018; Tachizawa et al., 2015), while a lower number of studies have examined green supply chain management effectiveness from the supplier perspective (e.g., Acosta et al., 2015; Chen & Chen, 2019b). In particular, although previous scholars have alerted us to the importance of perceptions in supply chain relationships (Czakoń & Kawa, 2018), and supply chain research more generally (Oosterhuis et al., 2013), we lack a thorough understanding of the suppliers' *perceived* ability of buyers' environmental assessment and collaboration practices to influence suppliers' environmental commitment (Jia et al., 2021; Nyaga et al., 2010).

In addition, several contingencies may influence the relationships between green supply chain management and supplier environmental commitment. Previous scholars focused on internal and external drivers of environmental assessment/collaboration and their effectiveness. Among others, Tachizawa et al. (2015) examined the influence of top management support and of coercive, mimetic, and normative pressures on the adoption of environmental assessment and collaboration practices, while Sancha, Wong, and Gimenez Thomsen (2016) explored the moderating effect of contextual conditions (i.e., product complexity, relationship stability, and relational adaptability) on the relationships between buyers' supply chain management initiatives and suppliers' environmental commitment. In addition to this literature, drawing on previous calls for a more behavioral approach to strategy research (Powell et al., 2011), and in line with the focus on suppliers' perceptions that characterizes the present study, we start from the assumption that perceptions matter when it comes to environmental commitment, and in particular that suppliers' perceptions play a significant role in the process by which suppliers adhere to buying firms' green initiatives and internalize their environmental goals (Shumon et al., 2019). We argue that effective green supply chain management requires a deeper understanding of the suppliers' perceptions regarding their relationships with buying firms. Two aspects are especially noteworthy, that is, to what extent

suppliers perceive the relationships to be attractive (Tóth et al., 2015) and characterized by justice (Liu et al., 2012). When suppliers' expected returns from their supply chain relationships are high and they perceive a sense of fairness in the relationships, they will adhere to the green supply chain management initiatives of their customers and will be more willing to prioritize their resources toward the environmental objectives of their counterparts. Thus, overall, the present paper aims at filling a gap in extant supply chain research, that is, to ascertain whether, in buyer–supplier relationships, supplier environmental commitment is influenced by the suppliers' perceptions concerning both the buying firms' environmental practices and the attractiveness and fairness of the relationships.

Based on the above, the present paper focuses on the following research questions. First, we ask whether buying firm's environmental supply chain management practices are perceived by suppliers as affecting their environmental commitment. Second, we focus more specifically on the psychological context of the suppliers' decision to commit to the environmental management initiatives of their buying counterparts, precisely on the moderating effects of supplier perceived relationship attractiveness and justice. In particular, we ask whether supplier perceived relationship attractiveness moderates the influence of both environmental assessment and collaboration on supplier environmental commitment, and whether these two moderating effects are in turn moderated by supplier perceived justice. We explore these questions using primary data from a survey of 237 Chinese suppliers operating across multiple industries.

2 | THEORY AND HYPOTHESES

Environmental commitment is “the willingness of an organization to determine, articulate, and manage its responsibilities toward the natural environment” (Simpson et al., 2007). In particular, supplier environmental commitment concerns the supplier's effort to accept its own environmental responsibilities and thus adopt environmental behaviors in accordance with the environmental requirements of its customers, such as adopting green processes and providing green products (Awan et al., 2018). Suppliers that make environmental commitment will focus on green practices and develop environmentally friendly capabilities, thereby reducing sustainability issues and decreasing environmental risks. Previous scholars have pointed out that commitment brings mutual benefits to the organizations involved in buyer–supplier relationships and is a key factor in maintaining enduring and valuable relationships (Patrucco, Moretto, & Knight, 2020; Shahzad et al., 2018). Accordingly, suppliers that make substantial efforts to meet the environmental requirements of buying firms help to ensure the continuity and stability of the relationships, as well as their ability to generate positive economic, environmental, and social performance outcomes for the participating organizations (Chen & Chen, 2019b).

In order to effectively stimulate the environmental commitment of suppliers, buying firms increasingly resort to green supply chain management. For the purposes of this paper, green supply chain

management consists of supplier management practices implemented by buying firms with respect to environmental issues, including environmental assessment and collaboration activities (Gimenez et al., 2012; Gualandris & Kalchschmidt, 2015). Environmental assessment aims at obtaining suppliers' compliance to their customers' environmental standards, which may adhere to legal regulations or even exceed regulatory demands (Chen & Chen, 2019a). Assessment activities performed by buying firms include establishing corporate sustainability standards, impose them on suppliers, collecting and processing data on supplier environmental performance to identify nonconformities, and propose or impose corrective actions (Gualandris & Kalchschmidt, 2015; Sancha, Gimenez, & Sierra, 2016). Environmental collaboration is instead aimed at generating business opportunities and competitive advantage for both buying and supplying firms by leveraging truly collaborative buyer–supplier relationships on environmental issues. Collaboration practices implemented by buying firms include sharing knowledge with suppliers to help them develop sustainability-related organizational capabilities, providing them with training and support on environmental issues, developing environmentally friendly processes or products jointly with suppliers, and encouraging them to develop a culture of environmental responsibility (Gimenez et al., 2012; Yadlapalli et al., 2018).

Several contingencies may influence the effectiveness of environmental assessment and collaboration. Previous literature pointed out that buying firms should consider the interests, motivations, and perceptions of suppliers in order to ensure that they are willing to invest in development activities, in general (Mortensen & Arlbjørn, 2012), and in sustainability-related practices, in particular (Chen & Chen, 2019b). We focus on the role of supplier perceived relationship attractiveness and supplier perceived justice in affecting the ability of environmental assessment and collaboration practices to influence supplier environmental commitment.

Relationship attractiveness arises from the ability of a relationship to generate returns. In buyer–supplier relationships, supplier perceived relationship attractiveness reflects the supplier's expectations of the benefits that a relationship with a specific customer can generate (Tóth et al., 2015). Based on previous interactions with a customer, the supplier evaluates several dimensions of the expected benefits of the relationship (La Rocca et al., 2012; Tóth et al., 2015) and considers the relationship to be attractive to the extent that the expected benefits meet its own expectations (Pulles et al., 2016). Extant research suggests that relationship attractiveness results from two sources: the first is the economic value that the relationship is expected to bring to the focal organization, while the other concerns the perceived relationship quality and the degree of intimacy and fit between the parties (La Rocca et al., 2012).

Organizational justice theory initially focused on the intraorganizational level, especially on how individuals and groups perceive workplace justice (Fortin et al., 2016; Greenberg, 1987; Niehoff & Moorman, 1993). In recent years, justice theory has also been applied at the interorganizational level (Zaefarian et al., 2016; Zhou et al., 2020). In supply chain contexts, justice is considered fundamental to supply chain relations, and is deemed to operate at four

levels, that is, benefit distribution, management policies and procedures, interpersonal relations, and information exchange (Bouazzaoui et al., 2020; Colquitt et al., 2001). Supplier perceived justice is therefore the supplier's perception of the degree to which a buyer–supplier relationship is characterized by distributive, procedural, interpersonal, and informational justice (Brito & Miguel, 2017; Liu et al., 2012; Matopoulos et al., 2019). Distributive justice concerns the extent to which the allocation of resources and/or outcomes is proportional to the costs incurred from the relationship. Procedural justice is the degree of fairness in the formulation and implementation of policies and procedures. Interpersonal justice refers to how persons are treated during interpersonal interactions. Finally, informational justice concerns the fairness of information distribution and communication.

Previous scholars have shown that, in buyer–supplier relationships, perceived justice influences opportunism and transaction costs (Huo et al., 2016; Luo et al., 2015; Trada & Goyal, 2017), stimulates the development of relational and social contents (Erfanian et al., 2021; Wang et al., 2014), and generates supplier commitment (Matopoulos et al., 2019). More importantly for our purposes, suppliers' perceived justice has been found to exert a positive impact on the effectiveness of transactional and relational supply chain sustainability practices (Alghababsheh et al., 2018), and to affect suppliers' perceptions regarding trust and commitment in the relationships (Kumar et al., 1995; Zaefarian et al., 2016) and the costs and rewards of interorganizational interactions (Srinivasan et al., 2018), hence the extent to which suppliers perceive buyer–supplier relationships to be attractive.

2.1 | Hypotheses development

2.1.1 | Green supply chain management and supplier environmental commitment

In buyer–supplier relationships, the goals of the participating organizations are typically not aligned. On the one hand, buyers expect more from suppliers in terms of quality, service, innovation, or sustainability. On the other hand, suppliers strive to meet the requirements of their counterparts while yielding the highest possible revenues or profit margins. Contractual governance has the potential to enhance goal alignment between partners involved in interorganizational relationships (Shahzad et al., 2018). Goal alignment reduces behavioral uncertainty and increases expected returns, thus creating economic incentives for the participating organizations to invest in the relationships (Maestrini et al., 2018). Accordingly, in buyer–supplier relationships, goal alignment has been found to increase information and resource exchange, stimulate relation-specific efforts to share and respond to common problems (Yan & Dooley, 2013), and ultimately to promote commitment on both parties, specifically on the supplier's side (Patrucco, Moretto, Luzzini, & Glas, 2020). Extending this view to green supply chain management, environmental assessment can be seen as a transactional mechanism by which buying firms not only impose environmental standards on suppliers but also conduct regular environmental reviews and feedback the results to the suppliers in a

timely manner (Sancha, Gimenez, & Sierra, 2016; Vachon & Klassen, 2006). This reduces information asymmetries between buyers and suppliers, allows suppliers to align their environmental goals to those of their counterparts, and ultimately reduces behavioral uncertainty in the relationships, thereby encouraging suppliers to develop environmental commitment. Assessment practices may facilitate goal alignment and supplier commitment in two ways, that is, by helping suppliers to comply with the buyers' environmental standards, and by leading them to internalize those standards and develop their own environmentally friendly practices.

On the one hand, as part of their assessment activities, buying firms restrict exhaust gas emissions, impose limits on waste water and waste emissions in the production process of suppliers, and encourage them to use recyclable and nontoxic packaging materials (Danese et al., 2018). Doing so, buying firms enable suppliers to provide products that meet their environmental standards (Shumon et al., 2019). Participation in assessment activities also encourages suppliers to invest in the improvement of their production information management systems, to strengthen process control, and to monitor waste during production and transportation, in order to reduce negative impacts on the environment (Sancha et al., 2019; Sancha, Gimenez, & Sierra, 2016). All this decreases the transaction costs caused by product returns and rework and reduces uncertainty in the transaction process.

On the other hand, some suppliers lack the environmental management resources, knowledge, and experience to accurately identify their own environmental shortcomings and work on them effectively (Sajjad et al., 2015). In such circumstances, assessment processes wherein buyers and suppliers communicate around environmental management issues allow suppliers understand the negative impact that their current procurement, manufacturing, and transportation practices may have on the environment (Liu et al., 2018). This not only facilitates suppliers in their efforts to adhere to the customers' environmental standards but also allows them to set their own environmental standards and procedures in line with their counterparts' goals (Shumon et al., 2019).

H1. Environmental assessment is positively associated with supplier environmental commitment.

While environmental assessment occurs through arm's length transactions wherein economic exchange is coordinated through detailed contractual clauses (Sancha, Wong, & Gimenez Thomsen, 2016), environmental collaboration refers to buyer–supplier cooperative relationships primarily coordinated through “social mechanisms,” that is, governance mechanisms which emerge out of, and whose effectiveness is grounded in, social relationships and networks (Capaldo, 2014; Larson, 1992). In particular, interpersonal relationships, trust, and reciprocity play a key coordinating role (Hofman et al., 2020).

First, tight interorganizational collaboration on environmental issues entails repeated interpersonal interactions among individual actors of the buying and supplying firms (Gölgeci et al., 2019). Thus, over time, the economic relationship becomes embedded into a rich

fabric of social interpersonal ties across the boundaries of the participating organizations, which set down mutual obligations and expectations of fairness and honesty (Larson, 1992). This, in turn, not only enhances the proclivity of the organizational actors on both sides to participate in environment-related collaborative activities but also lays the foundations for the development of trust and reciprocity at the interorganizational level (Capaldo, 2014).

Second, interorganizational trust reduces the fear of opportunistic behavior on the other side, leading the parties to increase their economic and psychological investment in the relationship (Capaldo & Giannoccaro, 2015; Chan & Ma, 2020). Buying firms, in particular, feel confident to invest in their suppliers and to more openly share with them their own knowledge on environmental issues, or even to collaborate with them in the co-production of new knowledge related to environmental management (Yen, 2018). Specifically, buyers provide suppliers with environmental training and education, share environmental knowledge and technology with them (e.g., the buyers transfer to suppliers explicit [manuals or procedures] or tacit [know how] environment-related knowledge), or directly provide them with capital, equipment, and personnel (Chen & Chen, 2019a; Sancha, Gimenez, & Sierra, 2016). In some cases, buying firms even collaborate with suppliers to (re)design green products or manufacturing processes, or to develop interorganizational routines for joint pollution control (Lee & Klassen, 2008; Tachizawa et al., 2015).

Third, being so accompanied by their customers in the process of understanding environmental issues and participating in green collaborative activities, and being endowed by them with the resources needed to do so, suppliers feel both motivated and able (and sometimes even obliged) to reciprocate in kind, and specifically to accept the environmental concept of the buying firms, develop a sense of environmental responsibility, and develop environmental management capabilities (Demirel & Kesidou, 2019). The customers' involvement in collaborative activities is indeed perceived by suppliers as an investment made by the other party to both develop the suppliers' knowledge base and reduce transaction costs, and therefore is especially effective in stimulating commitment on the suppliers' side (Patrucco, Moretto, & Knight, 2020).

H2. Environmental collaboration is positively associated with supplier environmental commitment.

2.1.2 | The moderating role of supplier perceived relationship attractiveness

While environmental assessment and collaboration can directly generate environmental commitment on the suppliers' side, we argue that the suppliers' reactions to the green supply chain management practices implemented by their customers are also affected by the suppliers' attitude toward the customers and the relationships, that is, by the extent to which the suppliers perceive their relationships with the customers to be attractive.

Adhering to the customers' environmental assessment practices often entails nontrivial operating costs on the suppliers' side. In

addition, the imposition of environmental standards may be seen by suppliers as something that constrains their decision space and reveals a lack of trust by the other party in both their willingness and organizational capabilities to deal with environmental issues. Therefore, in case suppliers expect the benefits of the relationships to be low, and the associated transaction costs to be high, or should they perceive that the overall relationship quality is low, they will lack the motivation to invest in the development of sustainability-related skills, or even refuse to meet their customers' environmental requirements (Patrucco, Moretto, Luzzini, & Glas, 2020). Conversely, should suppliers believe that the relationships will yield substantial tangible and intangible returns, that the relationships are based on mutual support, and that the participating organizations have a good fit in business and cultural terms, they will be more willing to both participate in buying firms' assessment practices and remedy the environmental non-conformities that may emerge (Cheng, 2011), with positive effects on their environmental commitment.

H3. Supplier perceived relationship attractiveness positively moderates the relationship between environmental assessment and supplier environmental commitment.

Environmental collaboration between buying and supplying firms inhibits opportunism, enhances mutual understanding, and ultimately increases financial, environmental, and social performance (Chen & Chen, 2019b; Sancha, Gimenez, & Sierra, 2016). However, since the social mechanisms underlying effective interorganizational collaboration emerge and develop over time from repeated and mutually beneficial interactions, truly collaborative buyer-supplier relationships and the associated benefits often take a long time to materialize (Capaldo, 2007). Though, instrumental motivation will lead suppliers not to abandon the pursuit of their short-term interests (Kitsis & Chen, 2019). In addition, adhering to the customers' environmental requirements entails substantial relation-specific investments on the suppliers' side, which are intrinsically risky and typically take time to generate the expected returns (Dyer & Singh, 1998). If the suppliers perceive the customers and the overall relationships not to be attractive, they will hardly accept to sacrifice their short-term interests and to make substantial financial, time, and emotional investments in such hazardous and demanding activities (Cheng, 2011). This will weaken the positive effect of buyer-supplier collaboration on the suppliers' commitment to the environmental requirements of the buyers.

Things will be different in case the suppliers perceive the relationship attractiveness to be high, from both an economic and social perspective, because such a positive attitude toward the partners and the relationships will enhance the ability of repeated collaborative buyer-supplier interactions to stimulate the emergence of trust and the development of interorganizational relationships wherein reciprocity acts as an informal but powerful rule (Capaldo, 2014; Jia et al., 2021; Patrucco et al., 2019). In such conditions, the adoption of environmental collaboration practices will further stimulate environmental commitment on the suppliers' side, so that the suppliers will be more likely to strive to satisfy their customers' requirements, or even to

anticipate them in a proactive manner (Patrucco, Moretto, Luzzini, & Glas, 2020).

H4. Supplier perceived relationship attractiveness positively moderates the relationship between environmental collaboration and supplier environmental commitment.

2.1.3 | The conditional moderating role of supplier perceived justice.

Another major contingency that influences the relationship between green supply chain management and supplier environmental commitment is the suppliers' perception of justice. Organizational justice research points out that fairness can effectively decrease perceived risk in economic exchange (Chang & Hsiao, 2008). By showing care and respect for the rights and dignity of the other party, buying firms reduce the suppliers' fear of exploitation and enhance their propensity to trustworthy and proactive behavior (Luo, 2008; Zaefarian et al., 2016). This encourages the customers' commitment to the relationship and their active involvement in knowledge sharing, as well as other coupling behaviors (Liu et al., 2012), which in turn increases, on the suppliers' side, the perceived benefits of the relationships and stimulates a more positive attitude toward the partners and the relationships, also in terms of a more positive reaction to the environmental assessment or collaboration practices implemented by the customers. Building on this thread, we argue that the strengthening effect of supplier perceived relationship attractiveness on the linkage between environmental assessment/collaboration and supplier environmental commitment will be enhanced when the suppliers perceive that their relationships with the buying firms are also characterized by a reasonable distribution of outcomes, consistent procedures, fair treatment of individuals, and symmetrical information.

On the one hand, when buyer–supplier relationships are characterized by an atmosphere of transparency and mutual respect, and the suppliers believe that their relationships with buying firms can enhance their competitive advantage, they tend to be less concerned about potential opportunistic behaviors on the other side and more inclined to invest in order to increase their ability to meet their customers' environmental requirements (Alghababsheh et al., 2018; Goffnett, 2018). Even though adhering to the environmental standards put forth by the other party may increase their transaction costs, suppliers are strongly encouraged to decrease environmental risks by improving their processes and equipment and by implementing environmental training for their employees, and to work in a timely manner on the environmental nonconformities that may emerge from assessment sessions (Ganegoda & Folger, 2015).

H5. Supplier perceived justice positively moderates the influence of supplier perceived relationship attractiveness on the relationship between environmental assessment and supplier environmental commitment.

On the other hand, suppliers' perceived relationship attractiveness and justice generate a synergistic effect on the development of the social mechanisms that allow coordination of buyer–supplier environmental collaboration and stimulate suppliers' environmental commitment. When suppliers have a positive attitude toward their partners and the relationships, a strong perception of fairness will further enhance the development of social networks across the boundaries of the partnered organizations and the development of interfirm trust (Wu & Chiu, 2018; Zaefarian et al., 2016), thereby setting the relationships on tracks of reciprocity (Capaldo, 2014). In such circumstances, the environmental collaboration practices promoted by buying firms will be seen by suppliers as even more beneficial actions to achieve collective benefits (Alghababsheh et al., 2018). Thus, suppliers will be more motivated to implement transformative innovations in their production systems and to work with buying companies to jointly design and develop environmentally friendly products and processes, and ultimately to invest in the development of green capabilities.

H6. Supplier perceived justice positively moderates the influence of supplier perceived relationship attractiveness on the relationship between environmental collaboration and supplier environmental commitment.

Our research hypotheses are summarized in the conceptual model depicted in Figure 1.

3 | METHODS

3.1 | Sample and data collection

We used a structured questionnaire to collect data from a sample of Chinese manufacturing companies. We deemed the Chinese manufacturing industry a suitable setting for the purposes of our study for the following reasons. First, China is the largest manufacturing country in the world. However, the rapid growth of the manufacturing industry has caused serious environmental problems in China, so that Chinese manufacturers are facing increasing pressure from stakeholders to solve their environmental problems (Li et al., 2019). Second, many Chinese manufacturers act as suppliers for buying firms, which in turn are suppliers to multinational companies, in a number of different industries. Being highly export-oriented, these buying firms typically have to comply to a number of environmental regulations, such as the Montreal Convention, Kyoto Protocol, ROHS, and WEEE Directive. In addition, operating in global markets wherein environmental awareness is an increasingly important driver of competitive advantage, these buying firms largely resort to green management practices across their supply chains. Finally, since most Chinese manufacturers typically have limited resources and expertise in sustainability management, they tend to rely on the support of their buying counterparts (Villena et al., 2020).

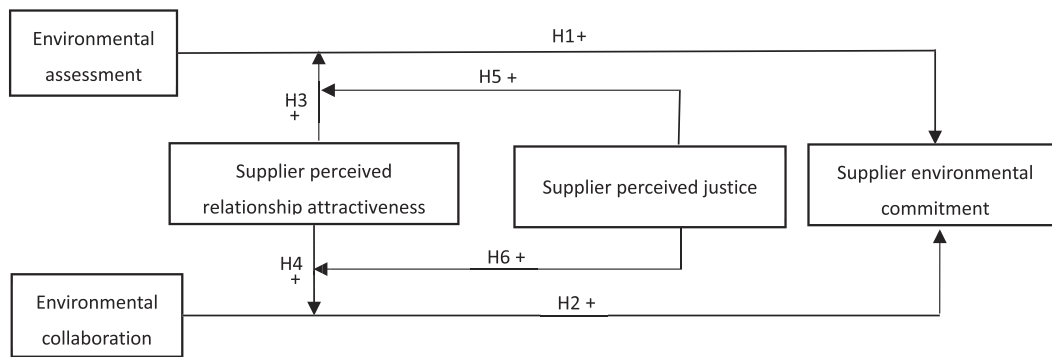


FIGURE 1 Conceptual model

TABLE 1 Participant characteristics

		Number	Percent
Field	Strategic management	67	28.27%
	Environmental (sustainability) management	58	24.47%
	Operations management	36	15.19%
	Production management	29	12.23%
	Customer relationship management	47	19.84%
Work experience	Less than 5 years	38	16.03%
	5–10 years	49	20.68%
	10–15 years	65	27.43%
	More than 15 years	85	35.86%
Education	Junior college and below	73	30.80%
	Undergraduate	106	44.73%
	Master and above	58	24.47%

We drew our sample from the green supply chain information database established by IPE (Chinese Public Environmental Research Center, <http://www.ipe.org.cn/index.html>), which is composed of 8085 suppliers operating in different industries, for example, textile, food, metals, chemicals, and leather. We randomly selected 500 suppliers and then contacted each of them to ascertain their availability to participate in the study and whether they had been involved in green supply chain management practices; 354 firms were willing to participate in the survey and met our basic requirements. Next, the questionnaire was emailed to the sample firms, together with a cover letter introducing the research and its background and aims. In order to evaluate the suppliers' perceptions as accurately as possible, executives in the fields of strategic management, environmental or sustainability management, operations management, production management, and customer relationship management were targeted as respondents (Table 1). After two rounds of data collection, from February 2020 to April 2020 and from May 2020 to July 2020, one hundred seventeen companies which restituted incomplete data were removed from the sample. Thus, the final sample is composed of 237 companies, yielding an effective response rate of 66.95%. Same basic characteristics of our sample suppliers are reported in Table 2.

3.2 | Questionnaire design and measures

All the theoretical constructs in this study were measured using scales drawn from extant English-language literature. In order to avoid misinterpretation and misunderstanding, we followed a rigorous translation/back-translation process in which the scales were first translated from English into Chinese by expert translators, and then translated back into English by different translators, to ensure that the final scales were consistent with the original ones (Brislin, 1970; Harkness, 2003). Next, in order to pretest the questionnaire (Douglas & Craig, 2007), we conducted preliminary interviews with 10 suppliers and asked our informants whether the scales were appropriate and the wording understandable and clear. We then revised the original measurement scales based on our informants' feedback. All this yielded a final questionnaire composed of 35 items gauging six constructs. All the items were measured by a 5-point Likert scale ranging from *not at all* to *significantly*. The constructs were measured as detailed in Table 3, which also reports the literature sources from which the measurement items were drawn.

Moreover, while we are theoretically focused on the role of environmental assessment and collaboration, other factors may influence the environmental commitment of suppliers. First, larger

TABLE 2 Sample

Sample characteristics	Category	Number	Percent
Firm size	Less than 100 employees	76	32.07%
	100–1000 employees	91	38.40%
	1000–10,000 employees	54	22.78%
	More than 10,000 employees	16	6.75%
Relationship length	Less than 3 years	38	16.03%
	3 to 6 years	102	43.04%
	7 to 10 years	78	32.91%
	More than 10 years	19	8.02%
Industry	Manufacture of food products	18	7.59%
	Manufacture of textiles	44	18.57%
	Manufacture of leather and related products	27	11.39%
	Manufacture of paper and paper products	19	8.02%
	Manufacture of chemicals and chemical products	23	9.70%
	Manufacture of basic metals	10	4.22%
	Manufacture of computer, electronic, and electrical products	54	22.78%
	Manufacture of transportation equipment	42	17.73%
Type of ownership	State-owned and collective firms	73	30.80%
	Private firms	115	48.52%
	Foreign-invested firms	49	20.68%

supplying firms are less likely to exit the market, have a long-term orientation, and are more visible to the public, and thus are typically more committed to environmental issues (Scott & Nyaga, 2019). In addition, larger companies are more attentive to their environmental reputation and have more resources to invest in environmental protection activities than SMEs (Danese et al., 2018). We therefore controlled for firm size. Based on the number of employees, we identified four categories of suppliers: 1 = less than 100 employees; 2 = 100–1000 employees; 3 = 1000–10,000 employees; and 4 = more than 10,000 employees. Second, we controlled for relationship length because longer buyer–supplier relationships typically lead to better working relationships (Liu et al., 2012) and breed interorganizational trust (Gulati, 1995), which may influence environmental commitment on the supplier's side (Capaldo, 2007). We measured relationship length by asking respondents how many years they had collaborated with their main customers (Wagner & Bode, 2014). Finally, the environmental practices of firms and the attention firms devote to the environment vary across industries (Chan et al., 2012). We therefore included in our models a dummy variable set to one for highly polluting industries, and zero otherwise. (Zhang et al., 2020). In this study, five industries (i.e., metal, chemical, paper, textile, and leather) are designated as highly polluting based on the “List of Listed Companies' Environmental Verification Industry Classification and Management” issued by the Ministry of Ecology and Environment of China.¹

3.3 | Nonresponse and common method bias

To assess the threat of nonresponse bias, we compared the data collected in the two data collection rounds. A *t* test showed no significant differences across the variables in the responses of early and late respondents, at $p > .05$. This suggests that nonresponse bias is not an issue in our study.

Since all data were collected from a single respondent in each sample firm, common method bias (CMB) may afflict our analysis. To reduce this risk, we adopted both *ex ante* and *ex post* remedies (Podsakoff et al., 2003). First, we selected, as respondents, managers who are typically highly experienced in customer relationship management. Second, procedural remedies such as respondent anonymity and confidentiality, item ambiguity reduction, and randomized question order were adopted. Third, following Harman's single-factor approach, we run an exploratory factor analysis by SPSS 25.0 which revealed that five factors had eigenvalues greater than 1, and that the factor with the highest variance contribution rate accounted for only 24.06% of total variance. Fourth, we controlled for the effects of an unmeasured latent method factor by comparing our base model including five factors with a model also including the method factor. Results showed no significant differences between the two models, as reported in Table 4. Based on the above, we are confident that common method bias does not affect our results.

TABLE 3 Measurement scales

Construct	Source	Measurement Item	Factor Loadings
Supplier Environmental Commitment (SEC) $\alpha = .816$; C.R. = .820; AVE = .532	Sancha, Wong, and Gimenez Thomsen (2016)	We constantly evaluate and improve our products and services to fulfill the environmental requirements of our customers.	.725
		We constantly evaluate and improve our business operations to fulfill the environmental requirements of our customers.	.712
		We collect and manage environment-related data in our operation processes in order to optimize them in accordance with the environmental requirements of our customers.	.715
		We have designed a set of procedures to ensure the reliability, consistency, and timeliness of environment-related data in order to comply with the environmental requirements of our customers.	.764
Environmental Assessment (EAS) $\alpha = .937$; C.R. = .940; AVE = .797	Tachizawa et al. (2015)	Our main customer(s) require us to comply with environmental regulations.	.856
		Our main customer(s) implement informal environmental audits on us.	.824
		Our main customer(s) conduct formal evaluations on us.	.900
		Our main customer(s) provide us with feedback on evaluation results.	.982
Environmental Collaboration (EC) $\alpha = .916$; C.R. = .916; AVE = .647	Tachizawa et al. (2015); Gölgeci et al. (2019)	Our main customer(s) provide us with training/ education.	.845
		Our main customer(s) provide us with design specifications that include environmental requirements.	.719
		Our main customer(s) support and encourage our attempts in energy conservation and efficiency improvement.	.766
		Our main customer(s) help us reduce waste emissions.	.853
		Our main customer(s) cooperate with us in environmental product development and cleaner production processes.	.801
		Our main customer(s) collaborate with us to acquire materials, parts, and/or services that support their environmental goals.	.834
Supplier Perceived Relationship Attractiveness (PRA) $\alpha = .989$; C.R. = .990; AVE = .884	La Rocca et al. (2012)	<u>Relationship Economic Expectations (actual)</u>	
		Our relationship with our main customer(s) helps us to remain competitive in pricing.	.914
		Our relationship with our main customer(s) helps us to reduce costs.	.971
		Our relationship with our main customer(s) helps us to make high profits.	.922
		<u>Relationship Economic Expectations (potential)</u>	
Our relationship with our main customer(s) will help us to expand our existing business and market.	.963		

(Continues)

TABLE 3 (Continued)

Construct	Source	Measurement Item	Factor Loadings
		Our relationship with our main customer(s) will help us develop new business and markets.	.965
		Our relationship with our main customer(s) contributes to our innovation ability.	.921
		<u>Relationship State Expectations (Closeness)</u>	
		Our relationship with our main customer(s) makes our main buyer(s) willing to listen and understand our position	.933
		Our relationship with our main customer(s) has given us special attention and care.	.929
		Our relationship with our main customer(s) makes communication more efficient	.958
		Our relationship with our main customer(s) helps us better understand each other's needs and goals	.932
		<u>Relationship State Expectations (Fit)</u>	
		Our relationship with our main customer(s) is reliable.	.911
		Problems in our relationship with our main customer(s) can be easily resolved.	.936
		We can cooperate well with our main customer(s).	.967
Supplier Perceived Justice (PJ) $\alpha = .951$; C.R. = .952; AVE = .712	Wu and Chiu (2018); Zhou et al. (2020)	<u>Distributive Justice</u>	
		We and other members of the supply chain profit in direct proportion to our contribution.	.879
		The gains for us and other members of the supply chain are commensurate with the roles and responsibilities in the supply chain.	.759
		<u>Procedural Justice</u>	
		Our main customer(s) apply fair policies and procedures to us.	.786
		Our main customer(s) treat all supply chain members fairly.	.822
		<u>Interpersonal Justice</u>	
		Our main customer(s) always treat us sincerely.	.891
		Our main customer(s) always respect us.	.864
		<u>Informational Justice</u>	
		Our main customer(s) always communicate with us openly and directly.	.834
		Our main customer(s) always give us feedback in time.	.903

TABLE 4 Result of the unmeasured latent method factor test

Model	χ^2	df	χ^2/df	CFI	TLI	IFI	RMSEA
Five-factor model	652.70	474	1.377	.952	.937	.953	.047
Model including the five factors and the method factor	651.79	473	1.378	.951	.937	.953	.047

3.4 | Reliability and validity

The reliability of the measurement scales was evaluated by using Cronbach's alpha (α) coefficients and composite reliability. As reported in Table 3, the α values for all our dependent and independent variables exceed the usual .70 threshold, and composite reliability (CR) for each construct also exceed the recommended value of .70. We also carried out confirmatory factor analysis (CFA) by Amos 21.0 to test the validity of the scales. As for convergent validity, Table 3 shows that all the measurement items load significantly on their respective constructs, with factor loadings ranging between .712 and .971. In addition, the average variance extracted (AVE) for each construct consistently exceed the recommended value of .5. As for discriminant validity, the square root value of the AVE of our constructs is higher than the correlations between the focal construct and the remaining ones. Results are shown in Table 5, which also reports descriptive statistics and correlation values for all our variables.

4 | HYPOTHESES TESTING

The present study employs regression analysis with bootstrapping procedures to examine a contingent causal process model of the influence that environmental assessment and collaboration exert on supplier environmental commitment. Specifically, we tested H1–H4 via moderation analysis, and H5 and H6 via moderated moderation (i.e., conditional moderation) analysis (Hayes, 2017). To test H1 and H3, we employed Model 1, which includes the control variables, the independent variable EAS, and the moderating variable PRA. Results are reported in Table 6 and show that firm size and relationship length have no significant effect on SEC (95% significant level confidence

interval includes 0, $p > .05$). Moreover, EAS has a positive but not significant effect on SEC (95% confidence interval includes 0, $p > .05$). H1 is not supported. The coefficient for the interaction term EAS * PRA is .1547. The p value is .0007, and the confidence interval at the 95% significance level is [.0039, .0142]. This suggests that EAS * PRA has a significant positive effect on SEC, that is, that supplier perceived relationship attractiveness positively moderates the relationship between environmental assessment and supplier environmental commitment (Figure 2). H3 is supported.

We employed Model 2 to test H2 and H4. Model 2 includes the control variables, the independent variable EC, and the moderating variable PRA. Results are reported in Table 7 and show that the coefficient for EC is .3303, and the confidence interval at 95% significance level is [.2667, .3940]. This indicates that EC has a significant positive effect on SEC. H2 is supported. The coefficient for the interaction term EC * PRA is .1095. The p value is .0002, and the confidence interval at the 95% significance level is [.0045, .0146]. This suggests that EC * PRA has a significant positive effect on SEC, that is, that supplier perceived relationship attractiveness positively moderates the relationship between environmental collaboration and supplier environmental commitment (Figure 3). H4 is supported.

To test H5, we employed Model 3, which includes the control variables, the independent variable EAS, and the moderating variables PRA and PJ. Results are reported in Table 8 and show that the coefficient for the interaction term EAS * PRA * PJ is .0120. The p value is .0012 and the confidence interval at the 95% significance level is [.0008, .0032]. This indicates that EAS * PRA * PJ has a significant positive effect on SEC, that is, that the positive moderating effect of supplier perceived relationship attractiveness on the relationship between assessment and supplier environmental commitment is in turn positively moderated by supplier perceived justice. H5 is

TABLE 5 Descriptive statistics and discriminant validity test

	Mean	SD	1	2	3	4	5
1. SEC	2.877	.587	.729				
2. EAS	2.717	.865	.102	.893			
3. EC	4.068	.805	.665**	.309**	.804		
4. PRA	3.612	.942	.340**	.127	.420**	.940	
5. PJ	3.796	.649	.533**	.165*	.486**	.456**	.844

Note: Diagonal entries (in bold) are the square root of the AVE (average variances extracted). Entries below the diagonal are correlations.

** $p < .01$.

* $p < .05$.

TABLE 6 Results—Main and moderating effects analysis (Model 1)

	Coeff	Se	t	p	95%LLCI	95%ULCI
Firm size	.1938	.1475	1.3140	.1902	−.0968	.4843
Relationship length	−.0270	.1578	−0.1712	.8642	−.3380	.2840
Industry	.1348	.2756	0.4892	.6251	−.4082	.6778
EAS	.0914	.0599	1.5259	.0574	−.0295	.1896
PRA	.2871	.0518	5.5394	.0000	.0368	.0774
EAS * PRA	.1547	.0449	3.4454	.0007	.0039	.0142

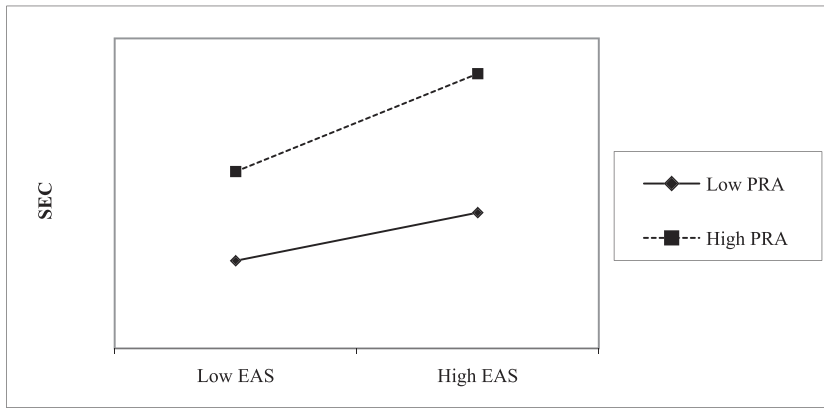


FIGURE 2 Moderating effect of PRA on the relationship between EAS and SEC

	Coeff	Se	t	p	95%LLCI	95%ULCI
Firm size	.1979	.1202	1.6459	.1011	-.0390	.4347
Relationship length	-.0382	.1298	-0.2943	.7688	-.2940	.2176
Industry	.0238	.2256	0.1056	.9160	-.4208	.4684
EC	.3303	.0323	10.2260	.0000	.2667	.3940
PRA	.0285	.0101	2.8244	.0052	.0086	.0484
EC * PRA	.1095	.0294	3.7232	.0002	.0045	.0146

TABLE 7 Results—Main and moderating effects analysis (Model 2)

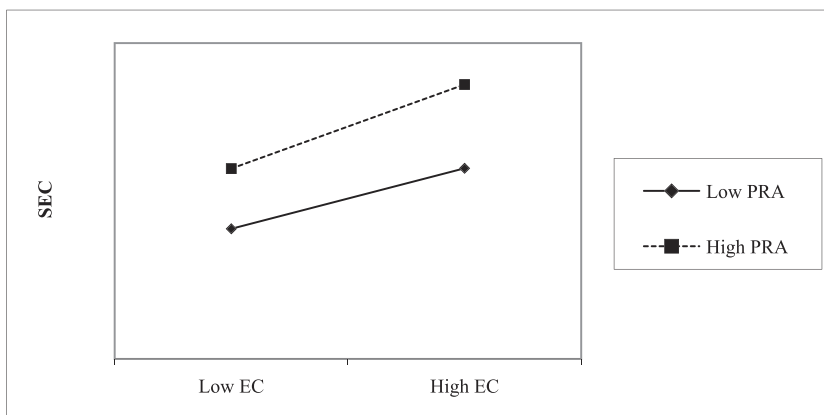


FIGURE 3 Moderating effect of PRA on the relationship between EC and SEC

	Coeff	Se	t	p	95%LLCI	95%ULCI
Firm size	.2961	.1227	2.4135	.0166	.0543	.5378
Relationship length	-.1199	.1311	-0.9141	.3616	-.3782	.1385
Industry	-.0232	.2285	-0.1016	.9192	-.4734	.4270
EAS	.1107	.0911	1.2148	.1257	-.0398	.1276
PRA	.1817	.0521	3.4875	.0000	.0021	.1413
PJ	.2110	.0265	7.9500	.0000	.1587	.2633
EAS * PRA	.0056	.0024	2.2738	.0239	.0007	.0104
EAS * PJ	.0352	.0072	4.9213	.0000	.0211	.0493
PRA * PJ	.0058	.0024	2.4234	.0162	.0011	.0106
EAS * PRA * PJ	.0120	.0037	3.2432	.0012	.0008	.0032

TABLE 8 Results—Moderated moderating effects analysis (Model 3)

supported. The moderated moderating effect of PRA on the relationship between EAS and SEC is shown in Figure 4.

We tested H6 by Model 4, which includes the control variables, the independent variable EC, and the moderating variables PRA and PJ. Results are reported in Table 9 and show that the coefficient for the interaction term EC * PRA * PJ is .0021. The *p* value is .0195 and the confidence interval at the 95% significance level is [.0003, .0038]. This indicates that EC * PRA * PJ has a significant positive effect on SEC, that is, that supplier perceived justice positively moderates the positive moderating effect of supplier perceived relationship

attractiveness on the relationship between environmental collaboration and supplier environmental commitment. H6 is supported. The moderated moderating effect of PRA on the relationship between EC and SEC is shown in Figure 5.

5 | DISCUSSION

Extending environmental management across the supply chain is a key strategic challenge for buying firms, which requires a strong

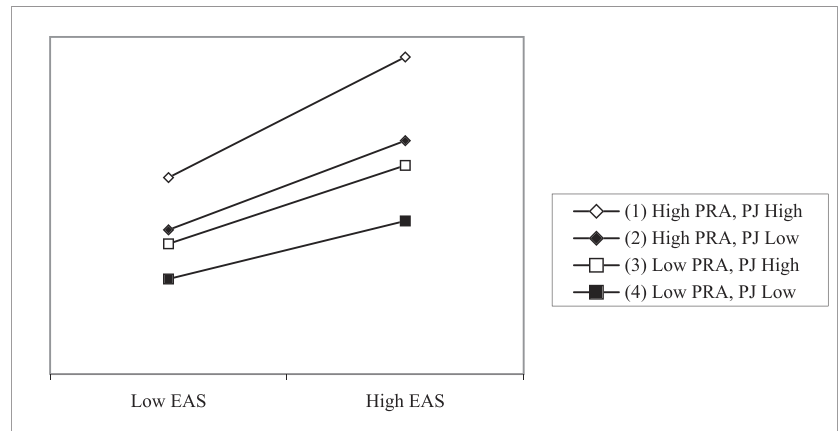


FIGURE 4 Moderated moderating effect of PRA on the relationship between EAS and SEC

TABLE 9 Results—Moderated moderating effect analysis (Model 4)

	Coeff	Se	t	p	95%LLCI	95%ULCI
Firm size	.2264	.1127	2.0084	.0458	.0043	.4485
Relationship length	-.1218	.1228	-0.9925	.3220	-.3637	.1201
Industry	-.0347	.2129	-0.1631	.8706	-.4542	.3847
EC	.1941	.0454	4.2763	.0000	.1047	.2836
PRA	.0211	.0113	1.8588	.0644	-.0013	.0434
PJ	.0900	.0295	3.0495	.0026	.0319	.1482
EC * PRA	.0102	.0033	3.0616	.0025	.0037	.0168
EC * PJ	.0011	.0083	0.1363	.8917	-.0151	.0174
PRA * PJ	.0054	.0027	1.9850	.0484	.0000	.0108
EC * PRA * PJ	.0021	.0009	2.3531	.0195	.0003	.0038

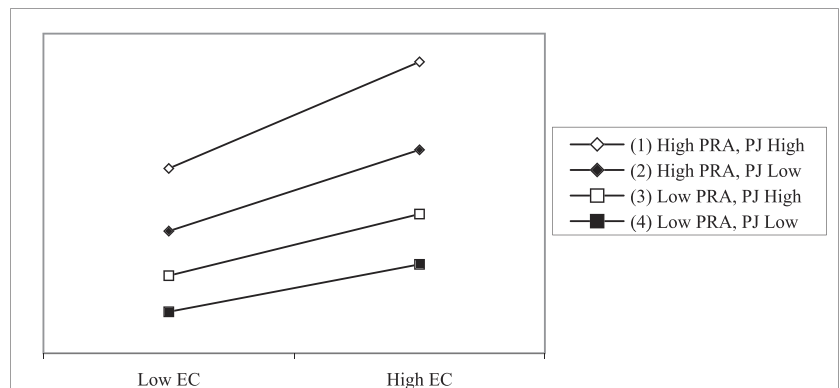


FIGURE 5 Moderated moderating effect of PRA on the relationship between EC and SEC

environmental commitment on the suppliers' side. Responding to recent calls for a more thorough analysis of the impact of supplier development practices from the perspective of suppliers (Saghiri & Mirzabeiki, 2021), we have employed regression analysis with bootstrapping procedures to examine a contingent causal process model of the influence that two major green supply chain management practices widely adopted by buying firms, that is, environmental assessment of suppliers and environmental collaboration with suppliers, exert on supplier environmental commitment, and the moderating effects of supplier perceived relationship attractiveness and justice. Results reveal that environmental collaboration positively affect supplier environmental commitment, whereas the impact of environmental assessment is not significant. Moreover, supplier perceived relationship attractiveness has a positive moderating effect on the influence exerted, on supplier environmental commitment, by both environmental assessment and collaboration, and both these moderating effects are in turn positively moderated by supplier perceived justice.

5.1 | Theoretical Implications

The present paper contributes to a stream of literature that has emphasized the importance of perceptions in management studies (Elsbach, 2003; Henriques & Sadosky, 1999), and in supply chain research in particular (Czakov & Kawa, 2018; Matopoulos et al., 2019; Oosterhuis et al., 2013; Wiedmer et al., 2020), by deepening the role of suppliers' perceptions in shaping the relationships between green supply chain management and supplier environmental commitment. Our study has major theoretical implications.

First, the paper reveals different reactions of suppliers to buying firms' assessment and collaboration practices. Differently from the extant literature which found a positive influence of environmental assessment on supplier environmental practices (Saghiri & Mirzabeiki, 2021), supplier environmental capabilities (Lee & Klassen, 2008), and performance at the buyer and/or supplier levels (Gimenez et al., 2012; Sancha, Gimenez, & Sierra, 2016; Sancha, Wong, & Gimenez Thomsen, 2016), we found no evidence of a significant impact of assessment on supplier environmental commitment. This is consistent with the results by Tachizawa et al. (2015) and by Sancha, Gimenez, and Sierra (2016), who found that assessment was not significantly associated to supplier environmental performance and social performance, respectively. We submit that, far from allowing buyers and suppliers to align their environmental goals, monitoring and evaluation activities not only force suppliers to incur higher monitoring costs (Gualandris & Kalchschmidt, 2015) but may also be perceived by suppliers as ways employed by their customers to transfer environmental responsibilities upstream the supply chain, thereby exerting no effect on the motivation and the ability of suppliers to commit to environmental issues. Conversely, and in accordance with previous research (Lee & Klassen, 2008; Sancha, Gimenez, & Sierra, 2016), environmental collaboration appears to have a major role in stimulating suppliers' environmental commitment.

Taken together, the above findings also allow our study to contribute to another central issue in the debate on green supply chain management, that is, the development of environmental management capabilities by suppliers (Hilliard & Goldstein, 2019; Lee & Klassen, 2008; Wong, 2013). While assessment practices may at best merely assure compliance to standards (Chen & Chen, 2019a), a basic condition for the development of environment-related capabilities is that suppliers are truly committed to environmental issues. This requires buyer-supplier collaborative relationships in which social mechanisms, such as interpersonal relationships and trust, stimulate the participating organizations to share environmental knowledge and to jointly develop new practices and routines. Over time, repeated participation to knowledge-intensive collaborative activities related to environmental issues lead suppliers to absorb the green practices conveyed by their customers and to translate them into their own organizational routines, and to invest in the development of (inter)organizational capabilities specifically related to environmental management (McEvily & Zaheer, 1999). A primary role in these processes is played by an informal "norm of reciprocity" (Gouldner, 1960) that emerges as collaboration proceeds and the social fabric of the relationship becomes increasingly dense, leading suppliers to reward the customers' investments in collaborative activities, which they perceive as purposive acts of commitment, through equivalent or comparable effort (Capaldo, 2007).

Third, our findings suggest that supplier perceived relationship attractiveness is a major contingency for the impact of green supply chain management on supplier environmental commitment. Previous scholars argued that whether suppliers are willing to make substantial environmental efforts depends on the quality of their relationship with buyers (Sancha, Wong, & Gimenez Thomsen, 2016; Simpson et al., 2007). Our analysis further reveals that suppliers who develop positive expectations about their partnerships with buying firms will perceive their customers' environment-related collaborative efforts even more positively, which in turn will further enhance the suppliers' environmental commitment. Interestingly, our study also suggests that a positive attitude of suppliers toward their buying counterparts and the relationships with them has the potential to alter the way suppliers perceive their customers' environmental assessment practices. We submit that, when suppliers perceive their relationships with buying firms as characterized by high intimacy, high profitability, and great development potential, they become willing to accept the buyers' assessment practices and tend to see them as useful devices for effective environmental management, with positive effects on their availability to make extra efforts to meet the environmental requirements of the other party.

Finally, the present study sheds light on the role of justice in supply chain relationships. Extant research has shown that, in buyer-supplier relationships, the perception of justice helps reduce opportunism and enhances commitment (Goffnett, 2018; Huo et al., 2016; Luo et al., 2015). Other scholars have found that, when suppliers perceive that their relationships with buying firms are in a fair state, the implementation of sustainable supply chain management practices by buyers improves suppliers' social performance (Alghababsheh &

Gallear, 2020). We add to this stream of literature by identifying the mechanism by which supplier perceived justice affects the effectiveness of buyer-led green supply chain management practices, specifically by unveiling synergistic effects between perceived relationships attractiveness and justice on the ability of buying firms' assessment and collaboration practices to stimulate suppliers to commit to their partners' environmental objectives. Our moderated moderation analysis reveals that the more suppliers develop positive expectations about their relationships with buying firms, and the more they perceive that, in those relationships, benefit distribution, management procedures, interpersonal interactions and information exchange are characterized by substantial fairness, the easier will be for them to figure out the strategic potential of green supply chain management, which in turn will enhance their commitment to their customers' environmental management practices.

5.2 | Managerial Implications

Our study also provides guidance to practitioners on how to effectively implement green supply chain management. Specifically, a fundamental message of our study, that is, that supplier perceptions matter in shaping the relationship between buyer-led green supply chain management practices and supplier environmental commitment, has several managerial implications. First, supply chain managers in buying firms should be careful when employing suppliers' assessment practices. Conducting environmental audits on suppliers and requiring them to obtain third-party certifications and/or provide self-assessment reports may not be effective ways to solicit suppliers' commitment to environmental issues. Moreover, a "one-size-fits-all" approach to supplier evaluation may easily end up stimulating resistance on the suppliers' side. Conversely, supplier development and training programs, accompanied by collaborative practices, knowledge exchange, and investments in relation-specific assets are far more effective ways for buying companies to build and strengthen over time supply chain relationships imbued with mutual understanding and reciprocal trust, which in turn will stimulate suppliers' care of, and commitment to, environmental issues.

Second, in order to ensure smooth and effective management of environmental issues across the supply chain, buying companies should actively promote the perceived attractiveness of their relationships with suppliers. Organizing seminars and mutual factory visits, sharing information about market and other environmental trends on a regular basis, and creating new business opportunities for the benefit of the overall supply chain allow buying firms to positively influence the perceptions of their supplying partners, thereby promoting profitable interactions with them. In such conditions, suppliers also tend to develop more positive expectations about their supply chain relationships and the associated outcomes. This, in turn, will lead suppliers to welcome their customers' green management practices, so increasing the ability of such practices to sustain environmental commitment on the suppliers' side, and thus the overall positive effects of the buying firms' efforts to apply green management across the supply chain.

Finally, we caution supply chain managers of buying companies to focus on practices and procedures aimed at promoting perceived justice in their supply chain relationships. For example, by integrating the information systems and establishing real-time data sharing platforms across the supply chain, buying firms can enhance the sharing with suppliers of information related to cost, quality, and environmental issues. Doing so will allow buying firms to allocate benefits and resources to suppliers proportionate to their contributions and to implement consistent procedures, thereby promoting transparency and avoiding discrimination in supply chain relationships.

5.3 | Limitations and future research

This study is not without its limitations, which provide opportunities for further development. First, since our sample was drawn from the Chinese manufacturing industry, the generalizability of our findings is limited to some extent. However, as China and the Chinese economy continue their impressive process of growth and catching up to global standards, we conjecture that the results of our study may also be applied to Western business contexts. We therefore encourage future researchers to conduct similar surveys in Western countries and assess whether there are significant differences across country contexts.

Second, we had a nontrivial number of nonresponding firms. We therefore encourage future researchers to conduct follow-up surveys on nonresponding firms to enhance the accuracy and validity of the findings.

Third, we considered environmental assessment and collaboration practices separately, without looking at their interactions. Future research is needed to ascertain whether assessment and collaboration are complements or substitute in their effects on the effectiveness of green supply chain management, and specifically on supplier environmental commitment.

Fourth, the theoretical perspective adopted in this study, based on suppliers' perceptions, has led us to explore the contingent influence of perceived relationship attractiveness and justice on the effectiveness of environmental assessment and collaboration. The adoption of different theoretical perspectives may allow future scholars to identify and test other contingencies affecting the effectiveness of green supply chain management. Among others, our study does not cover the influence of cultural issues, although their importance constantly grows as supply chains become increasingly global. Culturally distant partners may reveal different understandings of environmental issues, and different cultural perspectives may differently affect perceived relationship attractiveness on the suppliers' side, as well as their perceptions related to the distributive, procedural, interpersonal, and informational justice (Capaldo et al., 2012). We recommend that future research draws on cross-cultural research in the supply chain management field to understand how cultural distance between buying and supplying firms impact the effectiveness of green supply chain management by affecting the (inter)organizational processes by which suppliers develop commitment to environmental issues.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

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ENDNOTE

¹ The “List of Listed Companies' Environmental Verification Industry Classification and Management” is available at: https://www.mee.gov.cn/gkml/hbb/bgth/200910/t20091022_174891.htm.

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