

# Supplier Development and the Adoption of Sustainable Supplier Practices – A Power Perspective

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## ABSTRACT

Although supplier development is a mature tool to increase performance and capabilities, little is known about the impact on sustainable supplier practices and the role of buyer power use. This study investigates the relationships between buyer power, supplier development and sustainable supplier practices. We developed and tested a conceptual model with survey data from 130 managers in Dutch supplying companies. The results indicate a positive impact of direct (active involvement) and indirect (communication) supplier development on sustainable supplier practices. Furthermore, we found paths that run from coercive and non-coercive power and (direct and indirect) supplier development to the adoption of sustainable supplier practices. Apparently, companies stimulate sustainable supplier practices through supplier development, further enhanced by the use of their buying power.

**Keywords:** *coercive power, direct supplier development, indirect supplier development, non-coercive power, sustainable supplier practices*

## 1. INTRODUCTION

Many companies have acknowledged that sustainable supply chain management (SSCM) is critical for business success and environmental performance improvement (e.g. Khan *et al.*, 2021; Mujkic, *et al.*, 2018). In their scientometric analysis of more than 11,000 SCM publications, Biedova and Mahdikhani (2023) reported that sustainable supply chain management is one of the dominant themes in SCM literature. Due to increased globalization, supply chains have become complex and difficult to monitor (Mageto, 2021). Managing sustainable supply chains is challenging

because of their complexity and dynamic nature (e.g. Carter and Easton, 2011). Much research on SSCM focuses on implementing technological innovations and closed-loop supply chains (Yu *et al.*, 2022). Although significant efforts have been made to examine sustainable supply chains' environmental and social impacts, the effects of supplier management and, more specifically, supplier development are often overlooked (e.g. Håbek and Lavios, 2021). Supplier development literature has paid little attention to power issues (Sucky and Durst, 2013) and sustainability (Yawar and Seuring, 2018).

Supplier development includes "any effort of a buying firm with its supplier to increase the performance and/or capabilities of the supplier and meet the buying firm's supply needs" (Krause and Ellram, 1997, p. 21). This definition poses little constriction to the scope and variety of supplier development activities. Literature has narrowed the concept of supplier development down to two: direct and indirect activities based on the resources committed to a specific supplier (cf. Wagner, 2006). Indirect supplier development focuses on communication (requirements setting, evaluation), while direct supplier development implies active involvement, commitment, and investments of the buying company (e.g. Brix-Asala *et al.*, 2021; Saghiri and Mirzabeiki, 2021; Ağan *et al.*, 2018; Li *et al.*, 2017; Lee, 2015; Krause *et al.*, 2000; Li, 2007; Modi and Mabert, 2007).

Many companies encourage their suppliers to develop and implement sustainable initiatives and practices (Jia *et al.*, 2021; Sacha *et al.*, 2015; Zimmer *et al.*, 2016). Joint initiatives and measures include competitive pressure, incentives, management involvement, evaluation and assessment, and knowledge transfer (e.g. Modi and Mabert, 2007; Dou *et al.*, 2015). Other buyer-led initiatives include

training, knowledge sharing, and product development schemes (Tate *et al.*, 2012; Holt and Ghobadian, 2009). Supplier development is expected to stimulate suppliers' sustainable practices (e.g. Bai and Sarkis, 2019; Saghiri and Mirzabeiki, 2021). However, most studies focused on adopting suppliers' sustainable practices as a response to stakeholder pressure in general (e.g. Paulray, 2009) rather than as a response to buyer pressure in specific (Huq and Stevenson, 2020).

Although supplier development is a mature tool, little is known about its impact on environmental supplier practices (Saghiri and Mirzabeiki, 2021). Studies have investigated drivers (Sacha *et al.*, 2015; Pagell *et al.*, 2010) and measurement (Bai and Sarkis, 2010; Lu *et al.*, 2012) of sustainable supplier development. However, the various outcomes of these initiatives showed mixed findings. Similar supplier development initiatives resulted in varying levels of sustainable supplier practices (Busse *et al.*, 2016; Rodríguez *et al.*, 2016). The extant literature fails to provide a deep understanding of the effectiveness of sustainable supplier development and the factors that influence this effectiveness (Saghiri and Mirzabeiki, 2021).

Consequently, we must conclude that many companies fail to understand why some suppliers are receptive to supplier development initiatives and others are not. This lack of knowledge will likely limit companies' willingness to invest in risky supplier development projects. Most studies focus on the buyer; their point of view towards supplier development is central (Zimmer *et al.*, 2016; Zhang *et al.*, 2017; Liu *et al.*, 2018). There is a need for research that investigates the effectiveness of supplier development from the supplier's perspective. Literature mainly investigated supplier development from the buyer's standpoint, with limited research "on how suppliers view buyer-imposed environmental development programs" (Saghiri and Mirzabeiki, 2021). There is limited research on the suppliers' perspective. This study is set up from and focuses on the suppliers' perspective.

Supplier development is a way to influence the behavior and decisions of suppliers. The opportunities to use influence strategies are influenced by the balance of power between buying and supplying organizations. We define power as "the potential to affect another's behavior" (Cowan *et al.*, 2015, p.142) as "one party is recognized as being more influential and able to exercise control over the other party" (Siemieniako and Mitrega, 2018, p.91). The academic literature distinguishes between structural/potential power (i.e., dependence) and behavioral power (cf. Huo *et al.*, 2019). Our study focuses on using behavioral power, in which we distinguish coercive and non-coercive power. Buyers can use both to influence the decisions and actions of suppliers related to sustainability (Zhao *et al.*, 2008; Chkanikova, 2016).

In this study, we will investigate buying companies' use of power, influencing the effectiveness of (direct and indirect) supplier development. The buying company's power use will be linked to sustainable supplier practices, whereas supplier development initiatives are considered to mediate these linkages. Hypotheses are derived from literature and tested with survey data collected from 130 managers employed at companies in the Netherlands.

The remainder of this paper is organized as follows. In Section 2, we offer an overview of the relevant literature,

present our theoretical framework, and outline our hypotheses. Section 3 delineates our research design. In Section 4, we present the empirical results. Section 5 discusses the implications of these results, while Section 6 provides our main conclusions. Finally, in Section 7, we identify limitations and offer recommendations for future research.

## 2. LITERATURE REVIEW

### 2.1 Sustainable Supplier Practices

A well-known quote says that a firm "is no more sustainable than its supply chain" (Krause *et al.*, 2009, p. 18). It is well documented that companies must extend their sustainability efforts across their suppliers to improve their sustainability performance (e.g. Ağan *et al.*, 2018; Fu *et al.*, 2012; Eltayeb and Zailani, 2009; Vachon and Klassen, 2008). As it is not always possible to produce a product in-house, sustainable practices adopted by suppliers are a viable solution for buyers to control and improve their sustainability (Wagner, 2006). Buyers are advised to learn what factors motivate and affect suppliers' adoption of sustainable practices (Sarang *et al.*, 2016; Chen *et al.*, 2016). Managing supplier relationships is increasingly important, which implies that the buying initiatives should focus on the long term (Forkman *et al.*, 2016). Buyers should also acknowledge that suppliers, complying with customers' environmental demands, face significant trade-offs between lower cost and higher environmental performance (cf. Dabhilkar *et al.*, 2016). SMEs often need support from their larger customers to address environmental issues and requirements (Das and Mitra, 2018). In some cases, pressure from the buying firm "can be detrimental to the existing initiatives voluntarily carried out by SMEs" (Ciliberti *et al.*, 2009, p. 154).

Relevant factors for motivation and adoption of supplier development practices are supplier evaluation, training and education, reward, effective communication, asset specificity, joint action, and top management support (Joshi *et al.*, 2016). Factors concerned with managing the relationship from the supplier's perspective are trust, long-term commitment, and relationship practices from the supplier's perspective (Joshi *et al.*, 2016). Agrawal and Lee (2019) found that buyers use sourcing to influence suppliers to adopt sustainable criteria. Generally, buying companies use various governance mechanisms to stimulate lower-tier suppliers to adopt sustainability practices (Shalique *et al.*, 2022). In our study, we will focus on the impact of supplier development on the adoption of environmental sustainability of suppliers.

### 2.2 Supplier Development

Common supplier management aims to stimulate and develop suppliers to improve their performance. Leenders (1966) introduced the 'supplier development' concept, referring to buyer activities to identify, measure and improve supplier performance and capacities (e.g. Krause and Ellram, 1997). Supplier development may be initiated in various ways and focus on improving sustainable supplier practices. Studies by Chiarini (2017), Hojmosse and Adrien-Kirby (2012), Pattnaik and Pattnaik (2019), Rao (2002), and Zhu *et al.* (2017) underline the buyer's requirements or pressures as major drivers for the supplier's environmental practices.

Besides, Holt and Ghobadian (2009), Tate *et al.* (2012), and Zhu *et al.* (2005) address the impact of buyer-led environmental supplier development projects, for example, by training, knowledge and technology sharing, and buyer-supported research and development. Supplier development may have, according to Tran *et al.* (2022), positive (performance improvement) and negative (supplier opportunism) outcomes. In their systematic literature review, Jia *et al.* (2021, p. 15) found that supplier development is “mostly proposed in response to various contingencies.” Dabhilkar *et al.* (2016) also stress the importance of considering power and dependence to investigate circumstances and to determine the effectiveness of sustainable purchasing. Our study will elaborate on the use (intensity) of coercive and non-coercive power, influencing supplier development activities.

Companies may employ several strategies to promote supplier performance. Examples are providing incentives to suppliers for better performance, increasing and/or fueling competition among suppliers, and training, instructing, or involving supplier personnel (e.g. Krause *et al.*, 2000). Most commonly, supplier development activities are divided into direct and indirect supplier development (cf. Wagner, 2006) according to the level of buyer involvement and investments (Sanchez-Rodriguez *et al.*, 2005). On the one hand, direct supplier development requires high levels of commitment and the transfer of specific resources to the supplier, such as capital, human resources, know-how, and technology (e.g. Wagner, 2009). Indirect supplier development, on the other hand, requires less commitment, focusing on supplier assessment, evaluation, feedback, plant visits, and auditing (e.g. Krause and Ellram, 1997). Another critical difference is that indirect supplier development is applied to monitor and evaluate suppliers’ performance, whereas direct supplier development is applied to improve suppliers’ capabilities (e.g. Wagner, 2009; Zhang *et al.*, 2017).

### 2.2.1 Direct Supplier Development

Direct supplier development implies direct investments by the buying company, committing various financial, human, managerial and technological resources (Wagner, 2009). Direct development includes the transfer of tacit knowledge of the buyer to the supplier, for instance, through training, education, staff exchange, and financial investment (Krause *et al.*, 2007). For instance, they apply direct projects to improve environmental performance on technology, processes and management systems (Büyüközkan and Karabulut, 2018). These projects are based on knowledge transfer in the mentioned areas and are run or supported by the buyer. The connection and integration between buyer and supplier will benefit the environmental capabilities of the supplier and, in this way, contribute directly to the needs of the buying organization. Through the buyer, the supplier gets access to valuable information that is not widely and easy to acquire. The environmental practices depend significantly on the organization’s and its supply chain’s ability to acquire and use environmental knowledge (Babu and Blom, 2014). Gaining knowledge and actual support from the buyer will strengthen the supplier’s capabilities (Wagner, 2009). Results show that these activities positively impact the energy efficiency and logistics and transport activities of the suppliers (Saghiri *et al.*, 2021). In general, indirect supplier

development is applied to monitor and improve supplier performance (Wanger, 2009; Zhang *et al.*, 2017). We formulate the following hypothesis:

**H1:** *Direct supplier development is positively related to sustainable supplier practices.*

### 2.2.2 Indirect Supplier Development

Indirect supplier development is often executed by setting environmental requirements and audits. Indirect supplier development is based on *communication* and (supplier) *evaluation* (Wagner, 2009), including supplier improvement incentives, feedback, and supplier evaluations (Krause *et al.*, 2007). Buyers apply this approach to ensure the suppliers know the buyer’s expectations and meet their requirements. Indirect supplier development may result in a sense of urgency for suppliers, especially when buyers monitor the environmental practices and ensure they are congruent with objectives. Setting requirements and assessing the results by audits or certifications are considered appropriate methods of indirect supplier development (Boiral and Henri, 2012). Audits and certifications, training, and standard operating procedures can be used to improve suppliers’ social responsibility in response to institutional pressures (cf. Zhang *et al.*, 2017). Suppliers may also benefit from indirect supplier development whenever it results in an opportunity to gain competitive advantages (Rao Tummala *et al.*, 2006). The study of Saghiri *et al.* (2021) found that these activities have a positive impact on all the material management, energy efficiency, and logistics and transport activities of the suppliers. More generally, direct supplier development is applied to foster supplier performance by enhancing supplier capabilities (Wagner, 2009), and providing resources that support suppliers to improve their sustainable practices (cf. Zhang *et al.*, 2017). We hypothesize:

**H2:** *Indirect supplier development is positively related to sustainable supplier practices.*

## 2.3 Buyer Power

The division of power between parties characterizes all buyer-supplier relationships. A well-known definition of power is the extent to which party A “can get party B to do something that B would otherwise not do” (Dahl, 1957, p. 203). Buyer power plays an important role in supplier development activities since power holds the potential to affect the behavior of others (Cowan *et al.*, 2015). Coercive and mimetic pressures could drive companies to adopt sustainable practices (cf. Sancha *et al.*, 2015). Studies have identified buyer pressure and requirements as major drivers for sustainable supplier practices (e.g. Chiarini, 2017; Hoejmose and Adrien-Kirby, 2012; Zhu *et al.*, 2017). Still, the literature on buyer-led environmental supplier development is limited (cf. Saghiri and Mirzabeiki, 2021). From a power and dependence perspective, Dabhilkar *et al.* (2016) demonstrated and emphasized the impact of power on the effectiveness of sustainable supply management on environmental supplier compliance. Liu *et al.* (2019) also reported power’s impact on supplier development’s effectiveness. Our study postulates that (buyer) power has an impact on the selection, use and effectiveness of supplier

development initiatives, distinguishing between coercive and non-coercive use of power.

### 2.3.1 Coercive Power

Coercive power is defined as "one party's explicit attempts to exert control over partners through negative actions, such as punishments and threats to withhold support or promises" (Liu *et al.*, 2010; Yeung *et al.*, 2009). Coercive power refers to the ability to punish the target party in case they fail to comply with desired action (French and Raven, 1959). Coercive power includes "promising rewards in case of compliance and threatening punishments in case of noncompliance" (Gelderman *et al.*, 2020, p. 3347). Using non-coercive power has been linked to relationship strength, whereas using coercive power reduces relationship trust (cf. Taha and Reynolds, 2023).

Studies reveal negative results of coercive power, for instance, on relationship aspects such as trust and commitment (Benton and Maloni, 2005; Chaex *et al.*, 2017; Pulles *et al.*, 2014). Suppliers will likely perceive this ability to punish as a negative form of power. However, without pressure, suppliers might be not very sensitive to supplier development activities. Coercive power facilitates and makes it possible for the buyer to apply supplier development. From the buyer's perspective, coercive power can be considered an antecedent for (direct and indirect) supplier development.

**H3:** Coercive buyer power is positively related to direct supplier development (a) and indirect supplier development (b).

### 2.3.2 Non-coercive Power

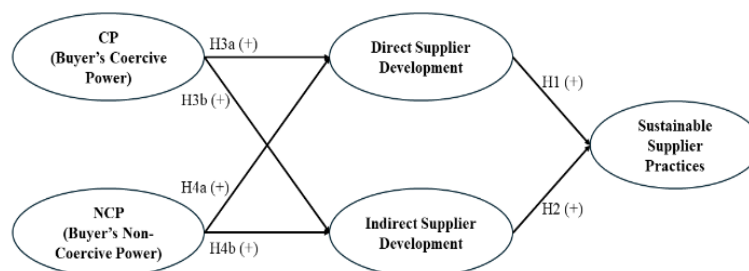
The influence mechanisms of non-coercive power is based on changing suppliers' attitudes and beliefs about the intended behavior's desirability (Payan and McFarland,

2005). Unlike coercive power, non-coercive power is not based on influencing suppliers through punishments and rewards (Gelderman *et al.*, 2020). Instead, non-coercive power refers to "one's party's attempt to promote desired behavior in its partners through positive actions such as providing assistance or supportive activities" (Huo *et al.*, 2019, p. 4). These power sources include reward, legitimate, expert, and referent power.

Reward power is the ability to reward the target party in case of the desired behavior (French and Raven, 1959). Incentives and rewards such as bonuses and long-term contracts demonstrate the willingness of the buyer to share the benefits of a partnership. This source of power contributes to an improved relationship (Nyaga *et al.*, 2013; Pulles *et al.*, 2014). When power originates based on formal contracts or values, it is called legitimate power. Certain valuable knowledge from one party to the other can indicate expert power. If one firm has a strong desire to identify itself with the other firm, this can be seen as referent power (French and Raven, 1959). The use of these sources of power is found to have a positive impact on the buyer-supplier relationship in general (cf. Huo *et al.*, 2017) and on (cognitive and structural) social capital in specific (cf. Gelderman *et al.*, 2020). The use and possession of these sources of power are all likely to contribute to the use and intensity of supplier development. Therefore, we hypothesize:

**H4:** Non-coercive buyer power is positively related to direct supplier development (a) and indirect supplier development (b).

**Figure 1** shows the conceptual model and the hypotheses resulting from our literature review.



**Figure 1** Conceptual model

## 3. METHODOLOGY

### 3.1 Sample and Data Collection

Data were collected using an online survey distributed among employees from various organizations in the Netherlands. The respondents are primarily senior or middle managers, mainly in sales or operations. Respondents were approached in person before being requested to participate in this study and to confirm that they were familiar with the subject. We allowed only one respondent per company. The data were collected during March and April 2022. We obtained 130 usable responses from a population of 987 targeted persons (13.2%).

Respondents in the sample all held a senior or middle managerial position. Nearly two-thirds work as senior

managers (66.2%), while the remaining respondents worked as middle managers in relevant departments, such as purchasing and quality assurance (33.8%). The respondents work for companies from various sectors, such as transport/warehousing (30.0%), manufacturing (24.6%) and wholesale (13.1%). Just over half of the respondents work in companies with more than 250 employees (52.3%). More than a quarter come from a small or medium-sized company with between 50 and 250 employees (26.1%), while the remaining 21.6% hold a management position in a small company (less than 50 employees).

### 3.2 Survey and Measures

We used multiple-item constructs to measure the five main variables of the conceptual model. The scales used to

measure coercive and non-coercive power are derived from the instrument used by Huo *et al.* (2019). The measures for indirect and direct sustainable supplier development are based on the survey by Saghiri and Mirzabeike (2021), and the variable sustainable supplier practices is based on the instrument by Das (2017). All survey questions were translated into Dutch and used five-point Likert scales. For the full list of items and the latent variables they belong to, see **Table A1** (in Appendix).

### 3.3 Data Analysis

Our research objective is predominantly predictive in nature since we aim to predict the target construct sustainable supplier practices depending on direct and indirect supplier development and buyer’s (non-)coercive power. When attempting to maximize explained variance in the dependent construct PLS-SEM is more appropriate than CB-SEM since the latter is more appropriate when testing and confirming existing theory (Hair *et al.*, 2017; Sarstedt *et al.*, 2014). Pre-data analysis indicates that our relatively small dataset contains non-normally distributed data (but not extremely nonnormal) supporting the use of PLS-SEM since PLS-SEM does not require normally distributed data (Vaithilingam *et al.*, 2024) and generally achieves higher levels of statistical power despite a limited sample size (Hair *et al.*, 2022).

## 4. RESULTS

### 4.1 Assessing the Measurement Models

In our model the five latent variables are presented as reflective measurement models which corresponds to the

sources these measures are adapted from: Das (2017), Saghiri and Mirzabeiki (2021), and Huo *et al.* (2019). These models are tested for their reliability and validity. All five constructs are suggested to be reliable, since Cronbach’s alpha (CA) values and composite reliabilities (CR) are well above the threshold value of 0.70 but less than 0.95, as recommended by Hair *et al.* (2017). Convergent validity, measured through the average variance extracted (AVE), for all five constructs exceeds the threshold value of 0.50 (Hair *et al.*, 2017). All item loadings are substantial and significant, as shown in **Table 1**. As a result, indicator reliability, internal consistency reliability and convergent validity are considered satisfactory.

To warrant discriminant validity, we examined the measurement models by evaluating loadings and cross-loadings, the Fornell-Larcker criterium, and assessed HTMT values. As can be concluded from **Table 2** the outer loadings on the associated construct are greater than any of its cross-loadings on other constructs suggesting the constructs are unique. Discriminant validity is further supported by both the Fornell-Larcker (1981) criterion and the HTMT assessment (Henseler *et al.*, 2015), see **Table 3**. With respect to the Fornell-Larcker criterion the square root of each construct’s AVE is greater than its highest correlation with any other construct. All HTMT values are well below the suggested threshold value of 0.85, providing further evidence of discriminant validity.

Based on our assessment of the reflective measurement models we conclude that all five latent variables show evidence for acceptable internal consistency reliability and validity (i.e., convergent and discriminant validity).

**Table 1** Outer loadings and testing results

Latent variable	Item	Loading	CR	CA	AVE
Sustainable supplier practices <sup>a</sup>	Epractice1	0.633***	0.831	0.812	0.511
	Epractice2	0.781***			
	Epractice3	0.731***			
	Epractice4	0.759***			
	Epractice5	0.732***			
	Epractice6	0.640***			
Direct supplier development <sup>b</sup>	DDP1	0.771***	0.894	0.883	0.683
	DDP2	0.849***			
	DDP3	0.898***			
	DDP4	0.838***			
	DDP5	0.769***			
Indirect supplier development <sup>b</sup>	ERA1	0.801***	0.791	0.788	0.612
	ERA2	0.829***			
	ERA3	0.733***			
	ERA4	0.764***			
Buyer’s Coercive Power <sup>c</sup>	CP1	0.709***	0.769	0.762	0.507
	CP2	0.736***			
	CP3	0.648***			
	CP4	0.729***			
	CP5	0.734***			
Buyer’s Non-coercive Power <sup>c</sup>	NCP1	0.730***	0.859	0.836	0.669
	NCP2	0.880***			
	NCP3	0.827***			
	NCP4	0.829***			

Notes:

\*\*\*  $p \leq 0.001$

CR = Composite Reliability ( $\rho_a$ ); CA = Cronbach’s Alpha;

AVE = Average Variance Extracted

Items are adapted from: <sup>a</sup> Das (2017); <sup>b</sup> Saghiri and Mirzabeiki (2021); <sup>c</sup> Huo *et al.* (2019)

**Table 2** Outer loadings and cross-loadings

Latent variable	Item	Epractice	DDP	ERA	CP	NCP
<i>Sustainable supplier practices<sup>a</sup></i>	Epractice1	0.633	0.262	0.266	0.144	0.060
	Epractice2	0.781	0.328	0.386	0.276	0.234
	Epractice3	0.731	0.535	0.354	0.333	0.303
	Epractice4	0.759	0.245	0.362	0.232	0.311
	Epractice5	0.732	0.344	0.330	0.301	0.264
	Epractice6	0.640	0.176	0.245	0.207	0.144
<i>Direct supplier development<sup>b</sup></i>	DDP1	0.458	0.771	0.646	0.305	0.289
	DDP2	0.328	0.849	0.519	0.400	0.270
	DDP3	0.486	0.898	0.584	0.413	0.309
	DDP4	0.326	0.838	0.507	0.359	0.296
	DDP5	0.317	0.769	0.428	0.239	0.355
<i>Indirect supplier development<sup>b</sup></i>	ERA1	0.328	0.447	0.801	0.239	0.361
	ERA2	0.400	0.504	0.829	0.229	0.399
	ERA3	0.343	0.599	0.733	0.348	0.264
	ERA4	0.368	0.505	0.764	0.310	0.289
<i>Buyer's Coercive Power<sup>c</sup></i>	CP1	0.236	0.339	0.309	0.709	0.383
	CP2	0.238	0.236	0.138	0.736	0.221
	CP3	0.276	0.238	0.138	0.648	0.074
	CP4	0.355	0.321	0.247	0.729	0.227
	CP5	0.200	0.317	0.346	0.734	0.376
<i>Buyer's Non-coercive Power<sup>c</sup></i>	NCP1	0.236	0.216	0.249	0.410	0.730
	NCP2	0.297	0.298	0.352	0.308	0.880
	NCP3	0.276	0.295	0.329	0.155	0.827
	NCP4	0.253	0.358	0.418	0.415	0.829

**Table 3** Discriminant validity of latent variables

	1	2	3	4	5
1 Sustainable supplier practices	<b>0.715</b>	0.508	0.563	0.444	0.371
2 Direct supplier development	0.472	<b>0.826</b>	0.781	0.489	0.418
3 Indirect supplier development	0.461	0.656	<b>0.782</b>	0.428	0.504
4 Buyer's Coercive Power	0.362	0.420	0.357	<b>0.712</b>	0.451
5 Buyer's Non-coercive Power	0.324	0.365	0.422	0.391	<b>0.818</b>

Note: on the diagonal (in **bold**) the square root of the AVE values; below the diagonal the correlations; above the diagonal the HTMT Values

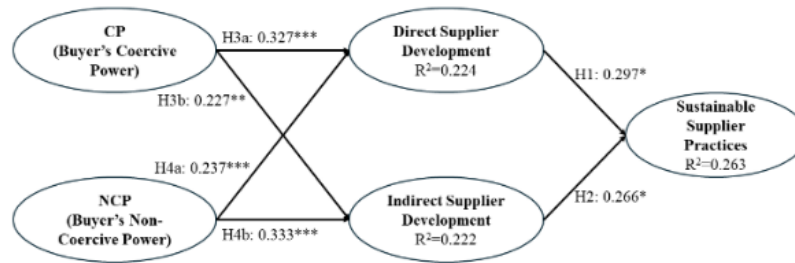
### 4.2 Assessing the Structural Model

Now we have confirmed that our measurement models are valid and reliable we continue assessing our structural model. This involves evaluating collinearity,  $R^2$  values,  $PLS_{predict}$  values, and size and significance of path coefficients. We first examine whether our structural model is free from critical levels of collinearity among the predictor constructs by evaluating the inner VIF values. Each predictor construct's VIF value is lower than the critical value of 3 for each subpart of the structural model ( $min.=1.180$ ;  $max.=1.754$ ), suggesting that collinearity is not a critical issue in our structural model. Next, we evaluate the explanatory power of our structural model by calculating the  $R^2$  values of our endogenous latent variables: direct supplier development, indirect supplier development, and sustainable

supplier practices.  $R^2$  values range from a minimum of 0.222 (for indirect supplier development) to a maximum of 0.263 (for sustainable supplier practices), see **Figure 2**. Based on the  $R^2$  values for our three endogenous latent variables the model's explanatory power, therefore, can be considered weak (Hair *et al.*, 2011; Henseler *et al.*, 2009). Applying the  $PLS_{predict}$  procedure for our model, however, shows high predictive power. With respect to the model's key endogenous construct (Sustainable Supplier Practices) the  $Q^2_{predict}$  statistics for the six indicators of Sustainable Supplier Practices are all positive, and the RMSE values for our model are lower than the RMSE values for the linear regression model (LM) benchmark (See **Table 4**). The predictive power of our model, therefore, can be considered better than the predictive power given by the most naïve benchmark (Hair *et al.*, 2022).

**Table 4** PLS<sub>predict</sub> results for the target construct sustainable supplier practices

Indicators	Q <sup>2</sup> <sub>predict</sub>	PLS-SEM RMSE	LM RMSE
Epractice1	0.007	1.421	1.500
Epractice2	0.077	1.122	1.193
Epractice3	0.103	1.011	1.043
Epractice4	0.085	1.023	1.088
Epractice5	0.085	0.966	1.007
Epractice6	0.036	1.044	1.138



Path coefficients and their level of significance, and R<sup>2</sup> values.  
 Note:\*\*\*  $p \leq 0.001$ ; \*\*  $p \leq 0.01$ ; \*  $p \leq 0.05$ .

**Figure 2** Structural model results

**Table 5** Structural path coefficients and hypothesis testing

Hyp.	Path	Path coefficient	T statistic	P value	95% BCa confidence interval	Hypothesis supported?
H1	Direct Supplier Development → Sustainable Supplier Practices	0.297	2.557	0.011	[0.050; 0.506]	Yes
H2	Indirect Supplier Development → Sustainable Supplier Practices	0.266	2.141	0.032	[0.035; 0.526]	Yes
H3a	CP → Direct Supplier Development	0.327	4.374	0.000	[0.183; 0.478]	Yes
H3b	CP → Indirect Supplier Development	0.227	2.884	0.004	[0.086; 0.397]	Yes
H4a	NCP → Direct Supplier Development	0.237	3.228	0.001	[0.087; 0.378]	Yes
H4b	NCP → Indirect Supplier Development	0.333	3.492	0.000	[0.132; 0.502]	Yes

**Figure 2** presents the size and significance of path coefficients. These results are also included in **Table 5**. **Table 5**, additionally, indicates that all our hypotheses are supported.

## 5. DISCUSSION AND IMPLICATIONS

Direct supplier development (i.e. the transfer of knowledge, cf. Krause *et al.*, 2007) is expected to have a strong impact on supplier behavior, since suppliers may benefit from the support and capabilities of the buying company (e.g. Saghiri *et al.*, 2021). We hypothesized that the active buyer involvement and investments have a positive impact on sustainable supplier practices. The results of our study confirmed that direct supplier development contributes to the sustainability efforts made by suppliers. Transferring knowledge to suppliers appear to be an effective way to improve their environmental performance (cf. Babu and Blom, 2014; Büyüközkan and Karabulut, 2018; Saghiri *et al.*, 2021).

We hypothesized that setting environmental requirements, supplier evaluations, and audits positively affects adopting sustainable practices. The results of our study also confirm that indirect supplier development has a positive relationship with the adoption of sustainable supplier practices (cf., Saghiri *et al.*, 2021; Boiral and Henri, 2012).

We hypothesized a positive relationship between non-coercive buyer power and indirect supplier development. The use of non-coercive power, such as reward and expert power, may legitimate buyer audits and requirements (cf Gelderman *et al.*, 2020). The results of our study confirmed relationships between both forms of buyer power and both forms of supplier development. We conclude that buyer power indeed may function as an antecedent for supplier development (cf. Dabhilkar *et al.*, 2016; Liu *et al.*, 2019). Sancha *et al.* (2015) posited that coercive pressures stimulate companies to adopt sustainable practices. Companies need to have some sort of power over their suppliers, will they decide to design and implement supplier development initiatives. Combining both ways of influencing supplier behavior

appear to be a viable approach for stimulating sustainable supplier activities.

We further investigated the mediating effects of (direct and indirect) supplier development. It was found that power use by the buying company is positively related to direct supplier development and sustainable supplier practices. Interestingly, we found paths that runs from coercive buying power to supplier development and ultimately to sustainable supplier practices. The same goes for the paths from non-coercive buying power. With some reservation we can conclude that coercive power has a stronger effect on direct supplier development, while non-coercive power shows a strong connection with indirect supplier development. A possible explanation is that direct supplier development is based on active involvement and transfer of resources, which implies a strong commitment of the buying company and putting more pressure on compliance. This finding may be counter intuitive, since we acknowledge that buying companies do not need to use their power whenever both parties acknowledge the favorable power position of the buyer (cf. Caniëls and Gelderman, 2010). Not exploiting a power position may be recommendable in the interest of long-term buyer-supplier collaboration (e.g. Reimann and Ketchen, 2017).

The results indicate that indirect supplier development benefits from the use of coercive buyer power. A possible explanation is that supplier development initiatives are buyer-led programs adopted for competitive reasons (cf. Sancha *et al.* 2015). Behavioral change by suppliers is likely to require more than communicating with suppliers and evaluating their performance. Indirect supplier development appears less effective without the accompanying influence of coercive power, inducing suppliers to show partial or delayed compliance (cf. Gelderman *et al.*, 2008) or merely short-term compliance (cf. Handley and Benton, 2012).

There are also important recommendations for practitioners related to our research findings. Companies can use both direct and indirect supplier development to foster sustainable supplier practices. To increase the effectiveness of indirect supplier development, companies could consider using coercive power. In contrast with common knowledge, we do not advise purchasing managers to refrain from non-coercive power use, aimed at enhancing supplier development and stimulating sustainable supplier practices.

Ultimately, it's all about sustainability, and if that is lost sight of, then all supplier development activities are de facto completely pointless. A periodic and systematic re-evaluation of sustainable supplier performance should be central to evaluating and managing the supply base.

## 5. CONCLUSION

Many companies encourage their suppliers to adopt sustainable practices. Supplier development is a well-known way to influence supplier practices, although its actual impact and the role of buyer power still need to be better understood. We investigated the impact of direct and indirect supplier development on sustainable practices from a power perspective. The hypotheses in our conceptual model have been tested with survey data from 130 middle managers in Dutch companies.

The empirical results confirmed the hypotheses in our conceptual model. Both direct and indirect supplier

development are positively related to sustainable supplier practices.

Interestingly, the direct transfer of knowledge to suppliers is slightly more effective compared to indirect supplier development initiatives which are based on asking commitment and action. The use of buyer power influences the adoption of sustainable supplier practices through (direct and indirect) supplier development. These mediating effects showed statistically significant impacts in the paths that run from power to supplier development and sustainable supplier practices.

## 6. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study used a cross-sectional survey design to explore the relationship between power, supplier development, and sustainability. A cross-sectional design has limitations when used for inferring causal relations, particularly given that our sample is relatively small. Endogeneity may be a problem (Hamilton and Nickerson, 2003). Future research could add to our findings by applying different methods, such as the use of longitudinal data and fixed effects models or the use of an experimental design (Angrist and Pischke, 2010).

Another limitation of this study is the focus on the use of buyer power. In literature, we find the distinction between the use of power (i.e. behavioral power) and the possession of power due to dependence of the other party (i.e. structural power) within buyer-supplier relationships (cf. Huo *et al.*, 2019). Both can be used to influence the decisions and actions of suppliers related to sustainability (Zhao *et al.*, 2008, Chkanikova, 2016). Future studies on sustainable supplier development could consider structural and behavioral power simultaneously. The research design was set up from the perspective of suppliers, where the perceptions of buyers could shed additional light on the use and effectiveness of supplier development.

We have investigated the impact of supplier development on sustainable supplier practices from a power perspective. Future research could add other perspectives, for instance, stakeholder pressure (e.g. Paulray, 2009), contingency fit (e.g. Jia *et al.*, 2021) or firm-specific antecedents (e.g. Blome *et al.*, 2014). Studies could explore the moderating effects on the supplier development – sustainable supplier practices of functional constraints and valuable functional constructs such as organizational dynamism and commitment, management systems, and internal environmental systems (cf. Sharma and Singla, 2021). Our study was limited to the environmental sustainability of suppliers. Future studies could encompass the social sustainability practices of suppliers (cf. Das, 2017). Perhaps most importantly, research could link supplier development to actual sustainable supplier performance.

This study focused on the impact of supplier development initiatives on sustainable supplier practices. However, to ensure sustainability compliance from suppliers, companies may choose from various governance mechanisms, including supplier development. Companies can use contractual and relational governance mechanisms (cf. Poppo and Zenger, 2002) as safeguards against opportunism and as ways to foster favorable performance

outcomes (Caniëls *et al.*, 2012). Future studies could investigate the role of these mechanisms and the role of certification (cf. Shalique *et al.*, 2022) as a common governance mechanism in search of supplier sustainability compliance.

## REFERENCES

- Ağan, Y., Acar, M. F., and Neureuther, B. (2018). The Importance of Supplier Development for Sustainability. *Sustainable Freight Transport: Theory, Models, And Case Studies*, pp. 165-178.
- Agrawal, V. and Lee, D. (2019). The Effect of Sourcing Policies on Suppliers' Sustainable Practices. *Production and Operations Management*, 28(4), pp. 767-787.
- Babu, S. C., and Blom, S. (2014). Capacity Development for Resilient Food Systems. Building Resilience for Food and Nutrition Security. *Conference paper, International Food Policy Research Institute, Washington*.
- Bai, C. S. and Sarkis, J. (2010). Green Supplier Development: Analytical Evaluation Using Rough Set Theory. *Journal of Cleaner Production*, 18(12), pp. 1200-1210.
- Benton Jr, W. C., Prahinski, C., and Fan, Y. (2020). The Influence of Supplier Development Programs on Supplier Performance. *International Journal of Production Economics*, 230, pp. 107793.
- Biedova, O., and Mahdikhani, M. (2023). Emerging Topics in Supply Chain Management Literature: A Scientometric Analysis. *Operations and Supply Chain Management*, 16(4), pp. 462-472.
- Boiral, O. and Henri, J. F. (2012). Modelling the Impact of ISO 14001 on Environmental Performance: A Comparative Approach. *Journal of Environmental Management*, 99, pp. 84-97.
- Brix-Asala, C., Seuring, S., Sauer, P. C., Zehendner, A., and Schilling, L. (2021). Resolving the Base of the Pyramid Inclusion Paradox Through Supplier Development. *Business Strategy and the Environment*, 30(7), pp. 3208-3227.
- Busse, C., Schleper, M. C., Niu, M., and Wagner, S. M. (2016). Supplier Development for Sustainability: Contextual Barriers in Global Supply Chains. *International Journal of Physical Distribution and Logistics Management*, 46(5), pp. 442-468.
- Caniëls, M.C.J., and Gelderman, C.J. (2010). The Safeguarding Effect of Governance Mechanisms in Inter-Firm Exchange: The Decisive Role of Mutual Opportunism. *The British Journal of Management*, 21(1), pp. 239-254.
- Caniëls, M.C.J., Gelderman, C.J. and Vermeulen, N. P. (2012). The Interplay of Governance Mechanisms in Complex Procurement Projects. *Journal of Purchasing and Supply Management*, 18(2), pp. 113-121.
- Carter, C. E. and Easton, P. L. (2011). Sustainable Supply Chain Management: Evolution and Future Directions. *International Journal of Physical Distribution and Logistics Management*, 41(1), pp. 46-62.
- Chae, S., Choi, T. Y., and Hur, D. (2017). Buyer Power and Supplier Relationship Commitment: A Cognitive Evaluation Theory Perspective. *Journal of Supply Chain Management*, 53(2), pp. 39-60.
- Chen, L., Ellis, S. C., and Suresh, N. (2016). A Supplier Development Adoption Framework Using Expectancy Theory. *International Journal of Operations and Production Management*, pp. 592-612.
- Chiarini, A. (2017). Environmental Policies for Evaluating Suppliers' Performance Based on GRI Indicators. *Business Strategy and the Environment*, 26(1), pp. 98-111.
- Chkanikova, O. (2016). Sustainable Purchasing in Food Retailing: Interorganizational Relationship Management to Green Product Supply. *Business Strategy and the Environment*, 25(7), pp. 478-494.
- Ciliberti, F., Baden, D., and Harwood, I. (2014). Insights Into Corporate Social Responsibility Practices in Supply Chains: A Multiple Case Study of Smes in the Uk. *Operations and Supply Chain Management*, 2(3), pp. 154-166.
- Cowan, K., Paswan, A. K., and Van Steenburg, E. (2015). When Inter-Firm Relationship Benefits Mitigate Power Asymmetry. *Industrial Marketing Management*, 48, pp. 140-148.
- Dabhilkar, M., Bengtsson, L., and Lakemond, N. (2016). Sustainable Supply Management as a Purchasing Capability: a Power and Dependence Perspective. *International Journal of Operations and Production Management*, 36(1), pp. 2-22.
- Dahl, R. A. (1957). The Concept of Power. *Behavioral Science*, 2(3), pp. 201-215.
- Das, D. (2017). Development and Validation of a Scale for Measuring Sustainable Supply Chain Management Practices and Performance. *Journal of Cleaner Production*, 164, pp. 1344-1362.
- Das, K., and Mitra, A. (2018). Integrating Sustainability in the Design and Planning of Supply Chains. *Operations and Supply Chain Management*, 11(4), pp. 161-185.
- Dou, Y., Zhu, Q., and Sarkis, J. (2015). Integrating Strategic Carbon Management Into Formal Evaluation of Environmental Supplier Development Programs. *Business Strategy and the Environment*, 24(8), pp. 873-891.
- Eltayeb, T., and Zailani, S. (2014). Going Green Through Green Supply Chain Initiatives Toward Environmental Sustainability. *Operations and Supply Chain Management*, 2(2), pp. 93-110.
- Forkmann, S., Henneberg, S. C., Naudé, P., and Mitrega, M. (2016). Supplier Relationship Management Capability: A Qualification and Extension. *Industrial Marketing Management*, 57, pp. 185-200.
- Fornell, C., and Larcker, D.F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, 18(1), pp. 39-50.
- French, J. R. and Raven, B. (1959). The Bases of Social Power, in Cartwright, D. (Ed.), *Studies in Social Power*, University of Michigan Press, Michigan, pp. 155-164.
- Fu, X., Zhu, Q., and Sarkis, J. (2012). Evaluating Green Supplier Development Programs at a Telecommunications Systems Provider. *International Journal of Production Economics*, 140(1), pp. 357-367.
- Gelderman, C. J., Semeijn, J., and De Zoete, R. (2008). The Use of Coercive Influence Strategies by Dominant Suppliers. *Journal of Purchasing and Supply Management*, 14(4), pp. 220-229.
- Gelderman, C. J., Semeijn, J., Ter Avest, F. and Peeters, E. R. (2020). Social Capital, Power and Information Sharing – Evidence from the Dutch Meat Processing Industry. *British Food Journal*, 122(11), pp. 3343-3360.
- Håbek, P., and Lavios, J. J. (2021). Striving for Enterprise Sustainability Through Supplier Development Process. *Energies*, 14(19), p. 6256.
- Hair, J.F., Ringle, C.M., and Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19, pp. 139-151.
- Hair, J.F., Matthews, L.M., Matthews, R.L., and Sarstedt, M. (2017). PLS-SEM Or CB-SEM: Updated Guidelines on Which Method to Use. *International Journal of Multivariate Data Analysis*, 1(2), pp. 107-123.
- Hair, J.F., Hult, T., Ringle, C.M., and Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 3rd.ed. Thousand Oaks: Sage.
- Hamilton, B. H., and Nickerson, J. A. (2003). Correcting for Endogeneity in Strategic Management Research. *Strategic Organization*, 1(1), pp. 51-78.

- Handley, S. M., and Benton, W. C. (2012). Mediated Power and Outsourcing Relationships. *Journal of Operations Management*, 30, pp. 253– 267.
- Henseler, J., Ringle, C.M., and Sinkovics, R.R. (2009). The Use of Partial Least Squares Path Modelling in International Marketing. *Advances in International Marketing*, 20, pp. 277-320.
- Henseler, J. Ringle, C.M., and Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science*, 43(1), pp. 115-135.
- Hoejmose, S. U. and Adrien-Kirby, A. J. (2012). Socially and Environmentally Responsible Procurement: A Literature Review and Future Research Agenda of a Managerial Issue in the 21st Century. *Journal of Purchasing and Supply Management*, 18(4), pp. 232-242.
- Holt, D., and Ghobadian, A. (2009). An Empirical Study of Green Supply Chain Management Practices Amongst UK Manufacturers. *Journal of Manufacturing Technology Management*, pp. 933-956.
- Huo, B., Flynn, B. B. and Zhao, X. (2017). Supply Chain Configurations and Their Relationships with Performance. *Journal of Supply Chain Management*, 53(2), pp. 88-111.
- Huo, B., Tian, M., Tian, Y., and Zhang, Q. (2019). The Dilemma of Inter-Organizational Relationships: Dependence, Use of Power and Their Impacts on Opportunism. *International Journal of Operations and Production Management*, 39(1), pp. 2-23.
- Huq, F. and Stevenson, M. (2020). Implementing Socially Sustainable Practices in Challenging Institutional Contexts: Building Theory from Seven Developing Country Supplier Cases. *Marketing Journal of Business Ethics*, 161(2), pp. 415-442.
- Jia, M., Stevenson, M., and Hendry, L. (2021). A Systematic Literature Review on Sustainability-Oriented Supplier Development. *Production Planning and Control*, pp. 1-21.
- Joshi, S., Kharat, M., Raut, R., Kamble, S., and Kamble, S. (2017). To Examine the Relationships Between Supplier Development Practices and Supplier-Buyer Relationship Practices from the Supplier's Perspective. *Benchmarking: An International Journal*, 24(5), pp. 1309-1336.
- Khan, S., Yu, Z. and Golpira, H. (2021). A State-of-the-Art Review and Meta-Analysis on Sustainable Supply Chain Management: Future Research Directions. *Journal of Cleaner Production*, 278,123357.
- Krause, D. R., and Ellram, L. M. (1997). Critical Elements of Supplier Development the Buying-Firm Perspective. *European Journal of Purchasing and Supply Management*, 3(1), pp. 21-31.
- Krause, D. R., Scannell, T. V., and Calantone, R. J. (2000). A Structural Analysis of the Effectiveness of Buying Firms' Strategies to Improve Supplier Performance. *Decision Sciences*, 31(1), pp. 33-55.
- Krause, D. R., Handfield, R. B., and Tyler, B. B. (2007). The Relationships Between Supplier Development, Commitment, Social Capital Accumulation and Performance Improvement. *Journal of Operations Management*, 25(2), pp. 528-545.
- Krause, D. R., Vachon, S., and Klassen, R. D. (2009). Special Topic Forum on Sustainable Supply Chain Management: Introduction and Reflections on the Role of Purchasing Management. *Journal of Supply Chain Management*, 45(4), pp. 18-25.
- Lee, V. H., Ooi, K. B., Chong, A. Y. L., and Lin, B. (2015). A Structural Analysis of Greening the Supplier, Environmental Performance and Competitive Advantage. *Production Planning and Control*, 26(2), pp. 116-130.
- Leenders, M. R. (1966). Supplier Development. *Journal of Purchasing*, 2(4), pp. 47-62.
- Li, W. H. (2007). The Impact of Specific Supplier Development Efforts on Buyer Competitive Advantage: An Empirical Model. *International Journal of Production Economics*, 106(1), pp. 230-247.
- Liu, Y., Li, Y., and Zhang, L. (2010). Control Mechanisms Across a Buyer-Supplier Relationship Quality Matrix. *Journal of Business Research*, 63(1), pp. 3-12.
- Liu, L., Zhang, M., Hendry, L. C., Bu, M., and Wang, S. (2018). Supplier Development Practices for Sustainability: A Multi-Stakeholder Perspective. *Business Strategy and the Environment*, 27(1), pp. 100-116.
- Liu, L., Zhang, M., and Ye, W. (2019). The Adoption of Sustainable Practices: A Supplier's Perspective. *Journal of Environmental Management*, 232, pp. 692-701.
- Lu, R. X., Lee, P. K., and Cheng, T. C. E. (2012). Socially Responsible Supplier Development: Construct Development and Measurement Validation. *International Journal of Production Economics*, 140(1), pp. 160-167.
- Mageto, J. (2021). Big Data Analytics in Sustainable Supply Chain Management: A Focus on Manufacturing Supply Chains. *Sustainability*, 13(13), p. 7101.
- Modi, S. B., and Mabert, V. A. (2007). Supplier Development: Improving Supplier Performance Through Knowledge Transfer. *Journal of Operations Management*, 25(1), pp. 42-64.
- Mujkic, Z., Qorri, A., and Kraslawski, A. (2018). Sustainability and Optimization of Supply Chains: A Literature Review. *Operations and Supply Chain Management*, 11(4), pp. 186-199.
- Pattnaik, S., and Pattnaik, S. (2019). Relationships Between Green Supply Chain Drivers, Triple Bottom Line Sustainability and Operational Performance: An Empirical Investigation in the UK Manufacturing Supply Chain. *Operations and Supply Chain Management*, 12(4), pp. 198-211.
- Paulray, A. (2009). Environmental Motivations: A Classification Scheme and its Impact on Environmental Strategies and Practices. *Business Strategy and the Environment*, 18(7), pp. 453-468.
- Payan, J. M., and McFarland, R. G. (2005). Decomposing Influence Strategies: Argument Structure and Dependence as Determinants of the Effectiveness of Influence Strategies in Gaining Channel Member Compliance. *Journal of Marketing*, 69(3), pp. 66-79.
- Poppo, L. and Zenger, T., 2002. Do Formal Contracts and Relational Governance Function as Substitutes or Complements?. *Strategic Management Journal*, 23, pp. 707-725.
- Rao, P. (2002). Greening The Supply Chain: A New Initiative in South East Asia. *International Journal Of Operations And Production Management*, 22(6), pp. 632-655.
- Reimann, F., and Ketchen Jr, D. J. (2017). Power in Supply Chain Management. *Journal of Supply Chain Management*, 53(2), pp. 3-9.
- Rodríguez, J. A., Giménez Thomsen, C., Arenas, D., and Pagell, M. (2016). Ngos' Initiatives to Enhance Social Sustainability in the Supply Chain: Poverty Alleviation Through Supplier Development Programs. *Journal of Supply Chain Management*, 52(3), pp. 83-108.
- Saghiri, S. S., and Mirzabeiki, V. (2021). Buyer-Led Environmental Supplier Development: Can Suppliers Really Help It? *International Journal of Production Economics*, 233, pp. 1-16.
- Sancha, C., Longoni, A., and Giménez, C. (2015). Sustainable Supplier Development Practices: Drivers And Enablers in a Global Context. *Journal of Purchasing and Supply Management*, 21(2), pp. 95-102.
- Sánchez-Rodríguez, C., Hemsworth, D., and Martínez-Lorente, Á. R. (2005). The Effect of Supplier Development Initiatives on Purchasing Performance: A Structural Model. *Supply Chain Management: An International Journal*, 10(4), pp. 289-301.
- Sarang, J. P., Bhasin, H. V., Verma, R., and Kharat, M. G. (2016). Critical Success Factors for Supplier Development and Buyer

- Supplier Relationship: Exploratory Factor Analysis. *International Journal of Strategic Decision Sciences*, 7(1), pp. 18-38.
- Sarstedt, M., Ringle, C.M., Smith, D., Reams, R., and Hair, J.F. (2014). Partial Least Squares Structural Equation Modelling (PLS-SEM): A Useful Tool for Family Business Researchers. *Journal of Family Business Strategy*, 5, pp. 105-115.
- Shalique, M. S., Padhi, S. S., Jayaram, J., and Pati, R. K. (2022). Adoption of Symbolic Versus Substantive Sustainability Practices by Lower-Tier Suppliers: A Behavioural View. *International Journal of Production Research*, 60(15), pp. 4817-4844.
- Sharma, E., and Singla, J. (2021). Sustainable Supply Chain Practices (Sscps) and Organizational Performance: A Mediating Role of Functional Constructs. *Operations and Supply Chain Management*, 14(4), pp. 456-466.
- Siemieniako, D. and Mitreġa, M. (2018). Improving Power Position with Regard to Non-Mediated Power Sources-the Supplier's Perspective. *Industrial Marketing Management*, 70, pp. 90-100.
- Sucky, E. and Durst, S.M. (2013). Supplier Development: Current Status of Empirical Research. *International Journal of Procurement Management*, 6(1), pp. 92-127.
- Taha, A. and Reynolds, P.L. (2023). Power in Third-Party Logistics. *Operations and Supply Chain Management*, 16(3), pp. 352-364.
- Tate, W. L., Ellram, L. M., and Dooley, K. J. (2012). Environmental Purchasing and Supplier Management (EPSM): Theory and Practice. *Journal of Purchasing and Supply Management*, 18(3), pp. 173-188.
- Tran, P. N., Gorton, M., and Lemke, F. (2022). Buyers' Perspectives on Improving Performance and Curtailing Supplier Opportunism in Supplier Development: A Social Exchange Theory Approach. *Industrial Marketing Management*, 106, pp. 183-196.
- Tummala, V. R., Phillips, C. L., and Johnson, M. (2006). Assessing Supply Chain Management Success Factors: A Case Study. *Supply Chain Management: An International Journal*, 11(2), pp. 179-192.
- Vachon, S., and Klassen, R. D. (2008). Environmental Management and Manufacturing Performance: The Role of Collaboration in the Supply Chain. *International Journal of Production Economics*, 111(2), pp. 299-315.
- Vaithilingam, S., Ong, C.S., Moisescu, O.I., and Nair, M.S. (2024). Robustness Checks in PLS-SEM: A Review of Recent Practices and Recommendations for Future Applications in Business Research. *Journal of Business Research*, 173(Feb.).
- Wagner, S. M. (2006). Supplier Development Practices: An Exploratory Study. *European Journal of Marketing*, 40(5/6), pp. 554-571.
- Wagner, S. M. (2009). Indirect and Direct Supplier Development: Performance Implications of Individual and Combined Effects. *IEEE Transactions on Engineering Management*, 57(4), pp. 536-546.
- Yawar, S.A. and Seuring, S. (2018). The Role of Supplier Development in Managing Social and Societal Issues in Supply Chains. *Journal of Cleaner Production*, 182, pp. 227-237.
- Yeung, J. H. Y., Selen, W., Zhang, M., and Huo, B. (2009). The Effects of Trust and Coercive Power on Supplier Integration. *International Journal of Production Economics*, 120(1), pp. 66-78.
- Yu, Z., Waqas, M., Tabish, M., Tanveer, M., Haq, I. U., and Khan, S. A. R. (2022). Sustainable Supply Chain Management and Green Technologies: A Bibliometric Review of Literature. *Environmental Science and Pollution Research*, pp. 1-17.
- Zenger, T. R., and Lawrence, B. S. (1989). Organizational Demography: The Differential Effects of Age and Tenure Distributions on Technical Communication. *Academy of Management Journal*, 32(2), pp. 353-376.
- Zhang, M., Pawar, K. S., and Bhardwaj, S. (2017). Improving Supply Chain Social Responsibility Through Supplier Development. *Production Planning and Control*, 28(6-8), pp. 500-511.
- Zhao, X., Huo, B., Flynn, B. B., and Yeung, J. H. Y. (2008). The Impact of Power and Relationship Commitment on the Integration Between Manufacturers and Customers in a Supply Chain. *Journal of Operations Management*, 26(3), pp. 368-388.
- Zhu, Q., Sarkis, J., and Geng, Y. (2005). Green Supply Chain Management in China: Pressures, Practices and Performance. *International Journal of Operations and Production Management*, 25(5), pp. 449-468.
- Zhu, Q., Qu, Y., Geng, Y., and Fujita, T. (2017). A Comparison of Regulatory Awareness and Green Supply Chain Management Practices Among Chinese and Japanese Manufacturers. *Business Strategy and the Environment*, 26(1), pp. 18-30.
- Zimmer, K., Fröhling, M., and Schultmann, F. (2016). Sustainable Supplier Management - A Review of Models Supporting Sustainable Supplier Selection, Monitoring and Development. *International Journal of Production Research*, 54(5), pp. 1412-1442.

## APPENDIX 1: LATENT VARIABLES AND THEIR MEASUREMENT ITEMS

Table A1 Latent variables and their respective items

Latent variable	Items	Abbreviation
Sustainable supplier practices <sup>a</sup>	Environmental management systems are in place in our organization in terms of ISO 14001 certification or any comparable EMS.	Epractice1
	We provide design specifications to suppliers that include environmental compliance for purchased item.	Epractice2
	We help suppliers set up environmental management system /get ISO 14001 certification.	Epractice3
	We address environmental concerns of our customers in terms of eco-friendly design/distribution of products.	Epractice4
	We address the environmental concerns of our customers by adopting cleaner production.	Epractice5

**Table A1** Latent variables and their respective items (Cont'd)

Latent variable	Items	Abbreviation
	We have successfully designed our products which consume reduced amount of input materials /energy.	Epractice6
	Our main buyer holds environmental awareness seminars for its/their suppliers (i.e. educating suppliers through written material, workshops or seminars).	DDP2
	Our main buyer guides/helps us to establish our own environmental programs.	DDP3
	Our main buyer brings its suppliers (including us) together to share their environmental know-how and problems.	DDP4
	Our main buyer arranges funds to help us for our environmental programs.	DDP5
<i>Indirect supplier development<sup>b</sup></i>	Our main buyer urges us to take environmental actions	ERA1
	Our company is evaluated and selected by our main buyer based on environmental criteria.	ERA2
	Our main buyer send its auditors to appraise our environmental performance and compliance.	ERA3
	Our main buyer asks us to commit to waste reduction goals (e.g. to use recyclable pallet system).	ERA4
<i>Coercive buyer power<sup>c</sup></i>	Our company must comply even if our main buyer's requirements are beyond the contract.	CP1
	Our company cannot gain special treatment if we do not meet our main buyer's requests.	CP2
	Our main buyer usually suggests that they will take action to reduce our profit if we do not meet their requests.	CP3
	Our main buyer will not give our company the necessary service if we do not meet our requests..	CP4
	Our company avoids many difficulties by meeting our main buyer's requests.	CP5
<i>Non-coercive power<sup>c</sup></i>	Our main buyer convinced our company that it makes sense to follow their suggestions.	NCP1
	Their business expertise enabled them to give our company proper suggestions.	NCP2
	Our main buyer usually gives good advice to our company.	NCP3
	Our company usually does what our main buyer anticipated because we have largely congruent business philosophies.	NCP4

Note: items are adapted from: <sup>a</sup> Das (2017); <sup>b</sup> Saghiri and Mirzabeiki (2021); <sup>c</sup> Huo *et al.* (2019)

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