

Naffin, Jule; Klewitz, Johanna; Schaltegger, Stefan

**Article — Published Version**

## Sustainable development of supplier performance. An empirical analysis of relationship characteristics in the automotive sector

Corporate Social Responsibility and Environmental Management

**Provided in Cooperation with:**

John Wiley & Sons

*Suggested Citation:* Naffin, Jule; Klewitz, Johanna; Schaltegger, Stefan (2023) : Sustainable development of supplier performance. An empirical analysis of relationship characteristics in the automotive sector, Corporate Social Responsibility and Environmental Management, ISSN 1535-3966, John Wiley & Sons, Inc., Chichester, UK, Vol. 30, Iss. 4, pp. 1753-1769, <https://doi.org/10.1002/csr.2452>

This Version is available at:

<https://hdl.handle.net/10419/287978>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<http://creativecommons.org/licenses/by-nc-nd/4.0/>

## RESEARCH ARTICLE

# Sustainable development of supplier performance. An empirical analysis of relationship characteristics in the automotive sector

Jule Naffin<sup>1</sup> | Johanna Klewitz<sup>2</sup> | Stefan Schaltegger<sup>1</sup> 

<sup>1</sup>Centre for Sustainability Management (CSM),  
Leuphana Universität, Lüneburg, Germany

<sup>2</sup>Audi AG, Ingolstadt, Germany

## Correspondence

Stefan Schaltegger, Centre for Sustainability  
Management (CSM), Leuphana University,  
Scharnhorststr. 1, D-21335 Lüneburg,  
Germany.

Email: [schaltegger@uni.leuphana.de](mailto:schaltegger@uni.leuphana.de)

## Abstract

Sustainability performance of suppliers has become increasingly important for both corporate practice and research. While the importance of relationships between the focal company and its suppliers has been acknowledged for improving sustainability performance of suppliers, little is known about the role of relation specific factors in practice. This research fills this gap by empirically analyzing the relevance of relation-specific factors for the sustainability performance of suppliers based on a unique data set of 736 first-tier suppliers of a German original equipment manufacturer in the automotive industry. The analysis reveals that the sustainability performance of suppliers relates positively to transaction volume and relationship length as specific forms of relation specific characteristics as well as strategic partnership as a proxy of incentivized, in-depth cooperation and knowledge exchange. Each of the investigated relation-specific characteristics show a link with either environmental or with social performance. Conclusions are drawn for research and management.

## KEYWORDS

automotive sector, relational-view, relation-specific factors, suppliers, sustainability performance

## 1 | INTRODUCTION

Recently, the assessment of the sustainability performance of suppliers has received increasing attention as an important part of reducing indirect negative sustainability impacts of focal companies (Holt & Ghobadian, 2009; Müller & Bessas, 2017; Popovic et al., 2018; Sancha, Gimenez, & Sierra, 2016; Seuring & Gold, 2013; Smith & Crotty, 2008). In ever more industries, focal firms are held accountable for impacts in their Scope 3 relationships and supply chains (Schaltegger et al. 2022), due to either regulations (e.g., UK Modern Slavery Act, EU Supply Chain Act, Germany Supply Chain Due Diligence Law), media and NGO attention, or customer demand. To

improve the sustainability performance of a focal company, it requires both information about and the reduction of social and environmental problems in the supply chain. Focal companies therefore search for approaches to effectively and efficiently assess the sustainability performance of a large range of suppliers (Andalib Ardakani & Soltanmohammadi, 2019; Wittstruck & Teuteberg, 2012). However, although sustainability assessment is an important basis for sustainable supply chain management (SSCM), research lacks empirical analyses about the relevance of relationship factors for the sustainability performance of suppliers in various large industries, such as the automotive industry (e.g., Jasinski et al., 2016; Moldavska & Abreu-Peralta, 2016).

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Corporate Social Responsibility and Environmental Management* published by ERP Environment and John Wiley & Sons Ltd.

Sustainability assessment supports risk analyses (Silva et al., 2019), can help enabling a focal company to develop priorities about what suppliers require particular attention (Harms et al., 2013; Schaltegger & Burritt, 2014) and can be linked to business models for sustainability (e.g., Norris et al., 2021). Both SSCM measures for managing supplier relationships as well as information about second- and n-tier suppliers in the supply chain are based on the assessment of first-tier suppliers. First-tier supplier assessment has two purposes. First, assessing their social and environmental performance is the basis for supplier selection in procurement. This serves to reduce risk by excluding suppliers with a high risk of sustainability violations (Govindan et al., 2018). Second, for supplier development and to ensure and improve sustainability performance of (the remaining first- and n-tier) suppliers, focal firms can pursue different approaches depending on the sustainability exposure, strengths and weaknesses of each supplier. While different approaches exist to assess supplier sustainability performance (e.g., Beske-Janssen et al., 2015; Büyükköçkan & Karabulut, 2018; Moldavska & Welo, 2015), only a few cover social and environmental issues in equal depth (e.g., Moldavska & Welo, 2015). The choice of which approaches are most apt for improving sustainability performance (Dijkstra-Silva et al., 2022) of the specific suppliers of a focal company can be based on the assessment results (Beske-Janssen et al., 2015).

However, as information asymmetries exist between the focal firm and suppliers (Dahlmann & Roehrich, 2019), supplier assessment is not just a measurement approach but the preceding process with a relational character (e.g., Burritt & Schaltegger, 2014; Touboulic & Walker, 2016). To receive reliable and representative information from first-tier suppliers it requires proactive management of these relationships. The relational character of sustainability assessments of suppliers may be one reason for missing empirical data about the sustainability performance of suppliers in large industries, such as the automotive industry (e.g., Jasinski et al., 2016; Moldavska & Abreu-Peralta, 2016).

Furthermore, information created with the sustainability assessment can only initiate and maintain effective improvements if the suppliers accept and react on the assessment and related management measures. Proactive management of supplier relationships can help building trust and supplier commitment to pursuing measures of improvement in the most effective way. Both assessment and management are therefore intertwined and cannot be excluded meaningfully from the context and character of the relationship between the focal company and its suppliers.

As the mere assessment of performance is not enough for effective SSCM (Sancha, Gimenez, & Sierra, 2016), it is crucial to understand which factors influence the focal and supplier companies' relationships with regard to the suppliers' sustainability performance. While existing research has largely concentrated on firm-specific, country-level and industry-specific factors (Banerjee et al., 2019), significantly less research considers specific relationship aspects between suppliers and a focal firm and which implications these aspects have on the actual sustainability performance of suppliers (Sancha, Gimenez, & Sierra, 2016; Sancha, Wong, & Thomsen, 2016; Simpson et al., 2007). However, as Seuring and Gold (2013) p. 2, state, "managing the link to suppliers plays

a key role when focal firms aim at moving toward sustainability." Adequate management of supplier relationships can therefore be essential to fully understand reasons for sustainability problems and performance of suppliers as well as to design and implement effective management approaches to improve the overall sustainability performance of suppliers and the whole supply chain (e.g., Norris et al., 2021).

Although the existing literature provides valuable frameworks and has identified multiple critical factors that affect SSCM, research lacks broader empirical analyses of a large range of suppliers in an industry (e.g., Jasinski et al., 2016; Moldavska & Abreu-Peralta, 2016) how relationships between the focal company and suppliers relate to the suppliers' sustainability performance. To fill this gap, this research follows a two-pronged approach.

First, the environmental and social performance of suppliers is assessed based on a unique data set drawn from the automotive industry, which, in recent years, has become an increasingly important field of supplier performance assessment. Due to its worldwide presence and multi-tier supply chains, automotive manufacturers are expected to proactively follow an integrated approach by combining economic, environmental and social measures within their business practices (Koplin et al., 2007; Simpson et al., 2007). Effective and efficient assessment of supplier performance is, however, a challenge for original equipment manufacturers (OEMs) in the automotive industry. The high variety and number of parts and the fact that most of value creation takes place in the supply chain moves relation-specific factors, that is, the role of the buyer–supplier relationship, into focus.

Second, while literature in the field of the automotive industry has concentrated on developing key performance measures for green supply chains (Olugu et al., 2011), social performance criteria have received less attention. This research therefore considers both social and environmental performance, and it investigates which relation-specific factors influence the suppliers' sustainability performance by drawing on the relational view (Dyer & Singh, 1998).

Against the above described research gaps, this study aims to provide empirical evidence for the automotive industry to contribute to the following research question: *What influence do different relation-specific factors have on the sustainability performance of suppliers?*

For the empirical analysis of this key question, this research uses a unique real-world set of data drawn from a large German automotive manufacturer. The sample includes sustainability performance data of 736 suppliers and their production sites. Each supplier was evaluated with an industry-wide accepted self-assessment questionnaire, aiming to assess to which level a supplier's production site(s) can fulfill the OEM's specific sustainability requirements. The data was analyzed with regard to different characteristics of the relationship between the OEM and the respective supplier, including transaction volume, relationship length, strategic partnership and relational distance.

The remainder of this paper is organized as follows. The literature is reviewed in light of assessing sustainability performance of suppliers in the automotive industry. Based on the relational view, hypotheses are developed, which are followed by a description of the research methodology and data sample. The results are presented and

discussed before drawing conclusions and pointing out the limitations of this research.

## 2 | LITERATURE REVIEW

### 2.1 | Supplier performance increasingly important for the automotive industry

In ever more industries, including the automotive industry, OEMs are challenged to consider social and environmental criteria to respond to sustainability requests of various stakeholders, including regulators, media, NGOs, business customers, and so on. (Silva et al., 2019). In this context, sustainability expectations also address the companies' products (De Medeiros et al., 2014) and suppliers (Foerstl et al., 2015), and therefore challenge the OEMs to assess the sustainability performance of suppliers.

OEMs are focal companies of the supply chain that “usually (1) rule or govern the supply chain, (2) provide the direct contact to the customer, and (3) design the product or service offered” (Seuring & Müller, 2008, p. 1699). Given the relevance of supply chains, supplier performance is key for OEMs to improve their environmental and social performance (Beske-Janssen et al., 2015; Schaltegger et al., 2022). While some companies assess supplier performance to prevent risks, others see opportunities by obtaining competitive advantage, safeguarding a long-term successful business relationship (e.g., Chen et al., 2017; Maletic et al., 2018; Wagner & Schaltegger, 2004), or satisfying the expectations of stakeholders (e.g., Beske et al., 2006; Windolph et al., 2014; Silva et al., 2019).

While the focus of the sustainability debate in the automotive industry has so far mainly been on exhausts of combustion engines, accidents and car disposal (Mayyas et al., 2012), more recently supplier performance has gained increasing attention among OEMs. Between 2000 and 2015, the share of OEMs of the total automotive value creation decreased from 31% to only 18% worldwide, while the remaining predominant part of value creation is located in the supply chain (Reuters, 2018). The increasing competition between production locations and growing Asian and global automotive markets have urged OEMs to outsource ever more parts of their production to suppliers (e.g., Held et al., 2018; Jasinski et al., 2016). The increasingly complex multi-tier supply chains with more specialized and changing suppliers has led to decreasing transparency about the consideration of social and environmental issues in the supply chain and results in higher exposure to sustainability risks (Koberg & Longoni, 2019). The ongoing fundamental change to electric mobility (VDA, 2018) furthermore shifts the focus of environmental and social impacts from the use phase of vehicles to manufacturing and supply chain related impacts.

Hence, due to the increased share of total value creation by suppliers and the subsequently increasing risks (e.g., Charms & García-Blandón, 2019; Windolph et al., 2014), OEMs can only safeguard and improve their sustainability performance, if they actively manage sustainability issues of suppliers (Burritt et al., 2020). In practice, different

approaches are applied to assess supplier sustainability performance. The following research therefore empirically investigates how different characteristics of supplier relationships in automotive industry relate to the sustainability performance of suppliers.

### 2.2 | Assessing supplier performance

As focal companies often face high barriers to influence n-tier suppliers with whom they have no direct contract, first tier suppliers are the direct link to transfer sustainability requirements to further n-tier suppliers (e.g., Leppelt et al., 2013; Sancha, Wong, & Thomsen, 2016; Seuring & Gold, 2013). To integrate social and environmental aspects into supplier selection and development processes, focal companies pursue different approaches to manage the relationship with their suppliers (e.g., Burritt & Schaltegger, 2014; Büyüközkan & Karabulut, 2018; Moldavska & Welo, 2015). Table 1 provides an overview of common tools suggested to manage supplier relationships with regard to sustainability performance. A first, often taken step, is the specification of sustainability requirements with a *Code of Conduct* (Burritt & Schaltegger, 2014). A Code of Conduct defines the expectations of the focal company toward their top-tier suppliers regarding social and environmental issues of their operations (e.g., Harms et al., 2013). By including the Code of Conduct into the contract, the focal company can oblige a supplier to comply with the specified sustainability requirements. However, merely fixing sustainability requirements does not yet guarantee that the actual sustainability performance of the supplier is achieved or improves (Beske et al., 2006). Hence, to ensure compliance with the sustainability requirements, focal firms must be able to assess supplier sustainability performance.

Many companies issue *sustainability reports* according to, for example, the Global Reporting Initiative guideline or the 10 principles of the UN Global Compact (Büyüközkan & Karabulut, 2018;

**TABLE 1** Common tools suggested to manage supplier relationships with regard to sustainability performance

Tool	Main use	Explanation
Code of conduct	Fixing requirements	Used by focal company (OEM) to state expectations and requirements
Sustainability report (e.g., based on GRI, UN GC)	Communication	Primarily used by large companies; limited comparability
Life-cycle assessments	Product design	Specialized know-how necessary; limited comparability; product focus
Certification standards (e.g., EMAS, ISO 14001, SA8000 etc.)	Process design	Mainly used by large companies; wide variety in covered topics leads to complexity in comparability



Hohnen & Hasle, 2018). Focal firms can consult the sustainability reports conveniently to evaluate the suppliers' sustainability performance. However, sustainability reports have often become box ticking exercises (Moneva et al., 2006) or may serve as camouflage for low performance (Crotty & Holt, 2021). They are furthermore predominantly issued by large companies, whereas small and medium sized companies have only begun to engage in sustainability reports. B2C companies have engaged earlier and more with sustainability and reports than B2B companies (Johnson et al., 2018), and particularly suppliers without direct contact to the focal company may not always have a well-developed sustainability report. Moreover, sustainability reports can vary widely depending on the company and reporting standard, which complicates comparability and assessment (Schaltegger & Wagner, 2006). Therefore, sustainability reports have so far been most appropriate to communicate to societal stakeholders like media (e.g., Burritt & Schaltegger, 2014; Büyüközkan & Karabulut, 2018) rather than to serve as a tool for focal companies to assess the sustainability performance of suppliers in a systematic and comparable manner.

Furthermore, product-related assessment approaches such as *life-cycle assessments* (LCAs) have been proposed as a tool to assess suppliers (Zimmer et al., 2017). LCAs evaluate various ecological and/or social impacts caused throughout the entire life cycle of a product. However, as LCAs serve primarily to evaluate the ecological footprint of a specific product or part, they do mostly not provide comprehensive information about the overall sustainability performance of the supplier and in its entire operations.

As another often-discussed approach, various *certification standards* for environmental, social and sustainability management help evaluating systems and processes to manage sustainability issues. A certification acquired by a supplier, such as ISO 9001, ISO 14001, ISO 26000, ISO 50001, EMAS or SA8000 signals that a management system and processes are in place and used to deal with sustainability issues. However, all mentioned certification standards cover different aspects, which makes it difficult to receive an aggregated view of the overall sustainability performance of the supplier. For instance, ISO 9001 focuses on requirements for the quality management system at a supplier's production site, whereas ISO 14001 focuses on environmental management systems, for example, waste management systems (Martins & Fonseca, 2018). Likewise, EMAS focuses on environmental management systems but is more extensive than ISO 14001 as it additionally requires an energy management system, which in combination with ISO 14001 would have to be separately certified with ISO 50001. SA8000 and ISO 26000 furthermore aim at implementing social accountability within the management practices. While ISO 26000 is only a guideline while SA8000 is an accepted certification standard (Murmura et al., 2017). A main impediment is that these certification standards provide information about the type and quality of management systems and processes in place but they do not provide a comparable account of a supplier's sustainability performance as such.

Although all these approaches provide some information about whether and how well a supplier deals with sustainability

management, they do not allow for efficient and reliable assessment of the actual sustainability performance of suppliers, and specifically, against for example an OEM's specific sustainability requirements, which are typically written down in Code of Conducts specifically directed toward suppliers and integrated into supplier contracts. These approaches are furthermore rather general with regard to industry, while sustainability problems and challenges can vary considerably between industries, suggesting the application of industry specific indicators to receive helpful assessments (Popovic et al., 2018).

In the automotive industry, first attempts can be observed to develop and agree on sustainability assessment approaches, such as the so called "self-assessment questionnaires" (e.g., CSR Europe, 2018; Fraser et al., 2020), which cover social and environmental sustainability issues and describe standards for supplier audits and on-site assessments to assess sustainability performance of suppliers (e.g., Hannibal & Kauppi, 2018). In their study analyzing 14 industry-based initiatives, Müller and Bessas (2017) found that 12 proposed approaches to assess sustainability performance of suppliers are based on *questionnaires* or *audits* conducted by focal firms. Extant research, however, reveals that supplier assessment alone does not necessarily always lead to improved supplier sustainability performance (Sancha, Gimenez, & Sierra, 2016). This raises the question how relation-specific factors, which focal companies can assess efficiently, relate to the sustainability performance of suppliers.

### 2.3 | Relation-specific factors in supply chains

Various empirical research publications focus on correlations whether and how firm-(e.g., firm size, firm age), country- and industry-specific factors relate to sustainability performance (e.g., Banerjee et al., 2019). For firm-specific factors, Martín-Tapia et al. (2010), Poltronieri et al. (2019) and Stanwick and Stanwick (1998) find that firm size is positively related to advanced environmental strategies and competitiveness as well as overall sustainability performance. Regarding country-specific factors, Maletic et al. (2016) find that organizations based in different countries have substantially different perspectives regarding the achieved levels of organizational performance as a consequence of deploying sustainability practices. Banerjee et al. (2019), however, find that firm characteristics dominate environmental outcomes over country-specific factors, whereas the importance of country-specific versus firm-specific factors varies between industries.

While most of the existing studies adopt of public or institutional stakeholder perspectives, the supply chain management perspective has gained growing attention in recent years, although only a few studies have investigated the role of buyer-supplier relationships in managing a sustainable supply chain (Kumar & Rahman, 2016; Touboulic & Walker, 2015). One stream of literature investigated how sustainable supplier co-operation between focal companies and suppliers influence the economic performance of the

focal company. Hollos et al. (2012) find that green practices have positive significant effects on the focal companies' economic performance, and that in contrast to practitioner perceptions, investments in sustainable supplier co-operation result in positive economic returns. Another stream of research investigates how creating relational capabilities can help transform stakeholder pressures into sustainable outcomes (Chen et al., 2017). However, within this field, only a few studies have investigated the role of buyer-supplier relationships for assessing and managing a sustainable supply chain (Kumar & Rahman, 2016).

Even less research considers specific relationship conditions and how they relate to the actual sustainability performance of suppliers. Simpson et al. (2007) explore the moderating impact of relationship conditions between a customer and their suppliers on the uptake and effectiveness of the customer's environmental performance requirements. Furthermore, Sancha, Wong, and Thomsen (2016) analyze the effectiveness of governance mechanisms in managing buyer-supplier relationships with respect to supplier commitments to environmental requirements of the buyers. While these studies provide valuable insights on the *environmental commitment of suppliers* with regard to the requirements of focal firms, they not analyze the *actual sustainability performance* of the suppliers. Given the typically large number of suppliers in complex industries (Chen et al., 2017; Kumar & Rahman, 2016; Seuring & Gold, 2013; Solér et al., 2010), such as the automotive industry, various instruments are already in place, such as audit programs, self-assessment questionnaires, trainings, ISO certifications, policies, or digital tools for more transparency. The question is, as supplier assessments alone do not invariably lead to improved supplier sustainability performance (Sancha, Gimenez, & Sierra, 2016), how relation-specific factors, which focal companies can assess efficiently, relate to the sustainability performance of suppliers.

The following empirical research aims to address this research gap by investigating how different relation-specific factors relate to the sustainability performance of suppliers, to better support how a focal company can efficiently assess the sustainability performance of its suppliers.

### 3 | DEVELOPING RELATIONS-SPECIFIC HYPOTHESES

#### 3.1 | A relational view on relation-specific factors of supplier performance

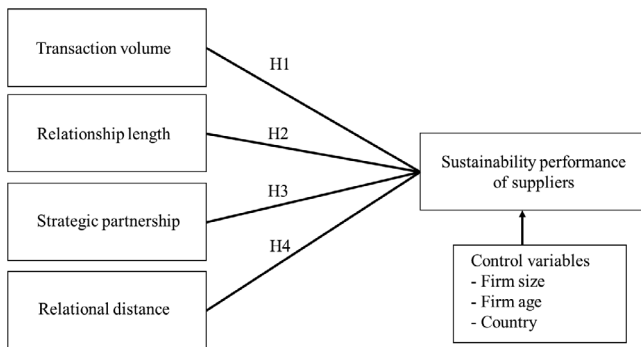
Both competitive advantage and improving the sustainability of products through sustainable supply chain relationship do not originate exclusively from within the firm's boundaries and through the acquisition and use of resources but are results of relationships. To investigate how relation-specific factors relate to sustainability performance of suppliers, the following empirical research therefore develops hypotheses based on the relational view (Barney, 1991; Dyer & Singh, 1998). A key assumption of the relational view is that firms are

embedded in a network of relationships. In this network, collaborative relationships enable relational rents (i.e., supernormal profits) that could not be created alone. This consequently leads to competitive advantage originating from the "joint idiosyncratic contributions of the specific alliance partners" (Dyer & Singh, 1998, p. 662).

For the last decade, the relational view has started to inform SSCM research (Chen et al., 2017). On a general level, Paulraj (2011) draws on the relational view to conceptualize SSCM as a relational capability that can improve the economic performance of focal companies. Gold et al. (2010) develop a conceptual framework of SSCM based on the relational view and highlight that partner-focused supply management capabilities are essential for ensuring economic, environmental and social performance. Touboulic and Walker (2015), applying the relational view to a case study in the food sector, identify supporting and hindering factors of collaborative SSCM. Blome et al. (2014) furthermore show that the sustainability of production is significantly influenced by the similarity of the sustainability profile of collaborating firms. Yang et al. (2015) extend the resource-based view with a relational view to identify the influence of environmental management practices and supply chain integration on technological innovation performance. In sum, the relational view has gained increasing recognition in the SSCM literature and has helped identifying various aspects, which could influence sustainability issues with regard to relationships between focal companies and suppliers, including transaction volume (e.g., Dyer & Singh, 1998; Touboulic & Walker, 2015), relationship length (e.g., Alvarez et al., 2010; Dyer & Singh, 1998; Wagner & Bode, 2014), the strategic role of a supplier (e.g., Albino et al., 2012; Vachon & Klassen, 2006), and relational distance (e.g., Aguilera-Caracuel et al., 2012; Golini et al., 2014; Solér et al., 2010). These developments notwithstanding, research gap remains that little is known how specific relationship conditions relate to the actual sustainability performance of suppliers. The following empirical research aims to address this research gap based. Figure 1 shows the research model with the four hypotheses, developed in the following.

#### 3.2 | Transaction volume and sustainability performance of suppliers

One necessary condition for generating any form of relational rent is the investment in relation specific assets (Dyer & Singh, 1998), which are often related to the transaction volume between the supplier and the focal company. While the sustainability relevance of transaction volume can vary depending on characteristics of the exchanged product, distances from suppliers to customers, and so on, it influences the relationship between suppliers and the focal company. Relationship-specific investments are non-refundable expenses made by a firm to support a specific inter-organizational relationship (Williamson, 1985). Once made, these investments usually cannot be redeployed to other inter-organizational relationships in case the relationship ceases. Firms typically make relation-specific investments to increase the efficiency of the relationship and because these investments may represent a



**FIGURE 1** Research model with tested hypotheses

promise for future benefits (Wagner & Bode, 2014). First empirical research underlines the importance of developing and having relationship-specific assets for implementing sustainability projects (Touboulic & Walker, 2015).

According to the relational view, asset-specific investments are highly influenced by the volume and scope of transactions between alliance partners (Dyer & Singh, 1998), usually defined by a contract between the focal firm and a supplier (Simpson et al., 2007). Contracts are a well-known tool for safeguarding relationship-specific investments (Wagner & Bode, 2014; Williamson, 1985). Studies empirical support that higher levels of specific investments are associated with, for instance, longer contracts between focal firms and suppliers (Wagner & Bode, 2014). Such contracts between focal firms and suppliers can weaken the “hold-up problem” in situations of specific investments (Fudenberg et al., 1990), for example, supplier-specific investments for sustainability improvement. Conditions facilitating relationship-specific investments between the focal firm and the supplier—particularly with regard to the supplier having dedicated commitments by the focal firm in terms of contracted transactions—will more likely get the supplier to be responsive to the focal firm's value system and sustainability requirements (Simpson et al., 2007). In general, suppliers' sustainability performance improvement requires the firms involved to commit financial and capital resources (Vachon & Klassen, 2007) as it provides the basis for the cumulative capabilities necessary for SSCM (Gavronski et al., 2011). The first hypothesis is therefore:

**Hypothesis 1.** *A higher transaction volume between the focal firm and a supplier is positively associated with the supplier's sustainability performance.*

### 3.3 | Relationship length and sustainability performance of suppliers

Asset-specific investments are not only influenced by the volume of transactions between alliance partners, but also by the duration of the respective partnership (Dyer & Singh, 1998). For instance, Dyer

(1996) found in his empirical study that Japanese suppliers were more likely to make relation-specific investments, because automotive OEMs offered safeguards on those investments for 8 years or more. In contrast, U.S. OEMs offered on average 2.3 years, demotivating suppliers to make relation-specific investments. A short relationship length implies that the supplier has not gathered a large amount of experience with the focal firm (e.g., Sajjad et al., 2015). When the relationship matures, the supplier should have accumulated information about and confidence in the focal firm. Hence, relationship length signals a high likelihood of relationship continuity to new and potential suppliers (Wagner & Bode, 2014). Expectations that the “relationship will extend over several years or indefinitely” is supposed to be positively associated with “supplier's buyer-specific investments” (Rossetti & Choi, 2005, p. 49). Consequently, the development of strong forms of collaboration, such as long-term partnerships, has been highlighted as a promising SSCM strategy (Vachon & Klassen, 2006). Duration of cooperation has found to be an important determinant of trust in relationships, which in turn enhances sustainable supply chain performance (e.g., Alvarez et al., 2010). Relationship length may therefore facilitate alignment of interests and understanding of requirements and expectations. This can in turn help overcome challenges in inter-firm business transactions and offers an opportunity to ensure stability (Burki & Buvik, 2010), in particular with regard to the implementation of sustainability in the supply chain (Touboulic & Walker, 2015). Based on these arguments, the second hypothesis is:

**Hypothesis 2.** *A higher relationship length between the focal firm and a supplier is positively associated with the supplier's sustainability performance.*

### 3.4 | Strategic partnership and sustainability performance of suppliers

Existing SSCM research proposes that firms aiming to improve their sustainability performance should engage in the development of strong supplier partnerships that facilitate sharing complementary knowledge and capabilities or to develop new ones (Albino et al., 2012). According to the relational view these principles of inter-firm knowledge sharing and capability combination are key determinants of generating relational rents (Dyer & Singh, 1998). Dyer and Singh (1998) highlight several facilitating core processes. First, partner-specific absorptive capacity describes the ability of a firm to recognize and assimilate crucial knowledge from a particular alliance partner. It is described as a “function of (1) the extent to which partners have developed overlapping knowledge bases and (2) the extent to which partners have developed interaction routines that maximize the frequency and intensity of sociotechnical interaction” (Dyer & Singh, 1998, p. 665). This is enhanced as alliance partners “get to know each other well enough to know who knows what and where critical expertise resides within each firm” (Dyer & Singh, 1998, p. 665).

Hence, firms particularly increase partner-specific absorptive capacity through inter-firm routines that facilitate information sharing and intimate, extensive interactions (Dyer & Singh, 1998). These elements are also highlighted by SSCM scholars as crucial for supporting sustainable supply chains. For instance, Ramanathan et al. (2014) highlight the importance of not only sharing general technical information, but also the wider requirements of participants, green agendas and strategies as a result of in-depth interactions between focal firms and suppliers. Furthermore, van Hoof and Thiel (2014) provide evidence that having a common goal, sharing information and structuring solutions as key elements of collaboration capacity is essential for implementing cleaner production in supply chains. A second facilitator to generate relational rents through knowledge sharing is the alignment of incentives by alliance partners that “encourage partners to be transparent, to transfer knowledge, and not to free ride on the knowledge acquired from the partner” (Dyer & Singh, 1998, p. 666). These incentives can be formal (e.g., financial equity arrangements) or informal (e.g., sharing exclusive information) (Dyer & Singh, 1998). SSCM research provides evidence that strong partnerships with suppliers, supported by appropriate incentive systems, are a significant element of the successful application of innovative environmental technologies.

To realize the above highlighted mechanisms in practice, a common measure of focal companies is to set up specific supplier programs that include a selected set of the most relevant strategic suppliers. One example in the automotive industry is the so-called Aligned Business Framework (ABF) of Ford. Here, Ford signs agreements with strategic suppliers, which lends to increased openness, dialog and a partnership attitude. Since its launch in 2005, Ford has identified and selected 114 strategic suppliers to be part of the program (Ford, 2019). Ford is facilitating the ABF commitment to SSCM through a three-stage process, in which the suppliers are required to: (1) articulate standards for working conditions and environmental responsibility throughout the value chain by establishing a CoC, (2) promote these standards in its facilities through trainings and (3) drive environmental performance in its facilities through environmental management systems (Ford, 2019).

Similarly, Volkswagen Group has introduced the FAST (Future Automotive Supply Tracks) Initiative in 2015 with strategic key suppliers. The aim of the initiative is a close cooperation on future topics, such as innovation and sustainability. As an incentive, these strategic suppliers are involved in the Group processes and strategic decisions at a very early stage. In so-called FAST Strategic Dialogs, critical knowledge, strategic agendas and future goals are exchanged on a regular basis (Volkswagen, 2019). In accordance with such activities, Paulraj (2011) emphasizes that firms must not only develop competitive capabilities internally, but they must leverage them to identify strategic partners and manage them collaboratively to meet sustainability targets. If a supplier is classified as a strategic partner by the focal firm, this may also signal to the supplier a specific form of inter-firm trust and customer-initiated collaborative activity, which is shown to be positively associated with the extent

to which firms engage in sustainability (Sharfman et al., 2009). Thus, the third hypothesis is:

**Hypothesis 3.** *The supplier's strategic partnership status obtained by the focal firm is positively associated with the supplier's sustainability performance.*

### 3.5 | Relational distance and sustainability performance of suppliers

Empirical research highlights the role of the relational distance between firms with regard to the implementation of sustainability measures (e.g., Aguilera-Caracuel et al., 2012). To generate rents from relationships, the relational view highlights the importance of in-depth interactions between firms, including the share and use of information (Dyer & Singh, 1998). Organizations located at distance from the focal firm in the supply chain are expected to share and use a limited amount of information. Solér et al. (2010, p. 24), conclude that “supply chain actors close to the end-consumer perceive environmental consumer demand (...) as connected to environmental aspects affecting end-consumer preference. For these actors the cost of using environmental information becomes an investment in company goodwill.” Actors at a greater distance perceive these costs “as having no or little connection to the preferences of the end-consumer,” which results in “a limited use of (...) information” (Solér et al., 2010, p. 24). In addition, the exchange between the customer and a firm with a higher relational distance is likely to be less intensive than with a firm with smaller distance to customers. Consequently, SSCM might be less intense or hindered in firms with a larger relational distance to the focal firm due to the lack of necessary information, knowledge, and tools. Hence, firms in a business network with a smaller relational distance to the focal firm, such as headquarter-based suppliers, are considered to have more sustainability competence (Golini et al., 2014). In contrast, “delocalized plants” have been suggested to achieve different levels of environmental and social sustainability performance, because sustainability programs and requirements are often developed and spread from the headquarters to the subsidiaries (Kassinis & Vafeas, 2006). Based on these arguments the fourth hypothesis is:

**Hypothesis 4.** *A lower relational distance between the focal firm and a supplier is positively associated with the supplier's sustainability performance.*

## 4 | RESEARCH METHOD

### 4.1 | Research context, sampling, and data collection

To answer the research questions and test the hypotheses, a unique empirical data set from a large German automotive manufacturer



(in the following “focal firm”) was used. The automotive industry is considered as one of the “highly sustainability sensitive” industries both due to its high economic relevance, the worldwide expansion of its business, including its complex, multi-tier supply chains, as well as due to the public debates about its environmental impacts (e.g., Brand, 2016). While earlier research has emphasized the relevance of SSCM to develop competitive advantage (Kumar & Rahman, 2016), societal pressures have increased the strategic relevance of SSCM. Automotive OEMs are therefore expected to actively manage sustainability issues as part of their business practices, including their supply chains (Koplin et al., 2007; Simpson et al., 2007). The focal firm under consideration is an internationally operating manufacturer of vehicles that uses a large, multinational supplier base. Sustainability in the supply chain and a systematic assessment of the sustainability performance of its suppliers have therefore gained high strategic relevance for the OEM. For the sustainability assessment of suppliers, the focal firm evaluates its supplier base with an established industry-common self-assessment questionnaire. The supplier assessment covers social and environmental compliance aspects. The evaluation of a supplier's sustainability performance is production site-based. Each supplier's production site is labeled with a unique D-U-N-S number (Data Universal Numbering System, a code system which identifies a supplier's location), and treated as a specific supplier. The total sample for the analyses covers 736 production suppliers with their sustainability performance data of 2018 including worldwide locations.

## 4.2 | Dependent variable: The sustainability performance of suppliers

The dependent variable of this analysis, the *sustainability performance of a supplier*, is taken from the database of the automotive industry's “Drive Sustainability” working group. The database includes a wide range of social and environmental aspects and is based on a self-assessment questionnaire (Sustainability Assessment Questionnaire

“SAQ Version 3.0”). “Drive sustainability” is an automotive partnership, at the time of data collection, between BMW Group, Daimler AG, Ford, Honda, Jaguar Land Rover, Scania CV AB, Toyota Motor Europe, Volkswagen Group, Volvo Cars and Volvo Group. This self-assessment questionnaire was launched in 2014 and has become the industry-wide accepted standard for collecting data on the sustainability performance of suppliers. The working group “Drive Sustainability” constantly develops the content of the questionnaire to cover important sustainability issues in the automotive supply chain. An accredited, external service provider organizes the data collection based on 32 questions (referring to the SAQ version 3.0 in 2018) covering a range of social and environmental performance aspects. Each supplier has to answer all questions and upload documents and certificates to verify the provided answers. The focal firms access the performance data via the external service provider's platform.

The self-assessment questionnaire includes general supplier data and five categories of data (company management, working conditions and human rights, business ethics, natural environment, sustainable supplier management) covering the sustainability performance of suppliers (Table 2).

For each category a maximum number of points can be achieved. All answers must be supported with evidence checked by the service provider. Unsupported statements and lack of evidence, such as a missing code of conduct or missing environmental management certificates, lead to a deduction of points. The overall sustainability performance of a supplier is assessed with a score ranging from 0% to 100%, while 100% represents a perfect score and fulfillment of all requirements in all categories. This score is disclosed on the online platform and can be accessed by the supplier.

The score based on the assessment process of “Drive Sustainability” is used as the dependent variable of the following analysis. As the assessment of the sustainability performance of the suppliers is conducted and checked by an independent service provider, the data is not as susceptible to a social desirability bias as data gathered from surveys without counterchecks of self-disclosed data. Similar

**TABLE 2** Content and exemplary sustainability requirements (SAQ 3.0, year of reference 2018)

Category	Sustainability dimension	Number of questions	Examples of topics covered
Company management	Social	11	<ul style="list-style-type: none"> <li>- Social sustainability responsible management person available</li> <li>- Code of conduct in place</li> <li>- Internal training sessions on CSR/sustainability</li> </ul>
Working conditions and human rights	Social	6	<ul style="list-style-type: none"> <li>- Working conditions policy (e.g., working hours, child labor)</li> <li>- Health and safety policy/management system</li> </ul>
Business ethics	Social	4	<ul style="list-style-type: none"> <li>- Formal business ethics policy (e.g., anti-corruption, privacy)</li> </ul>
Environment	Environmental	6	<ul style="list-style-type: none"> <li>- Formal environmental policy (e.g., energy consumption, air quality, water consumption)</li> <li>- Certified energy management system</li> <li>- Procedures to identify and manage substances with restrictions</li> </ul>
Sustainable supplier management	Social and Environmental	5	<ul style="list-style-type: none"> <li>- Corporate social responsibility/sustainability requirements set toward suppliers (e.g., child labor, greenhouse gas emissions)</li> </ul>

approaches analyzing the sustainability performance of firms have been used for various existing studies (e.g., Husted & de Sousa-Filho, 2017).

### 4.3 | Independent variables: Volume, relationship length and strategic partnership

*Transaction volume* was measured as the total turnover (in Euro) between the focal firm and each supplier (Zaremba et al., 2016). This variable was lagged by 1 year to infer causality, that is, the year before the assessment was conducted. The data was drawn from the internal supplier database of the focal firm.

*Relationship length* was measured as the period of time (in years) how long the focal firm has worked together with the respective supplier (Wagner & Bode, 2014). The data was obtained from the internal supplier database of the focal firm.

The status of *strategic partnership*, is based on whether a supplier is classified as strategic partner by the focal firm or not. Strategic partners of the focal firm are involved in a group-wide supplier program, which aims to ensure in-depth cooperation, including the exchange of critical knowledge, strategic agendas and future goals as well as supplier awarding (e.g., for very sustainable suppliers) (van Hoof & Thiell, 2014). Accordingly, the variable is dichotomous with the value of 1 for all suppliers with a strategic partnership status and the value of 0 for non-strategic suppliers. The data was drawn from the internal supplier database of the focal firm.

For *relational distance*, the position of a supplier in the business network of the focal firm was used. Specifically, headquarter-based suppliers were classified as having a small relational distance to the focal firm and assessed with the value of 1. All other suppliers were assessed to have a large relational distance to the focal firm and the value of 0 was assigned for relational distance. The data was obtained from the internal supplier database of the focal firm and complemented with supplier-reported information on the location.

### 4.4 | Control variables

Several important control variables are included in the analysis (Table 3). First, *firm size* has been considered to affect sustainability performance, because large firms have a greater resource base and therefore are able to invest more in social and environmental aspects (e.g., Golicic & Smith, 2013). Firm size was measured based on the number of employees of the supplier (Golini et al., 2014). A second important variable according to the literature that was controlled for is *firm age*. Many authors conclude that older firms tend to be more sustainable than younger firms given the higher likelihood of being involved in social and environmental issues over time (Banerjee et al., 2019; Gelhard & von Delft, 2016). Firm age was measured as the number of years since the start of the supplier's business. Finally, diversity in culture, norms, national laws, and other factors as a result of country-level differences can influence a firm's sustainability

**TABLE 3** Summary of variable definitions for all variables used in the empirical analysis

Variable	Description	Type
Supplier's sustainability performance	Results of SAQ ranging from 0%–100%	Continuous
Transaction volume	Total turnover between the focal firm and the specific supplier in the year prior to assessment	Continuous
Relationship length	Duration in years of the relationship between the focal firm and the specific supplier	Continuous
Strategic partnership	Proxy for in-depth, incentivized cooperation. Dummy variable with the value of 1 for all suppliers with a strategic partnership status and the value of 0 for all suppliers without a strategic partnership status	Dichotomous
Relational distance	Dummy variable taking the value of 1 for all headquarter-based suppliers (lower relational distance) and the value of 0 for all non-headquarter based suppliers (higher relational distance)	Dichotomous
Firm size	Number of employees of the respective supplier	Continuous
Firm age	Number of years elapsed since start of business of the respective supplier	Continuous
Country	Country of the respective supplier	Dummy

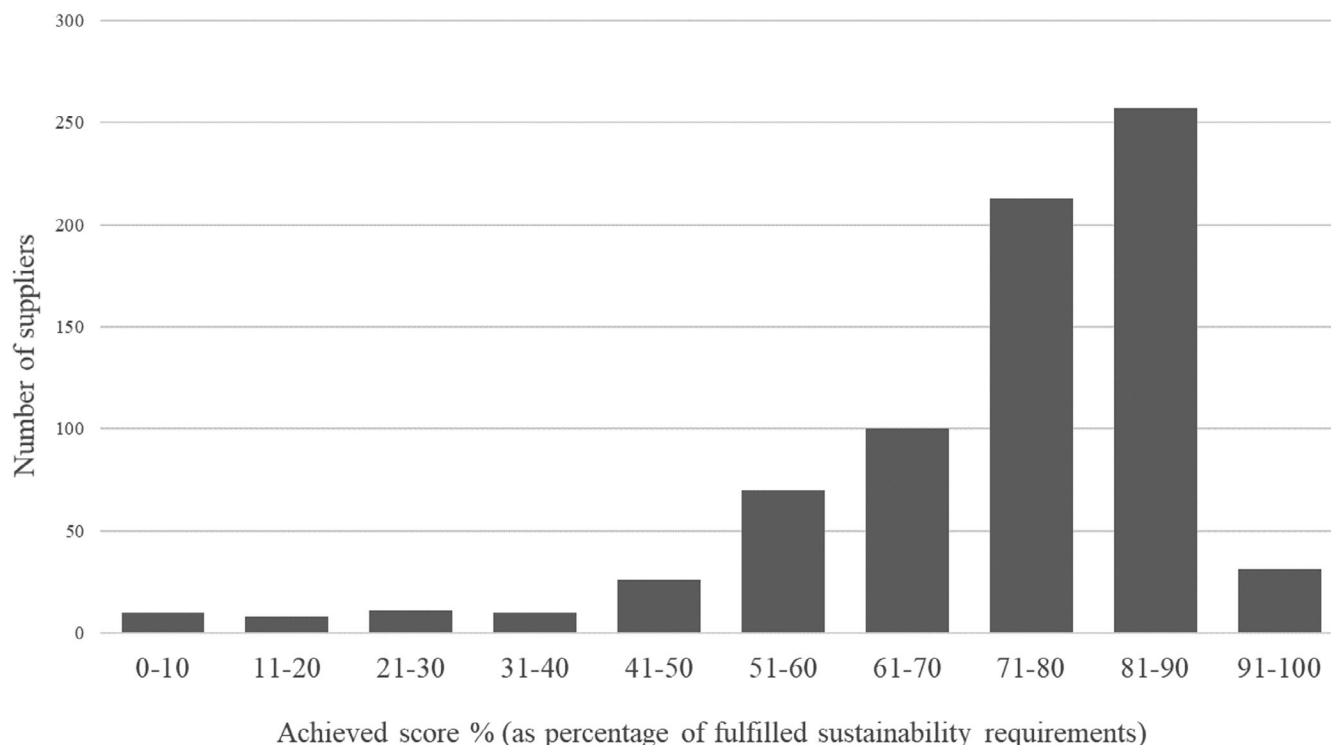
performance and therefore needs to be controlled for (Banerjee et al., 2019; Ramanathan et al., 2017). Hence, the following analysis controlled for *country effects* by including dummy variables in the analysis. All data for the control variables were reported by the suppliers within the assessment procedure and validated with the internal supplier database of the focal firm.

Table 3 provides an overview of the variables used for testing the hypotheses. As the data for dependent and independent variables largely originate for different data sources a common source bias is avoided the validity of the results increased (Wagner & Hoegl, 2006).

## 5 | RESULTS AND DISCUSSION

### 5.1 | Environmental and social performance of the examined suppliers

Based on the sustainability requirement data collected with the self-assessment questionnaire (SAQ version 3.0) of the “Drive Sustainability” partnership of the automotive industry, the analyzed sample of



**FIGURE 2** Distribution of sustainability assessment of suppliers (scores in percentage per decile)

**TABLE 4** Overview of conformities

Category	Examples of requirements	Requirement fulfilled	Requirement not fulfilled	Percentage fulfilled
Company management	- Social sustainability manager available	695	41	94.4
	- Compliance manager available	706	30	95.9
	- Code of conduct in place	672	64	91.3
	- Internal CSR/sustainability training sessions	383	353	52.0
	- Company publish a CSR/sustainability report	250	486	34.0
Working conditions and human rights	- Management system to manage working conditions in place	527	209	71.6
	- Health & safety policy in place, complying with local law	663	73	90.1
	- Health & safety management system in place	426	310	57.9
Ethics	- Formal business ethics policy in place	665	71	90.4
Environment	- Formal environ. policy committing to continuous measurement and improvements in environ. performance	681	55	92.5
	- Certified environmental management system	408	328	55.4
	- Certified energy management system	140	596	19.0
	- Procedures to identify and manage substances with restrictions	298	438	40.5
Sust. Supplier mgmt.	- Corporate social responsibility/sustainability requirements set toward suppliers	604	132	82.1

Note: Total number of assessed suppliers: 736.

736 suppliers in the year 2018 performs with an average performance score of 72.73%. Figure 2 shows the distribution of the sustainability performance of the suppliers with more than 30% (253 of 736 suppliers) achieving a score between 81% and 100% (second last column to the right).

An overview of fulfilled requirements is provided in Table 4. In tendency, the suppliers perform better with regard to environmental requirements (average score of 76.59%) than with regard to social

requirements (average score of 73.03%). One possible explanation might be that resource conservation as an environmental requirement often goes along with cost savings, is more easily measured and therefore motivates suppliers to reduce energy, materials or water consumption.

While the majority of suppliers have a responsible social sustainability (94.4%) and compliance manager (95.9%) and a code of conduct in place (91.3%), about half of the suppliers (52.0%) conduct

training sessions to support a deeper understanding of sustainability requirements, and a third has a sustainability report (34.0%). Essential, for the improvement of sustainability performance in complex and global supply chains is that direct suppliers, in turn, set clear sustainability requirements toward their suppliers (second-tier suppliers from the OEMs perspective). In the data sample this is the case for 82.1% of the first-tier suppliers.

Performance differences become visible, for example, with regard to “working conditions and human rights” (SAQ Version 3.0) where only 57.9% of suppliers have a health and safety management system while in the category “environment,” 92.5% of suppliers have a formal environmental policy but only 19% of the suppliers have a certified environmental management system. Hence, core strengths of automotive suppliers based on the study are in the area of defining sustainability requirements (91.3% with code of conduct), whereas weaknesses exist in the area internal training sessions (52.0% with internal training), and the implementation of certified health and safety (57.9%), environmental (55.4%) and energy (19.0%) management systems.

## 5.2 | Relation-specific factors influencing the sustainability performance of suppliers

In order to understand whether relation-specific factors are related to the sustainability performance of suppliers the first hypothesis was tested for the above-described dataset. The statistical program R was applied and ordinary least squares (OLS) regression used because the dependent variable is measured as a continuous variable. Table 5 displays the descriptive statistics and correlations of the variables.

No indication of multi-collinearity could be found. The correlations are within acceptable ranges ( $|r| < 0.30$ ) and the variance inflation factors (VIF) for the variables are all below 4.00, while a VIF

greater than 10.00 would indicate multi-collinearity problems (Kennedy, 1992).

The results of the OLS regression are presented in Table 6. Model 2 introduces the independent variables transaction volume, relationship length, strategic partnership, and relational distance to test for the hypothesized effects on the sustainability performance of the suppliers (dependent variable). Model 2 provides a good fit, as indicated by the significant  $F$  value and increasing  $R^2$  after including the independent variables. Model 1 includes the control variables firm size, firm age and the country dummies.

The control variables firm size ( $\beta = 0.145$ ,  $p = 0.0006$ ) and firm age ( $\beta = 0.144$ ,  $p = 0.000$ ) are positively associated with the sustainability performance of suppliers. This find confirms earlier studies by Martín-Tapia et al. (2010), Poltronieri et al. (2019) and Stanwick and Stanwick (1998) in general and shows the relevance of firm size and age for first-tier suppliers of the automotive industry.

The OLS regression furthermore shows that the transaction volume between the focal firm and a supplier is significantly ( $p < 0.10$ ) positively associated with the sustainability performance of suppliers in the automotive industry ( $\beta = 0.069$ ,  $p = 0.069$ ). This confirms Hypothesis 1 that higher transaction volume is positively related to higher sustainability performance of suppliers.

Hypothesis 2 proposing that a longer relationship length between the focal firm and a supplier is positively associated with the supplier's sustainability performance is also supported ( $\beta = 0.076$ ,  $p = 0.042$ ).

The analysis furthermore strongly supports Hypothesis 3 ( $\beta = 0.139$ ,  $p = 0.000$ ) and reveals that a supplier's strategic partnership status at the focal firm is positively associated with the supplier's sustainability performance.

However, while a significant association between relational distance and a supplier's sustainability performance could be found, the effect is surprisingly contrary to the effect proposed with Hypothesis 4 ( $\beta = -0.279$ ,  $p = 0.000$ ). The effects also remain the same when distinguishing social and environmental performance.

**TABLE 5** Descriptive statistics and correlations

	1	2	3	4	5	6	7
1 Suppliers' sustainability performance	1.00						
2 Transaction volume	0.169	***	1.00				
3 Relationship length	0.068	+	0.171	**	1.00		
4 Strategic partnership	0.200	***	0.226	***	-0.043	1.00	
5 Relational distance	-0.283	***	-0.082	*	0.121	**	-0.163
6 Firm size	0.222	***	0.218	***	0.051	0.093	*
7 Firm age	0.082	*	-0.001	0.212	***	-0.008	0.235
Mean	72.732	21506582.1	9.027	0.147	0.355	641.592	28.807
Standard deviation	17.074	38895654.0	5.147	0.354	0.478	864.673	26.892

Note:  $N = 736$ . Significance levels: +  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

TABLE 6 OLS regression results for the sustainability performance of the analyzed suppliers

	Overall sustainability performance of suppliers				Social performance of the suppliers				Environmental performance of the suppliers			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.
(Intercept)	*** (3.735)	*** (3.701)	*** (3.937)	*** (3.897)	*** (3.937)	*** (3.897)	*** (3.937)	*** (3.897)	*** (5.307)	*** (5.307)	*** (5.406)	*** (5.406)
Firm size	*** 0.230 (0.001)	*** 0.145 (0.001)	*** 0.233 (0.001)	*** 0.149 (0.001)	*** 0.233 (0.001)	*** 0.149 (0.001)	*** 0.233 (0.001)	*** 0.149 (0.001)	*** 0.194 (0.001)	*** 0.194 (0.001)	** 0.129 (0.001)	** 0.129 (0.001)
Firm age	* 0.106 (0.026)	*** 0.144 (0.025)	*** 0.081 (0.028)	* 0.121 (0.026)	*** 0.081 (0.028)	** 0.121 (0.026)	** 0.121 (0.026)	** 0.121 (0.026)	** 0.119 (0.037)	** 0.119 (0.037)	*** 0.138 (0.037)	*** 0.138 (0.037)
Country <sup>a</sup>	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Transaction volume		0.069 (0.000)	+		0.070 (0.000)	+		0.070 (0.000)		0.046 (0.000)		0.046 (0.000)
Relationship length		0.076 (0.124)	*		0.061 (0.131)			0.061 (0.131)		0.114 (0.182)		0.114 (0.182)
Strategic partnership		0.139 (1.790)	***		0.146 (1.885)	***		0.146 (1.885)		0.068 (2.615)	+	0.068 (2.615)
Relational distance		-0.279 (1.374)	***		-0.277 (1.447)	***		-0.277 (1.447)		-0.211 (2.007)	***	-0.211 (2.007)
R <sup>2</sup>	0.101	0.202	0.107	0.208	0.107	0.208	0.107	0.208	0.099	0.099	0.154	0.154
F value	1.797	**	3.694	***	1.923	***	3.850	***	1.767	**	2.674	***

Note: N = 736. Standardized regression coefficients ( $\beta$ ) are presented. S.E. = standard error. Significance levels: +  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .  
<sup>a</sup>42 country dummies included.

The findings overall show that the sustainability performance of a first-tier supplier in the automotive industry is associated with relation-specific factors. Specifically, transaction volume and relationship length as specific forms of relation-specific assets as well as strategic partnership as a proxy of incentivized, in-depth cooperation and knowledge exchange (Dyer & Singh, 1998) are positively related to a supplier's sustainability performance. This is in line with existing research showing that forms of relation-specific investments (Simpson et al., 2007; Simpson & Power, 2005; Touboulis & Walker, 2015; Vachon & Klassen, 2006) and cooperation as well as knowledge exchange between partners (Ramanathan et al., 2014; Sancha, Gimenez, & Sierra, 2016; van Hoof & Thiell, 2014) positively influence the implementation of sustainability measures and the sustainability performance of supply chains.

Surprisingly, firms with a smaller relational distance to the focal firm (i.e., headquarter-based suppliers), have a significantly worse sustainability performance. While this result is in line with existing findings that headquarters do not necessarily perform better than subsidiaries (Golini et al., 2014) the finding is still surprising from a relational view. A more detailed analysis of the suppliers evaluated as being close to the focal firm's headquarters shows that they are significantly smaller than the average supplier ( $x = -0.157$ ,  $p < 0.001$ ). Firm size, which has been associated in earlier studies with lower sustainability performance (Min & Galle, 2001; Stanwick & Stanwick, 1998) may therefore play a larger role than relations distance. To understand whether further aspects can explain this result could be investigated in future research.

## 6 | CONCLUSION, LIMITATION, AND OUTLOOK

A considerable part of the existing SSCM research has so far concentrated on developing frameworks and tools to assess the sustainability performance of suppliers (Seuring & Müller, 2008). With view to new legislations around the world, the mere assessment is not enough, as at the core of these new legislation the focus lies on "accountability and impact." Hence, focal companies need to prove to external stakeholders, incl. legislators, how impact was generated with the tools. For this purpose, this analysis complements this research by empirically investigating whether relation-specific factors are associated with the sustainability performance of suppliers. This is essential, as focal companies need to draw the rights conclusions from the mere "performance analysis" and go toward impact-oriented tools. From a practitioner's perspective this is relevant to understand, as in the past tools such as an "SAQ" were used to measure the level of performance. Moving forward, practitioners should understand tools such as an "SAQ" as means to enable their suppliers, by, for instance, requiring that suppliers implement social and environmental management systems that put them in a position to handle sustainability risks and problems.

The results support the literature noting that partner-specific absorptive capacity is increased through sharing information,

extensive interactions, and in general emphasizing the relationships between suppliers and the focal firm. Hence, firms particularly increase partner-specific absorptive capacity through inter-firm routines that facilitate information sharing and intense interactions (Dyer & Singh, 1998). These elements are also highlighted by SSCM scholars as crucial for supporting sustainable supply chains. For instance, Ramanathan et al. (2014) highlight the importance of not only sharing general technical information, but also the wider requirements of participants, green agendas, and strategies as a result of in-depth interactions between focal firms and suppliers.

Furthermore, while Chen et al. (2017) show in their literature review that most of the existing studies focus on the environmental perspective of sustainability performance, with only about 20% examining social performance, this analysis has considered both environmental and social aspects of the sustainability performance of first-tier suppliers in the automotive industry. This study shows that relation-specific factors are strongly associated with the sustainability performance of suppliers. More specifically, the analysis reveals that *higher transaction volume, longer relationship length and strategic partnership status are positively associated with higher sustainability performance of a supplier. Relational distance between a supplier and the focal company, however, is negatively related to supplier performance* and may be overridden by the smaller firm size of suppliers close to the headquarters of the focal company. While this analysis is informed by relational theory and it acknowledges that the examined variables can influence the willingness of a supplier to invest in sustainability improvements but that no indicator can be considered a guarantee for high sustainability performance for each supplier.

This research has implications for managers, particularly involved in supply chain management and SSCM positions. The automotive industry is increasingly under scrutiny to develop and demonstrate its engagement to improve the sustainability performance of the supply chain. This is of particular relevance in light of recent governmental initiatives (e.g., due diligence regulation, EU regulation schemes) aiming to regulate due diligence across complex and global supply chains, placing increasing responsibility on the focal firms. Hence, ensuring a high level of sustainability performance of first-tier suppliers, may be an essential lever to cascade sustainability requirements both broadly and deeply into the supply chain. The empirical results of this study show which relation-specific factors are positively related to the sustainability performance of suppliers. This knowledge can support practitioners to positively influence the achievement of higher levels of sustainability performance by considering relationship-factors in their SSCM. The following management implications can be derived:

First, focal firms can review their strategic partnership schemes and explicitly consider relation specific criteria such as length of partnership and high transaction volume. The empirical results support the often-stated view in the SSCM literature that *more intense and close supplier relationships are beneficial with regard to sustainability performance* in contrast to volatile and frequently changing sourcing partners. This could require focal companies to implement strategic sustainability programs that incentivize suppliers to explicitly interact with the focal company with regard to sustainability performance.

Second, this study shows that *relation-specific factors* may influence the actual suppliers' sustainability performance and *should therefore be integrated in a company's SSCM*. Managers can use the empirical results of this study to receive an overview of how sustainability is anchored in the automotive supply chain and in which sustainability categories non-conformities are more likely. By including "length and transaction" volume into strategic partnership schemes, SSCM activities could be adapted to the type of supplier group. The empirical results support the SSCM approach to differentiate the type of supplier (relationship-length, transaction volume) and the existing level of sustainability knowledge/capacity. For instance, designing minimum requirements to set a baseline for all suppliers and raising the level of requirements in dependence of supplier size (e.g., employees), could be a way forward to deal with the heterogeneity of automotive suppliers, but at the same time fostering continuous improvement of sustainability performance. This study has further identified sustainability trainings (52.0% of the assessed first tier suppliers had such trainings; see Table 4) as a core area for SSCM improvement. Further dissemination of management systems for working conditions and health and safety (57.9% fulfilled) as well as certified environmental (55.4% fulfilled) and energy (19.0% fulfilled) could support awareness and a continuous consideration of sustainability issues in supply chains among employees and managers.

Third, procurement and sustainable supply chain managers can use the results of this study to identify suppliers with weak relation-specific characteristics and to intensify the relationship with them in order to foster improvement of sustainability performance in the supply chain. Such *intensification of supplier relationships* can, for example, include focused trainings or customizing supply chain programs for suppliers with less well-developed relation-specific characteristics.

Fourth, although the existence of a code of conduct is a starting point for further developing the relationship between a focal company and a supplier with regard to sustainability, this research highlights the importance of relation-specific factors. Beyond communication and integrating code of conduct expectations in, for example, business contracts and trainings, SSCM-managers should invest in activities that influence the relationship to a supplier positively, for example, via online trainings, topic-specific workshops, or supplier-type specific interaction formats.

Fifth, as this research shows that certain relation-specific factors are of utmost importance, SSCM-managers need to broaden the spectrum with risk analysis, mitigation, and prevention-tools that focus on "capacity building," where suppliers receive a clear benefit on the interactions with a specific customer/focal company. Based on the result that relation-specific factors are key, focal companies should work toward becoming the "preferred customer."

Sixth, the results show that investment in sustainable supplier cooperation/relations can lead to improved sustainability performance. This should strengthen management to invest in specific sustainability relationship management programs versus simply setting requirements and "ticking the box."

Seventh, the analysis shows that core weaknesses of automotive suppliers are in the training sessions and implementing certified

sustainability management systems. But trainings and management systems are essential, for enabling suppliers to work in their own right on solving sustainability problems and issues. Hence, for SSCM-managers, it will become essential to build up facilitating programs that target at the specific capacity building of suppliers and their sub-suppliers. Going forward, tools such as the SAQ, should be understood as a vehicle toward supplier enablement versus mere performance measurement tools. This also has implications for the further development of tools such as the SAQ or audit programs at an industry level.

Even though this research is based on a large empirical sample, it is not without limitations. These, in turn, provide opportunities for future research. The sample of suppliers for this analysis entails data of suppliers of one single automotive manufacturer of a specific year. Although suppliers (as in this sample) commonly maintain business relations with various manufacturers and the focal firm under consideration can be considered representative for other large manufacturers in the automotive industry, more empirical research for different firms and industries with a different supplier base is needed to validate the research findings. In particular, studies within other sectors facing high social and/or environmental impact (e.g., chemical sector) would deepen the understanding whether and under which circumstances a supplier's sustainability performance is influenced by relation-specific factors.

While this research points to relevant relationship-specific factors and the effect on suppliers' sustainability performance, this can only be a starting point. Future studies should cover further relevant relation-specific factors and measures. For instance, this research used the strategic partnership status as a proxy of incentivized, in-depth collaboration and knowledge exchange. Future research could use multi-item measures, for example, buyer-supplier collaboration to further validate the findings. Furthermore, the relational distance between a focal firm and a supplier, respectively the role of the headquarter within a buyer-supplier network, could be investigated more deeply, given the results of this research. Specifically, future studies might consider the actual role of the headquarter within a supplier's network, and whether it has a specific boundary spanning function, for example, for developing sustainability programs for other subsidiaries.

The results refer to a certain point in time. Future studies might use longitudinal research designs. It would, in particular, be interesting to see how the sustainability performance of suppliers develops over time depending on changing relationship conditions.

Furthermore, investigating the effect of buyer-initiated trainings on the sustainability performance of suppliers as a measure of supplier development would allow to deepen the understanding about the relevance of relation-specific factors.

A longitudinal study based on the same data set of the industry's "Drive Sustainability" working group (i.e., SAQ data) would be interesting, to better understand, for example, how new legislative developments have influenced sustainability performance development, whether the recent update of the questionnaire (from SAQ 3.0 to SAQ 5.0) has had an influence, or how in the meanwhile undertaken measures the initiative's member OEMs (e.g., trainings, additional on-

site visits, establishment of an obligatory nomination criterion related to the sustainability performance of its suppliers etc.) have influenced the suppliers' sustainability performance.

Finally, whereas this research provided insight into a large sample size, it was limited to the first-tier level of suppliers. With multi-tier supply chains and the increased value creation across the globe, with both smaller and larger companies playing a decisive role, it is necessary to understand, how improving sustainability performance can be cascaded further into the supply chain.

## ACKNOWLEDGMENT

Open Access funding enabled and organized by Projekt DEAL.

## ORCID

Stefan Schaltegger  <https://orcid.org/0000-0001-7756-5526>

## REFERENCES

- Aguilera-Caracuel, J., Aragón-Correa, J. A., Hurtado-Torres, N. E., & Rugman, A. M. (2012). The effects of institutional distance and headquarters' financial performance on the generation of environmental standards in multinational companies. *Journal of Business Ethics*, 105, 461–474.
- Albino, V., Dangelico, R. M., & Pontrandolfo, P. (2012). Do inter-organizational collaborations enhance a firm's environmental performance? A study of the largest U.S. companies. *Journal of Cleaner Production*, 37, 304–315.
- Alvarez, G., Pilbeam, C., & Wilding, W. (2010). Nestlé Nespresso AAA sustainable quality program: An investigation into the governance dynamics in a multi-stakeholder supply chain network. *Supply Chain Management*, 15(2), 165–182.
- Andalib Ardakani, D., & Soltanmohammadi, A. (2019). Investigating and analyzing the factors affecting the development of sustainable supply chain model in the industrial sectors. *Corporate Social Responsibility and Environmental Management*, 26(1), 199–212.
- Banerjee, R., Gupta, K., & McIver, R. (2019). What matters most to firm-level environmentally sustainable practices: Firm-specific or country-level factors? *Journal of Cleaner Production*, 218, 225–240.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Beske, P., Koplin, J., & Seuring, S. (2006). The use of environmental and social standards by German first-tier suppliers of the Volkswagen AG. *Corporate Social Responsibility and Environmental Management*, 15(2), 63–75.
- Beske-Janssen, P., Johnson, M., & Schaltegger, S. (2015). 20 years of performance measurement in sustainable supply chain management. What has been achieved? *Supply Chain Management*, 20(6), 664–680.
- Blome, C., Paulraj, A., & Schuetz, K. (2014). Supply chain collaboration and sustainability: A profile deviation analysis. *International Journal of Operations & Production Management*, 24(5), 639–663.
- Brand, C. (2016). Beyond 'Dieselgate': Implications of unaccounted and future air pollutant emissions and energy use for cars in the United Kingdom. *Energy Policy*, 97, 1–12.
- Burki, U., & Buvik, A. (2010). Do relationship history and norms matter in overcoming inter-organisational difficulties in the procurement function? *International Journal of Procurement Management*, 3(3), 279–291.
- Burritt, R. L., Christ, K. L., Rammal, H. G., & Schaltegger, S. (2020). Multinational enterprise strategies for addressing sustainability: The need for consolidation. *Journal of Business Ethics*, 164(2), 389–410.
- Burritt, R., & Schaltegger, S. (2014). Accounting towards sustainability in production and supply chains. *The British Accounting Review*, 46(4), 327–343.

- Büyükkökan, G., & Karabulut, Y. (2018). Sustainability performance evaluation: Literature review and future directions. *Journal of Environmental Management*, 217, 253–267.
- Charms, N., & García-Blandón, J. (2019). On the importance of sustainable human resource management for the adoption of sustainable development goals. *Resources, Conservation & Recycling*, 141, 109–122.
- Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal of Production Economics*, 194, 73–87.
- Crotty, J., & Holt, D. (2021). Towards a typology of strategic corporate social responsibility through camouflage and courtship analogies. *Corporate Social Responsibility and Environmental Management*, 28(3), 980–991.
- CSR Europe. (2018). About us. <https://drivesustainability.org/about-us/>
- Dahlmann, F., & Roehrich, J. K. (2019). Sustainable supply chain management and partner engagement to manage climate change information. *Business Strategy and the Environment*, 28(8), 1632–1647.
- De Medeiros, J. F., Ribeiro, J. L. D., & Cortimiglia, M. N. (2014). Success factors for environmentally sustainable product innovation: A systematic literature review. *Journal of Cleaner Production*, 65, 76–86.
- Dijkstra-Silva, S., Schaltegger, S., & Beske-Janssen, P. (2022). Understanding positive contributions to sustainability. A systematic review. *Journal of Environmental Management*, 320, 115802.
- Dyer, J. H. (1996). Effective interim collaboration: How firms minimize transaction costs and maximize transaction value. *Strategic Management Journal*, 18(7), 535–556.
- Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review*, 23(4), 660–679.
- Foerstl, K., Azadegan, A., Leppelt, T., & Hartmann, E. (2015). Drivers of supplier sustainability: Moving beyond compliance to commitment. *Journal of Supply Chain Management*, 51(1), 67–92.
- Ford Motor Company Ford. (2019). Ford sustainability report 2018/19. <https://corporate.ford.com/microsites/sustainability-report-2018-19/assets/files/sr18.pdf>
- Fraser, I. J., Müller, M., & Schwarzkopf, J. (2020). Dear supplier, how sustainable are you? *Sustainability Management Forum*, 28(3), 127–149.
- Fudenberg, D., Holmstrom, B., & Milgrom, P. (1990). Short-term contracts and long-term agency relationships. *Journal of Economic Theory*, 51(1), 1–31.
- Gavrónski, I., Klassen, R. D., Vachon, S., & do Nascimento, L. F. M. (2011). A resource-based view of green supply management. *Transportation Research Part E: Logistics and Transportation Review*, 47(6), 872–885.
- Gelhard, C., & von Delft, S. (2016). The role of organizational capabilities in achieving superior sustainability performance. *Journal of Business Research*, 69(10), 4632–4642.
- Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: A literature review. *Corporate Social Responsibility and Environmental Management*, 17(4), 230–245.
- Golicic, S. L., & Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of Supply Chain Management*, 49(2), 78–95.
- Golini, R., Longoni, A., & Cagliano, R. (2014). Developing sustainability in global manufacturing networks: The role of site competence on sustainability performance. *International Journal of Production Economics*, 147(B), 448–459.
- Govindan, K., Shankar, M., & Kannan, D. (2018). Supplier selection based on corporate social responsibility practices. *International Journal of Production Economics*, 200, 353–379.
- Hannibal, C., & Kauppi, K. (2018). Third party social sustainability assessment: Is it a multi-tier supply chain solution? *International Journal of Production Economics*, 217, 78–87.
- Harms, D., Hansen, E. G., & Schaltegger, S. (2013). Strategies in sustainable supply chain management: An empirical investigation of large German companies. *Corporate Social Responsibility and Environmental Management*, 20(4), 205–218.
- Held, M., Weidmann, D., Kammerl, D., Hollauer, C., Mörtl, M., Omer, M., & Lindemann, U. (2018). Current challenges for sustainable product development in the German automotive sector: A survey-based status assessment. *Journal of Cleaner Production*, 195, 869–889.
- Hohnen, P., & Hasle, P. (2018). Third party audits of the psychosocial work environment in occupational health and safety management systems. *Safety Science*, 109, 76–85.
- Hollos, D., Blome, C., & Foerstl, K. (2012). Does sustainable supplier cooperation affect performance? Examining implications for the triple bottom line. *International Journal of Production Research*, 50(11), 2968–2986.
- Holt, D., & Ghobadian, A. (2009). An empirical study of green supply chain management practices amongst UK manufacturers. *Journal of Manufacturing Technology Management*, 20(7), 933–956.
- Husted, B. W., & de Sousa-Filho, J. M. (2017). The impact of sustainability governance, country stakeholder orientation, and country risk on environmental, social and governance performance. *Journal of Cleaner Production*, 155(2), 93–102.
- Jasinski, D., Meredith, J., & Kirwan, K. (2016). A comprehensive framework for automotive sustainability assessment. *Journal of Cleaner Production*, 135, 1034–1044.
- Johnson, M., Redlbacher, F., & Schaltegger, S. (2018). Stakeholder engagement for corporate sustainability: A comparative analysis of B2C and B2B companies. *Corporate Social Responsibility and Environmental Management*, 25(4), 659–673.
- Kassinis, G., & Vafeas, N. (2006). Stakeholder pressures and environmental performance. *Academy of Management Journal*, 49(1), 145–159.
- Kennedy, P. (1992). *A guide to economics*. Blackwell.
- Koberg, E., & Longoni, A. (2019). A systematic review of sustainable supply chain management in global supply chains. *Journal of Cleaner Production*, 207, 1084–1098.
- Koplin, J., Seuring, S., & Mesterharm, M. (2007). Incorporating sustainability into supply management in the automotive industry. The case of the Volkswagen AG. *Journal of Cleaner Production*, 15(11–12), 1053–1062.
- Kumar, D., & Rahman, Z. (2016). Buyer supplier relationship and supply chain sustainability: Empirical study of Indian automobile industry. *Journal of Cleaner Production*, 131, 836–848.
- Leppelt, T., Foerstl, K., Reuter, C., & Hartmann, E. (2013). Sustainability management beyond organizational boundaries: Sustainable supplier relationship management in the chemical industry. *Journal of Cleaner Production*, 56, 94–102.
- Maletic, M., Maletic, D., & Gomiscek, B. (2016). The impact of sustainability exploration and sustainability exploitation practices on the organizational performance: A cross-country comparison. *Journal of Cleaner Production*, 138(2), 158–169.
- Maletic, M., Maletic, G., & Gomiscek, B. (2018). The role of contingency factors on the relationship between sustainability practices and organizational performance. *Journal of Cleaner Production*, 171, 423–433.
- Martins, F., & Fonseca, L. (2018). Comparison between eco-management and audit scheme and ISO 14001:2015. *Energy Procedia*, 153, 450–454.
- Martín-Tapia, I., Aragón-Correa, J. A., & Rueda-Manzanares, A. (2010). Environmental strategy and exports in medium, small and micro-enterprises. *Journal of World Business*, 45(3), 266–275.
- Mayyas, A., Qattawi, A., Omar, M., & Shan, D. (2012). Design for sustainability in automotive industry: A comprehensive review. *Renewable and Sustainable Energy Reviews*, 16(4), 1845–1862.
- Min, H., & Galle, W. P. (2001). Electronic commerce-based purchasing: A survey on the perceptual differences between large and small organizations. *International Journal of Logistics Research and Applications*, 4(1), 79–95.
- Moldavska, A., & Abreu-Peralta, J. V. (2016). Learning factories for the operationalization of sustainability assessment tools for





- manufacturing: Bridging the gap between academia and industry. *Procedia CIRP*, 54, 95–100.
- Moldavska, A., & Welo, T. (2015). On the applicability of sustainability assessment tools in manufacturing. *Procedia CIRP*, 29, 621–626.
- Moneva, J. M., Archel, P., & Correa, C. (2006). GRI and the camouflaging of corporate unsustainability. *Accounting Forum*, 30(2), 121–137.
- Murmura, F., Bravi, L., & Palazzi, F. (2017). Evaluating companies' commitment to corporate social responsibility: Perceptions of the SA 8000 standard. *Journal of Cleaner Production*, 164, 1406–1418.
- Müller, M., & Bessas, Y. (2017). Potential of industry initiatives for a sustainable development of supply and value chains (in German): Potenziale von Brancheninitiativen zur nachhaltigen Gestaltung von Liefer- und Wertschöpfungsketten. Ulm: Bundesministerium für Arbeit und Soziales/Ulm University.
- Norris, S., Hagenbeck, J., & Schaltegger, S. (2021). Linking sustainable business models and supply chains. Toward an integrated value creation framework. *Business Strategy and the Environment*, 30(8), 3960–3974.
- Olugu, E. U., Wong, K. Y., & Shaharoun, A. M. (2011). Development of key performance measures for the automobile green supply chain. *Resources, Conservation and Recycling*, 55(6), 567–579.
- Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply management and organizational sustainability. *Journal of Supply Chain Management*, 47(1), 19–37.
- Poltronieri, C. A., Devós Ganga, G. M., & Gerolamo, M. C. (2019). Maturity in management system integration and its relationship with sustainable performance. *Journal of Cleaner Production*, 207, 236–247.
- Popovic, T., Barbosa-Póvoa, A., Kraslawski, A., & Carvalho, A. (2018). Quantitative indicators for social sustainability assessment of supply chains. *Journal of Cleaner Production*, 180, 748–768.
- Ramanathan, R., He, Q., Black, A., Ghobadian, A., & Gallea, D. (2017). Environmental regulations, innovation and firm performance: A revisit of the porter hypothesis. *Journal of Cleaner Production*, 155(2), 79–92.
- Ramanathan, U., Bentley, Y., & Pang, G. (2014). The role of collaboration in the UK green supply chains: An exploratory study of the perspectives of suppliers, logistics and retailers. *Journal of Cleaner Production*, 70, 231–241.
- Reuters, T. (2018). Value added of automotive suppliers in the global automotive production in the years 1985 until 2015 (in German: Wertschöpfungsanteil der Automobilzulieferer am weltweiten Automobilbau in den Jahren 1985 bis 2015). <https://de.statista.com/statistik/daten/studie/162996/umfrage/wertschoepfungsanteil-der-automobilzulieferer-am-automobilbau-weltweit/>
- Rossetti, C., & Choi, T. Y. (2005). On the dark side of strategic sourcing: Experiences from the aerospace industry. *Academy Management Perspectives*, 19(1), 46–60.
- Sajjad, A., Eweje, G., & Tappin, D. (2015). Sustainable supply chain management: motivators and barriers. *Business Strategy and the Environment*, 24(7), 643–655.
- Sancha, C., Gimenez, C., & Sierra, V. (2016). Achieving a socially responsible supply chain through assessment and collaboration. *Journal of Cleaner Production*, 112(3), 1934–1947.
- Sancha, C., Wong, C. W. Y., & Thomsen, C. G. (2016). Buyer–supplier relationships on environmental issues: A contingency perspective. *Journal of Cleaner Production*, 112(3), 1849–1860.
- Schaltegger, S., & Burritt, R. (2014). Measuring and managing sustainability performance of supply chains: Review and sustainability supply chain management framework. *Supply Chain Management. An International Journal*, 19(3), 232–241.
- Schaltegger, S., & Wagner, M. (2006). Integrative management of sustainability performance, measurement and reporting. *International Journal of Accounting, Auditing and Performance Evaluation*, 3(1), 1–19.
- Schaltegger, S., Christ, K. L., Wenzig, J., & Burritt, R. L. (2022). Corporate sustainability management accounting and multi-level links for sustainability—A systematic review. *International Journal of Management Reviews*, 24(4), 480–50.
- Seuring, S., & Gold, S. (2013). Sustainability management beyond corporate boundaries: From stakeholders to performance. *Journal of Cleaner Production*, 56, 1–6.
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699–1710.
- Sharfman, M. P., Shaft, T. M., & Anex, R. P. (2009). The road to cooperative supply-chain environmental management: Trust and uncertainty among pro-active firms. *Business Strategy and the Environment*, 18(1), 1–13.
- Silva, S., Nuzum, A., & Schaltegger, S. (2019). Stakeholder expectations on sustainability performance measurement and assessment: A systematic literature review. *Journal of Cleaner Production*, 217, 204–215.
- Simpson, D. F., & Power, D. J. (2005). Use the supply relationship to develop lean and green suppliers. *Supply Chain Management*, 10(1), 60–68.
- Simpson, D., Power, D., & Samson, D. (2007). Greening the automotive supply chain: A relationship perspective. *International Journal of Operations & Production Management*, 27(1), 28–48.
- Smith, M., & Crotty, J. (2008). Environmental regulation and innovation driving ecological design in the UK automotive industry. *Business Strategy and the Environment*, 17(6), 341–349.
- Solér, C., Bergström, K., & Shanahan, H. (2010). Green supply chains and the missing link between environmental information and practice. *Business Strategy and the Environment*, 19(1), 14–25.
- Stanwick, P. A., & Stanwick, S. D. (1998). The relationship between corporate social performance, and organizational size, financial performance, and environmental performance: An empirical investigation. *Journal of Business Ethics*, 17, 195–204.
- Touboulic, A., & Walker, H. (2015). Love me, love me not: A nuanced view on collaboration in sustainable supply chains. *Journal of Purchasing & Supply Management*, 21(3), 178–191.
- Touboulic, A., & Walker, H. (2016). A relational, transformative and engaged approach to sustainable supply chain management: The potential of action research. *Human Relations*, 69(2), 301–343.
- Vachon, S., & Klassen, R. D. (2006). Green project partnership in the supply chain: The case of the package printing industry. *Journal of Cleaner Production*, 14(6–7), 661–671.
- Vachon, S., & Klassen, R. D. (2007). Supply chain management and environmental technologies: The role of integration. *International Journal of Production Research*, 45(2), 401–423.
- Van Hoof, B., & Thiell, M. (2014). Collaboration capacity for sustainable supply chain management: Small and medium-sized enterprises in Mexico. *Journal of Cleaner Production*, 67, 239–248.
- VDA (Association of the Automotive Industry; Verband der Automobilindustrie). (2018). Annual report (in German: Jahresbericht) 2018. <https://www.vda.de/de/aktuelles/publikationen/publication/jahresbericht-2018>
- Volkswagen. (2019). FAST. [http://www.vwgroupsupply.com/one-kbp-pub/de/kbp\\_public/fast\\_2/basicpage\\_for\\_general\\_pages\\_html\\_2.html](http://www.vwgroupsupply.com/one-kbp-pub/de/kbp_public/fast_2/basicpage_for_general_pages_html_2.html)
- Wagner, M., & Bode, C. (2014). Supplier relationship-specific investments and the role of safeguards for supplier innovation sharing. *Journal of Operations Management*, 32(3), 65–78.
- Wagner, M., & Schaltegger, S. (2004). The effect of corporate environmental strategy choice and environmental performance on competitiveness and economic performance: An empirical study of EU manufacturing. *European Management Journal*, 22(5), 557–572.
- Wagner, S. M., & Hoegl, M. (2006). Involving suppliers in product development: Insights from R&D directors and project managers. *Industrial Marketing Management*, 35(8), 936–943.
- Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. The Free Press.



- Windolph, S. E., Harms, D., & Schaltegger, S. (2014). Motivations for corporate sustainability management: Contrasting surveys results and implementation. *Corporate Social Responsibility and Environmental Management*, 21(5), 272–285.
- Wittstruck, D., & Teuteberg, F. (2012). Understanding the success factors of sustainable supply chain management: Empirical evidence from the electrics and electronics industry. *Corporate Social Responsibility and Environmental Management*, 19(3), 141–158.
- Yang, J., Han, Q., Zhou, J., & Yuan, C. (2015). The influence of environmental management practices and supply chain integration on technological innovation performance: Evidence from China's manufacturing industry. *Sustainability*, 7(11), 15342–15361.
- Zaremba, B. W., Bode, C., & Wagner, S. M. (2016). Strategic and operational determinants of relationship outcomes with new venture suppliers. *Journal of Business Logistics*, 37(2), 162–167.
- Zimmer, K., Fröhling, M., Breun, P., & Schultmann, F. (2017). Assessing social risks of global supply chains: A quantitative analytical approach and its application to supplier selection in the German automotive industry. *Journal of Cleaner Production*, 149, 96–109.

**How to cite this article:** Naffin, J., Klewitz, J., & Schaltegger, S. (2023). Sustainable development of supplier performance. An empirical analysis of relationship characteristics in the automotive sector. *Corporate Social Responsibility and Environmental Management*, 30(4), 1753–1769. <https://doi.org/10.1002/csr.2452>