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Patterns in sustainable relationships between buyers and suppliers: evidence from the food and beverage industry

RESEARCH ARTICLE

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Abstract

Although research on sustainable procurement is increasing, little empirical research has been done on how sustainable procurement is established between companies. Therefore, drawing on supply chain management and purchasing management literature, this study explores how food industries manage sustainable supplier relationships. Through the identification of company clusters with typical sustainable procurement approaches, the paper contributes to the supply chain management literature. A questionnaire is applied to gather data amongst Dutch Food and Beverage companies from which 62 could be used for the analyses (effective response rate 28.9%). Cluster analysis revealed four types of companies with distinctive sustainable procurement relationships: market relationships (arms-length), sustainability leader, one-sided sustainability (interested supplier but less interested buyer), and inconclusive sustainability (buyer and suppliers only made a start). As the implementation of sustainable procurement remains low in practice, insights from this study are important for managers.

Keywords: supplier relationships, procurement, sustainability, food industry, performance
JEL code: L22, M14, Q001

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1. Introduction

Sustainability is not a company stand-alone performance, but is achieved in the supply chain with suppliers' support (Jabbour *et al.*, 2014). Sustainability goals on the economic, environmental and social dimensions are taken into account on a supply chain level (Govindan *et al.*, 2016), presupposing collaboration between the different chain members which in mutual coordination enable sustainable development (Govindan *et al.*, 2016; Seuring and Muller, 2008). Building effective and efficient supply chain relationships and collaborations is stated to enhance sustainable performance (Gellynck *et al.*, 2012; Govindan *et al.*, 2016; Rota *et al.*, 2013). Especially the purchasing function plays a critical role in this (Chkanikova, 2016). Eventually raw material, components and (half-)products are introduced via the purchasing function and sustainability requirements on suppliers and possibly on suppliers' suppliers are transferred to them via procurement (Zsidisin and Hendrick, 1998). Sustainable procurement is defined as the simultaneous pursuit of economic, environmental and social development objectives through the purchasing process (Walker *et al.*, 2012).

Although procurement trajectories can be characterised by a high level of uncertainty, risk and technical complexity, these trajectories become even more challenging in the context of sustainability issues (Bruno, *et al.*, 2018). Research into such trajectories is scarce (Bruno *et al.*, 2018; Ellram *et al.*, 2007; Nordin and Angdal, 2008) and inconclusive on how purchasing relationships concerning sustainability are managed and could be managed (Chkanikova, 2016). The necessity of developing collaboration into strong relationships to achieve sustainability is highlighted by some authors (Caniëls and Gelderman, 2007; Duffy *et al.*, 2013; Gold *et al.*, 2010; Seuring and Muller, 2008) whilst collaboration is found not always appropriate by others (Cox, 1996; Dyer and Singh, 1998; Lambert and Cooper, 2000), whereas the use of power is advocated to force suppliers to act sustainable (e.g. Awaysheh and Klassen, 2010; Hoejmose *et al.*, 2013).This current lack of conclusiveness of empirical research into buyer-supplier relationships and how they can foster sustainability has left researchers undecided on what is important in the buyer-supplier relationship to achieve sustainability (Duffy *et al.*, 2013; Grimm *et al.*, 2014; Oruezabala and Rico, 2012). Likewise, little empirical research has been done on how actually supply chain relationships are managed and how supply chain activities as a whole are being integrated (Varoutsa and Scapens, 2015). As current empirical insights into supply chain relations (also) with respect to sustainable procurement are lacking, this paper uses an inductive approach to enhance existing theory and help to explain actual sustainable supply chain functioning. The guiding research question is: which patterns from the perspective of sustainability can be identified in procurement relationships and to which sustainability performance does that lead?

This study focuses on the actual relationships between buyers and suppliers with respect to sustainable purchasing, which buyer's and supplier's internal and their relational characteristics play a role and to which sustainability performance that leads. The inductive approach will result in the identification of patterns of relationships comprising constellations of companies' internal and relational characteristics and their sustainability performance. This research contributes theoretically to sustainable supply chain management literature to present a variety of patterns of supplier-buyer relationships in which each pattern illustrates a specific constellation of characteristics of companies and of their interrelation in conjunction with sustainable performance. These patterns make clear how in complex procurement trajectories sustainable perspectives are incorporated (Brammer and Walker, 2011; Preuss, 2009). As the implementation of sustainable procurement remains low in practice (Genovese *et al.*, 2013; Schneider and Wallenburg, 2012), insights from this study are also important for managers. By presenting sustainability relationship patterns managers are supported to recognise and form relationships to improve sustainability (Pagell *et al.*, 2010).

This paper is structured as follows. In the literature review (Section 2), the procurement practice is explored from the perspective of the buyer-supplier relationship, characteristic of buying and supplying companies, the level of integration of sustainable procurement and sustainable performance. The results of this research are based on a survey sent to 214 companies from which 62 could be used for the analyses (effective response rate 28.9%). The research methodology will be explained in Section 3. Section 4 presents a Principal Component

Analysis and the cluster analysis of the sustainable procurement practices in presented in Section 5. We will close this article with conclusions and discussion on the findings.

2. Literature

Sustainable procurement is a field that has received growing attention within the academic community during the last decade (Krause *et al.*, 2009; Walker *et al.*, 2012). Nevertheless, the existing literature is diverse and researchers have acknowledged the complexity and dynamic nature of sustainable procurement (Hoejmose and Adrien-Kirby, 2012). Some topics have received considerably more attention than others, such as internal and external drivers for sustainable procurement, and the impact on performance and barriers for the implementation of sustainable procurement (Hoejmose and Adrien-Kirby, 2012). When defining sustainability in terms of the triple P encompassing the social, economic and environmental dimension, surely, most attention has been given to green, environmental, procurement issues (Carter and Easton, 2011). One of the important research gaps (Hoejmose and Adrien-Kirby, 2012; Sarkis *et al.*, 2011) this article will pay attention to is research into characteristics of buyer-supplier relationships and especially into how these can foster sustainability (Duffy *et al.*, 2013; Grimm *et al.*, 2014; Oruezabala and Rico, 2012). Fostering sustainability within a relationship presupposes certain characteristics of the relationship itself, the holders of that relationship (buyer and supplier) and having insight in the level of sustainability which is fostered. The objective of this study was to relate company internal and relationships' characteristics to sustainability performance. The following literature review identifies the main constructs for our research.

2.1 Buyer-supplier relationships characteristics

Although several scholars identified the importance of buyer-supplier relationships for sustainability (e.g. Beske *et al.*, 2014; Duffy *et al.*, 2013; Gualandris *et al.*, 2014; Schneider and Wallenburg, 2012), they remain undecided on what is important in the relationship to actually facilitate sustainable procurement (Grimm *et al.*, 2014; Oruezabala and Rico, 2012). This literature search identifies important characteristics of buyer-supplier relationships from and their impact on sustainable supplier relationships. Power and dependency have often been recognised to be important aspects in buyer-supplier relationships (Kraljic, 1983) and more recently in understanding its connection with sustainability (e.g. Andersen and Skjoett-Larsen, 2009; Hoejmose *et al.*, 2013). Furthermore, trust and commitment are also central concepts (Wagner, 2011). Trust and commitment are considered crucial for a collaborative approach towards sustainability (Beske and Seuring, 2014; Carter and Jennings, 2002; Sarkis *et al.*, 2011). Additionally, as stated by Fawcett *et al.* (2011), a basic requirement for buyer-supplier relationships is information exchange. Some scholars argue that the buyer-supplier relationship can also be influenced by the geographical distance between a buyer and supplier (Awaysheh and Klassen, 2010; Hoejmose *et al.*, 2013). The final feature of a buyer-supplier relationship that will be taken into account is the presence of a code of conduct. Several scholars acknowledge the importance of codes of conduct (e.g. Beske and Seuring, 2014; Hoejmose and Adrien-Kirby, 2012; Wu and Pagell, 2011). They indicate how the value orientation of the purchasing company and its expectations from its suppliers (Amaeshi *et al.*, 2008; Hoejmose and Adrien-Kirby, 2012), can have an influence on how the buyer-supplier relationship is shaped, and the level of sustainable procurement that is reached.

2.2 Buyer and supplier characteristics impacting their relationships

- *Buyer*

We identified the following characteristics from the literature: supplier management, corporate culture, stakeholder management, know-how and expertise. The first feature often identified as important in literature on sustainable procurement is 'supplier management'. This entails the processes of supplier selection, supplier development and supplier evaluation (Reuter *et al.*, 2010). Due to the impact suppliers can have on the sustainability performance of a company (Ageron *et al.*, 2012), supplier management is a crucial issue for a company aiming to maintain a strategically competitive position (Govindan *et al.*, 2013). Moreover,

the incorporation of sustainability criteria in the supplier selection process increases the complexity of the purchasing process and supplier management (Handfield *et al.*, 2002), as more criteria need to be met. 'Corporate culture', the next buyers' feature, encompasses aspects related to how the company works. If top management support, a corporate history of working on sustainability issues and dedicated employees are present, the corporate culture can support sustainable procurement (Caniëls *et al.*, 2013). Additionally, if the corporate culture supports cross-functional cooperation, the functional and corporate strategies are better aligned, which is of vital importance for business success (Boks, 2006; González-Benito, 2007). Furthermore, 'stakeholder management' entails understanding the role and influence of stakeholders such as consumers, governments, NGOs, activists and even competitors or shareholders (Crespin-Mazet and Dontenwill, 2012; Miemczyk *et al.*, 2012; Schneider and Wallenburg, 2012). Companies may experience difficulties with implementing sustainable procurement if they do not conduct appropriate stakeholder management. Therefore, properly assessing stakeholders, prioritising them accordingly and engaging stakeholders in the purchasing process is of importance in this realm. Know-how and expertise of the buying company is the final feature to be included. The buying company needs to have knowledge on relevant sustainability practices in order to implement sustainable procurement and transfer this to its suppliers (Blome *et al.*, 2014; Sucky and Durst, 2013).

- *Supplier*

Also in the case of a supplying company corporate culture is identified as a key feature to be taken into account. Similar to the buying company, a suppliers' sustainability is likely to vary depending on top management support, attitude of employees and corporate history of working with sustainability issues. Additionally, willingness to learn and to participate in sustainability initiatives from the buying company is an important aspect of corporate culture (Caniëls *et al.*, 2013; Spekman and Carraway, 2006). Know-how and expertise, similar to the buying company, is included as well. Relevant knowledge and expertise were found to be positively related to suppliers' participation in sustainability initiatives (Caniëls *et al.*, 2013). Finally, Grekova *et al.* (2014) and Caniëls *et al.* (2013) recognised suppliers' access to resources from buyers, NGOs or governments as potential constraints for sustainability. Because of low margins in many food industries, most companies have limited financial, human and technical resources available to invest in sustainability (Caniëls *et al.*, 2013; Lee and Klassen, 2008).

2.3 Maturity levels of sustainability

In the previous sections, characteristics of buyers and suppliers and their relationships are identified as part of procurement practices. In our research we relate procurement practices to sustainability performance. The basic idea is similar to maturity models. In such models maturity of a company's sustainability state is determined by the integration of sustainability into the activities of a company and into their external relations (Müller and Pfleger, 2014). To illustrate the idea of such a model we present the four levels' maturity model of Baumgartner and Ebner (2010; and as used by e.g. Amini and Bienstock, 2014; Müller and Pfleger, 2014). They created a four-level maturity grid, in which level one stands for a rudimental level, where the company might begin to consider sustainability and where (if any) only mandatory regulations are adhered to. In the second level, the company complies with sustainability-related regulations and even goes slightly further, to differentiate itself from the competitors and to increase its credibility. Level three represents a substantial consideration and maturity of sustainability, which is often above the industry average. Companies are focussed on the external presentation of sustainability to substantially increase their credibility in society, but also aim at positively influencing the basic conditions of corporate sustainability in society. Finally, level four represents an outstanding effort towards sustainability and a sophisticated maturity. These companies show a highly developed sustainability commitment in order to become a market leader in sustainability

issues (Baumgartner and Ebner, 2010). In this highest level, the company includes customers, suppliers and partners in sustainability practices and drives industry standards (Müller and Pfleger, 2014)[1].

3. Methodology and empirical strategy

3.1 Selection industry

The connections between the buyer-supplier relationship, buyer and supplier characteristics and the level of sustainable procurement are explored by conducting a survey in a sample of Dutch companies operating in the food and beverages (F&B) industry. In order to identify how buyer-supplier relationship can support sustainable procurement, this research aims to find companies with similar characteristics when it comes to buyer-supplier relationships and sustainable procurement. Although prior research has often considered multiple industries simultaneously, there has been an increasing call for industry specific research and applications (Carter and Easton, 2011; Hollos *et al.*, 2012; Schneider and Wallenburg, 2012; Sucky and Durst, 2013; Tate *et al.*, 2012). Indeed, sustainability practices vary per industry, due to the differences in external pressure and the relevancy of the three sustainability aspects (Tate *et al.*, 2012). For example, the sustainable procurement profile of chemical companies will focus to a larger extent on environmental issues, whereas the labour-intensive textile industry will mainly focus on social issues (Carter and Easton, 2012; Schneider and Wallenburg, 2012). Thus, industry specific circumstances influence the integration of sustainable procurement practices in companies and are therefore relevant to take into account when considering the buyer-supplier relationship. Following these arguments, this research adopts a single industry approach. More specifically, in this research we use data and information derived from companies operating in the Dutch F&B industry to perform our analysis on how buyer-supplier relationships can foster and facilitate sustainable procurement.

The Dutch F&B industry is an appropriate industry to gain more insights into how buyer-supplier relationships can facilitate sustainable procurement. The F&B industry is one of the largest industries in the Netherlands in terms of production and turnover (CBS, 2014), but also one of the most polluting industries (Grekova *et al.*, 2014). Through all sorts of initiatives, mostly initiated by NGOs, the sector has increasingly paid attention to sustainability issues (Erich, 2012). Examples include Fair Trade, the MSC label for fish products or the production of organic products. Furthermore, Hollos *et al.* (2012) stated that customers and other stakeholders are inclined to punish companies, especially those selling branded products to the end consumer, that fail to comply with accepted sustainability standards. Moreover, due to the high pressure on prices and profit margins from retailers in the Netherlands (Grekova *et al.*, 2014), cooperation within the chain seems necessary. Indeed, enhanced coordination between actors in the chain and the quality of their relationship are increasingly recognised as potential sources of competitiveness (Schiemann, 2007). Therefore, according to Grekova *et al.* (2014) and Erich (2012), the Dutch F&B industry can be increasingly characterised by intense supply chain cooperation.

3.2 Sample

The sampling frame was compiled from the address file of Dutch F&B companies from the Dutch Chamber of Commerce. A sample of 325 Dutch F&B companies with at least 50 employees was selected. Consistent with the definition of small and medium-sized enterprises of the European Commission (EC, 2014), this research leaves out the small and micro-sized companies by only including companies with at least 50 employees. Small and micro-sized companies are outside the scope of this research. Grekova *et al.* (2014) showed that environmental sustainability practices and capabilities were less implemented and developed in small companies.

[1] Similar to the four levels of Baumgartner and Ebner (2010), Okongwu *et al*. (2013) and the Industrial Research Initiative (IRI, 2014) also identified four levels of maturity related to sustainability.

After deletion of production locations and other double locations from the address file, 214 unique companies remained that together made up the sampling frame.

Each respondent in the sample was selected based on their job responsibilities, which had to be procurement or an equivalent function in which there was regular contact with suppliers. In an effort to increase the response rate, the research protocol started with an introductory telephone contact in which the respondents were asked for their cooperation and e-mail addresses. Subsequently, an e-mail with a personalised link to the online survey was sent. In order to enhance the response rate, respondents were offered a summary of the results. When respondents had not completed the survey after seven days, a reminder e-mail with a deadline for completing the survey was sent to encourage participation. After the data collection period of three weeks, 75 responses were received from the sample size of 214, resulting in a response rate of 35%. After excluding 13 responses that were deemed unusable due to incompleteness, the effective response rate was 28.9% (62/214). The characteristics of the sample are provided in Table 1, showing the number of employees, the function of the respondents and the industry sector of the company within the food and beverages sector.

3.2 Operationalisation of the variables

A literature review was conducted to derive the variables that measure the theoretical constructs. All the items were measured using 7-point Likert scales[2]. In total, four general concepts were measured in the survey, namely the buyer-supplier relationship, the buyer capabilities, the supplier capabilities, and the maturity level of sustainable procurement.

[2] The survey can be requested from the corresponding author.

Table 1. Profile of respondents.

		N	Percentage
Number of employees	50-100	11	18
	100-500	36	58
	501-1000	4	6
	>1000	11	18
	Total	62	100
Function respondents	Presidents/vice presidents	4	6
	Directors	10	16
	Purchasing manager	22	35
	Buyer	22	35
	Other	4	6
	Total	62	100
Industry sector	Dairy	4	6
	Meat	8	13
	Fish and seafood	3	5
	Fruit and vegetables	6	10
	Bakery	16	26
	Beverages	6	10
	Other	19	31
	Total	62	100

The concept buyer-supplier relationships is operationalised in terms of (1) power and dependency; (2) trust and commitment; (3) information exchange and communication; (4) geographical distance and (5) code of conduct. Power and dependency was measured using a three items construct to; assess the power of the supplier and a three items construct to assess the power of the buying company. Both these constructs have been adopted from Hoejmose *et al.* (2012). The concepts trust and commitment were measured using a three items construct on the degree of commitment present, which was adopted from Carter and Jennings (2002), and a three items construct on trust, which was adopted from Hoejmose *et al.* (2012). The information exchange and communication variable was measured via a four items construct that was adopted from Paulraj *et al.* (2008) to measure the inter-organisational communication and a three items construct adopted from Fawcett *et al.* (2007) on information technology. To measure the geographical distance, a three items construct was developed by the researchers themselves. Finally, in order to measure the concept code of conduct, a four and two items scale of Awaysheh and Klassen (2010) were used to measure respectively the existence of a code of conduct and the monitoring and evaluation activities present to control adherence to the code of conduct.

The buyer characteristics were the following: (1) supplier management; (2) the corporate culture; (3) stakeholder management; and (4) the level of know-how and expertise. Supplier management was measured using a five item scale based on Yu *et al.* (2014). The corporate culture was measured using a three items construct from Cousins *et al.* (2006) that measured top management support, another three items construct from Cousins *et al.* (2006) to measure cross-functional cooperation and finally, two items on the attitude of employees were adopted from Park and Stoel (2005). For the concept of stakeholder management, a three items construct was developed based on Crespin-Mazet and Dontenwill (2012). To measure the level of know-how and expertise, two items from Cousins *et al.* (2006) were used to assess the level of skills of purchasing employees on sustainability and two items were developed based on literature to assess the sustainability knowledge management.

The concept supplier characteristics covered (1) corporate culture; (2) know-how and expertise; and (3) access to resources. The corporate culture also included items on top management support, adopted from Cousins *et al.* (2006), and the attitude of employees (Park and Stoel, 2005). Furthermore, it comprised of a three-items construct adopted from Lee (2008) that measured the willingness to participate in the buyers' sustainability initiatives. The know-how and expertise was measured via a three items construct that was developed based on Lee (2008) and Rao (2002). Finally, the access to resources was also measured using a three-items construct that was based on Lee (2008) and Rao (2002).

Based on the maturity concept the level of integration of sustainability measurements in the company was included. For every sustainability dimension 4 aspects were selected. For economic sustainability: economic value distribution, sustainability reporting, knowledge management, innovation and technology (Amini and Bienstock, 2014; Baumgartner and Ebner, 2010; IRI, 2014; Okongwu *et al.,* 2013; Van Marrewijk, 2005). For environmental sustainability: life cycle assessment, material and part purchasing, manufacturing impact, supplier management (adapted from IRI (2014) and Van Marrewijk (2005)). For social sustainability: health and safety, employee management, supplier management, corporate citizenship (adapted from Baumgartner and Ebner (2010); Carter and Jennings (2004); IRI (2014); Van Marrewijk (2005)). For every aspect of economic, environmental and social sustainability, a two items construct was developed. Each construct encompassed one item related to the organisational integration of that particular aspect and the other item measured the content integration of that sustainability aspect (see Supplementary Materials S1 for an overview of these items as included in the questionnaire). Moreover, as control variables questions were included on company performance and the presence of dedicated (sustainable) product lines.

4. Analysis

4.1 Principal component analysis

In order to reduce the number of variables in the analysis, a principal component factor analysis (PCA) with oblimin rotation was conducted using SPSS 22 (IBM Corporation, Armonk, NY, USA). Since the survey was created based on theory, the PCA was driven by the earlier identified concepts of buyer capabilities, supplier capabilities and buyer-supplier relationships. Next, all three PCAs that were performed will be discussed. Subsequently, a description will be given of how the concept of maturity levels of sustainable procurement was divided into factors.

4.2 Principal component analysis buyer-supplier relationships

A PCA was conducted on the 28 items of the concept buyer-supplier relationship. Five components were retained explaining 73.19% of the variance combined. In Table 2 the factor loadings after rotation are presented (factor loadings over 0.4 appear in bold). The items that load on the same components suggest that component 1 represents loyalty in a relationship, component 2 the strictness of guidance in a relationship, component 3 joint dependency, component 4 the intensity of communication and component 5 the connectivity.

Table 2. Summary of principal component analysis for buyers-supplier relationships (N=62).

	Loyalty	**Strictness of guidance**	**Joint dependency**	**Intensity of communication**	**Connec-tivity**
Promises made by suppliers are reliable.	**0.913**	0.061	0.046	-0.063	0.066
If problems arise. the suppliers are honest about the problems.	**0.871**	-0.104	-0.012	-0.157	-0.225
Suppliers have been frank in dealing with us.	**0.756**	-0.037	0.026	0.182	-0.006
We are committed to the relationship with these suppliers.	**0.645**	0.046	0.051	0.287	0.022
Suppliers are monitored to ensure adherence to our code of conduct.	-0.100	**0.918**	0.007	0.072	0.056
Supplier relationships are ended if suppliers do not adhere to our code of conduct.	0.119	**0.836**	0.037	0.062	0.068
We have specific audit procedures to ensure that suppliers adhere to our code of conduct.	0.028	**0.790**	-0.115	0.029	-0.224
Purchasing has sustainable sourcing training programs.	-0.086	**0.625**	0.071	-0.070	-0.133
We account for a large proportion of these suppliers' total sales.	-0.028	0.019	**0.881**	-0.028	-0.034
The suppliers would find it difficult to replace us.	-0.038	-0.181	**0.812**	0.224	-0.242
We do not have a good alternative to these suppliers.	0.048	0.211	**0.731**	-0.283	0.171
We are important to these suppliers.	0.384	0.002	**0.584**	0.208	-0.024
We have frequent face-to-face communication.	-0.143	0.037	-0.010	**0.879**	-0.072
We inform each other about things that may affect the other.	0.277	0.006	0.067	**0.715**	0.101
Suppliers are provided with any information that might help them.	0.374	0.203	-0.066	**0.623**	-0.022
Current information systems satisfy supply chain communication requirements.	0.206	0.132	-0.058	-0.133	**-0.811**
Information systems are integrated throughout the supply chain.	-0.084	0.151	0.205	0.187	**-0.740**
Initial eigenvalues	5.34	2.79	1.97	1.29	1.06
% of variance explained	31.40	16.40	11.60	7.57	6.23
Cronbach's α	0.86	0.83	0.80	0.78	0.71

The internal consistency of the scales was assessed using Cronbach's α coefficients. The α coefficients all exceeded the threshold of 0.70 outlined by Nunnally (1978).

4.3 Principal component analysis buyer characteristics

A PCA was conducted on the 20 items of the concept buyer capabilities. Three components were retained explaining 60.02% of the variance combined. In Table 3 the factor loadings after rotation are presented (factor loadings over 0.4 appear in bold). The items that load on the same components suggest that component 1 represents the integration of sustainable procurement, component 2 the purchasing skills and component 3 the attitude of employees. The internal consistency of the scales was assessed using Cronbach's α coefficients. The Cronbach α coefficients were all well above the recommended threshold of 0.70 outlined by Nunnally (1978).

4.4 Principal component analysis supplier characteristics

A PCA was conducted on the 13 items of the concept supplier capabilities. Three components were retained explaining 67.90% of the variance combined. In Table 4 the factor loadings after rotation are presented (factor loadings over 0.4 appear in bold). The items that load on the same components suggest that component 1 represents the supplier attitude, component 2 the access to resources from the buying company and component 3 the supplier sustainable resources deployment. The internal consistency of the scales was assessed using

Table 3. Summary of principal component analysis for buyer characteristics (N=62).

	Integration of sustainable procurement	**Purchasing skills**	**Attitude of employees**
Sustainability is considered a vital part of our corporate strategy.	**0.947**	-0.014	-0.085
My company stimulates working together with suppliers for sustainability.	**0.903**	0.023	-0.152
My company cooperates with suppliers for achieving sustainability objectives together.	**0.866**	0.058	-0.105
Top management supports our efforts to improve sustainability.	**0.783**	-0.120	0.187
Design specifications with sustainability requirements are provided to suppliers.	**0.739**	0.212	-0.138
Top management values purchasing views on sustainable procurement.	**0.725**	-0.027	0.151
Social sustainability risks are integrated in purchasing decisions.	**0.724**	0.060	0.213
Environmental sustainability risks are integrated in purchasing decisions.	**0.653**	0.071	0.185
Purchasing actively identifies relevant stakeholders.	0.053	**0.882**	-0.239
Stakeholder input is integrated in purchasing processes.	0.187	**0.815**	-0.322
My company ensures training needs of employees are identified and acted upon.	-0.220	**0.754**	0.386
My company stimulates working in cross-functional teams.	0.010	**0.724**	0.156
Purchasing has the skills to interpret changes in the supplier market.	0.069	**0.693**	-0.032
Purchasing participates in product and process design.	0.137	**0.603**	0.237
My colleagues' business decisions are highly socially responsible.	0.369	0.089	**0.689**
My colleagues are highly ethical and socially responsible.	0.370	0.122	**0.617**
Initial eigenvalues	7.59	2.24	1.22
% of variance explained	47.44	13.99	7.59
Cronbach's α	0.93	0.86	0.79

Table 4. Summary of principal component analysis for supplier characteristics (N=62).

	Supplier attitude	Access to resources from buying company	Supplier sustainable resources deployment
The suppliers' top management values its employees' views on sustainability.	**0.879**	-0.028	-0.034
The suppliers expect benefits from the sustainability initiatives.	**0.865**	0.210	-0.070
The suppliers' employees behave highly ethical and socially responsible.	**0.767**	-0.042	-0.113
The suppliers are willing to participate in our sustainability initiatives.	**0.705**	0.027	0.232
The suppliers' top management wants to improve sustainability.	**0.698**	-0.096	0.234
The suppliers are aware of our sustainability initiatives.	**0.426**	0.261	0.317
My company provides training/education to the supplier's.	0.047	**0.896**	-0.019
My company arranges funds to help suppliers increase their sustainability.	0.020	**0.886**	0.013
Suppliers engage in inter-firm sustainability knowledge transfer.	-0.100	0.236	**0.825**
Suppliers have the internal resources to invest in our sustainability requirements.	0.035	-0.125	**0.764**
Suppliers have the knowledge and expertise required to act upon sustainability.	0.291	-0.209	**0.600**
Initial eigenvalues	4.67	1.74	1.06
% of variance explained	42.44	15.85	9.61
Cronbach's α	0.87	0.80	0.67

Cronbach's α coefficients. The α coefficients for the supplier corporate culture (α=0.87) and access to resources from the buying company (α=0.80) were well above the lower limits of acceptability of 0.70 outlined by Nunnally (1978). The α coefficients for supplier internal resources reached a respectable 0.67.

4.5 Integration of sustainable procurement

Unlike the other concepts, no principal component analysis was run on the 24 items (see annex) of the concept integration of sustainable procurement. Since a PCA could relate the 24 items to different dimensions of sustainability than intended in this research (i.e. economic, social and environmental), it was chosen not to perform a PCA. Instead, based on the strong conceptual motivations of the maturity model, the items belonging to the economic, social and environmental aspects respectively were added to create three factors. These factors each comprise eight items and represent the economic, social and environmental sustainability integration level of the purchasing department. The internal consistency of the scales was assessed using Cronbach's α coefficients. The α coefficients for the economic aspects (α=0.87), social aspects (α=0.87) and environmental aspects (α=0.91) were all well above the threshold of 0.70 outlined by Nunnally (1978).

4.6 Cluster analysis

The previous section analysed the key characteristics reflecting the constructs buyer-supplier relationships, buyer capabilities, supplier capabilities and sustainable procurement maturity level. As the objective of this study was to gain insight into procurement practices and sustainable procurement, the next step in the analysis was to cluster the companies (N=62) based on the 14 created factors. According to Meyers *et al.* (2012), cluster analysis is often used as an exploratory approach. Moreover, due to the small sample size cluster analysis is an appropriate choice, as cluster analysis does not have very strong assumptions that have to be met in order to properly interpret the results (Meyers *et al.*, 2012).

The cluster analysis structured the procurement practices based on the buyer capabilities, supplier capabilities, the buyer-supplier relationship and the integration levels of sustainable procurement. In this way, an overview is created of typologies of companies, based on these four concepts. To conduct the cluster analysis, a hierarchical agglomerative technique with Ward's method and the squared Euclidean distance measure was used. In conducting the cluster analysis all values were standardised to Z scores, because the values of the variables created via the PCAs were on different scales than the values of the variables that were created via adding (i.e. the sustainability maturity variables).

5. Results

Table 5 provides the agglomeration coefficients. The number of clusters is determined based on where the distance coefficients make a larger change (Burns and Burns, 2009). In this case, from 48.73 on there are relatively large changes. Based on this criterion, a four-cluster solution was selected as most appropriate.

5.1 Cluster interpretation

The interpretation stage involves assigning each of the four identified clusters a name or label that accurately describes the nature of that cluster (Cousins *et al.*, 2006). Table 6 shows the final four-cluster solution. It describes each cluster based on the central concepts of this research: supplier capabilities, buyer capabilities, the buyer-supplier relationship and sustainability performance that were found per cluster.

In order to interpret the clusters better, other, possible explanatory questions from the survey were compared with the cluster groups via comparing means and crosstab analysis in SPSS. Next, the performance of the clusters was assessed using the performance indicators from the survey. The highest scoring cluster on sustainable procurement performance also has the highest cost reductions, largest growth in market share and higher profits due to its sustainability activities. The second highest scoring cluster has the second best improvements on these aspects, the third and the worst scoring cluster show no improvements on these performance indicators. The same distribution holds for the cluster scorings on the integration of the three sustainability aspects and their own assessment of their sustainability. The results furthermore showed that in the highest scoring cluster in terms of sustainable procurement performance almost all companies (11 vs 2) had a special product line focussed on high sustainability levels. For the second best cluster this was more equally divided (9 vs 14), whereas the two lowest scoring clusters had significantly more companies without these special sustainability focussed product lines (2 vs 18 and 1 vs 5). Finally, the results showed that the number of employees cannot explain the cluster distribution.

As has been mentioned before, this research focusses on the incorporation of the Triple Bottom Line, in which all three sustainability aspects are equally important. Table 7 shows the mean and standard deviation per cluster. Except for the third cluster, the three sustainability aspects are quite equally integrated in the other three clusters. Additionally, Table 7 shows that for all clusters the environmental sustainability aspect of sustainable procurement is implemented to a lesser extent than the economic and social sustainability aspects.

Table 5. Reformed agglomeration schedule.

Clusters	Agglomeration last step	Coefficients this step	Change
2	854.00	631.25	222.75
3	631.25	570.12	61.13
4	570.12	521.39	48.73
5	521.39	480.02	41.37
6	480.02	448.55	31.48
7	448.55	418.69	29.86
8	418.69	393.05	25.65

Table 6. Final clusters mean and standard deviation.

	Cluster 1 (N=20) Mean (SD)	Cluster 2 (N=13) Mean (SD)	Cluster 3 (N=6) Mean (SD)	Cluster 4 (N=23) Mean (SD)	F
Supplier attitude	-0.92 (0.87)	0.61 (0.71)	0.16 (1.12)	0.41 (0.63)	F=13.990 *P*<0.05
Access to resources from buying company	-0.32 (1.02)	0.44 (0.99)	-0.93 (0.37)	0.27 (0.89)	F=4.400 *P*<0.05
Supplier sustainable resources deployment	-0.88 (0.82)	0.62 (0.83)	1.02 (0.73)	0.14 (0.68)	F=15.540 *P*<0.05
Integration on sustainable procurement	-0.88 (0.64)	1.00 (0.32)	-1.09 (1.03)	0.48 (0.52)	F=39.490 *P*<0.05
Purchasing skills	-0.90 (1.08)	0.73 (0.44)	0.91 (0.30)	0.13 (0.59)	F=17.169 *P*<0.05
Attitude of employees	-0.06 (0.94)	0.41 (0.86)	-1.06 (0.79)	0.09 (1.02)	F=3.446 *P*<0.05
Loyalty	-0.55 (1.21)	0.59 (0.79)	0.14 (0.80)	0.10 (0.73)	F=4.228 *P*<0.05
Strictness of guidance	-0.39 (0.95)	1.07 (0.67)	-0.88 (1.01)	-0.04 (0.70)	F=11.390 *P*<0.05
Joint dependency	-0.21 (0.86)	0.30 (1.01)	-1.09 (0.67)	0.30 (0.98)	F=4.345 *P*<0.05
Intensity of communication	-0.77 (0.91)	0.56 (0.44)	0.34 (0.38)	0.26 (1.05)	F=8.105 *P*<0.05
Connectivity	0.34 (1.14)	-0.81 (0.72)	0.96 (0.56)	-0.08 (0.73)	F=7.250 *P*<0.05
Economic sustainability	26.05 (7.62)	44.46 (4.22)	27.67 (5.24)	34.74 (5.95)	F=25.20 *P*<0.05
Environmental sustainability	21.50 (4.51)	40.85 (6.94)	14.17 (3.19)	29.70 (7.30)	F=37.14 *P*<0.05
Social sustainability	25.95 (6.30)	42.39 (5.11)	23.00 (6.75)	36.26 (6.16)	F=27.10 *P*<0.05

Table 7. Mean and standard deviation of sustainable procurement performance.

	Cluster 1 (N=20)	Cluster 2 (N=13)	Cluster 3 (N=6)	Cluster 4 (N=23)
Economic sustainability	26.05	44.46	27.67	34.74
Environmental sustainability	21.50	40.85	14.17	29.70
Social sustainability	25.95	42.38	23.00	36.26
Mean	24.50	42.56	21.61	33.57
SD	2.60	1.81	6.86	3.44

The scores on each of these three factors were combined to form a measure of sustainable procurement performance. This was done by taking the average of the scores on the three aspects for each cluster. In the analysis of the results this average is used in the graph to represent the sustainable procurement performance.

5.2 Describing the clusters: finding patterns of sustainable procurement in a buyer-supplier relationship setting

As mentioned previously, part of the interpretation stage involves assigning the clusters a name or label that accurately describes the nature of that cluster (Cousins *et al.*, 2006). The rationale for each of these names will be given next. The first cluster is labelled 'market relationship'. This cluster represents 20 companies or 32.3% of the sampled population. The practices in this cluster strongly resemble a market type of relationship, meaning that the buyer and the supplier are not committed to each other or the relationship, the information exchange is relatively low and there is little coordination needed (Gereffi *et al.*, 2005). This type of arm's-length market relationship is comparable to what is found in cluster 1. The companies do not invest in each other, communication is brought to a minimum and there is no loyalty towards each other. Moreover, sustainability is not a goal for these companies, which means the complexity will be low and prices are the most important, as is also the case for market relationships (Gereffi *et al.*, 2005).

The second cluster is termed 'sustainability leader'. This cluster represents 13 companies or 21% of the sampled population. This cluster scores significantly better than the other clusters on the maturity level of sustainable procurement. Moreover, the cluster scores by far the highest on strictness of guidance, indicating that there is a strict code of conduct and that there are strict rules to follow. This resembles a strong leadership with tight control to ensure sustainability. Since both the buyer and the supplier want to be sustainable and there is a high degree of loyalty and a high intensity of communication, the highest sustainable performance is reached in this cluster. Surprisingly, the (systems) connectivity of cluster 2 is by far the lowest compared to the other clusters.

The third cluster is termed 'one-sided sustainability'. This cluster represents 6 companies or 9.7% of the sample. The 'one-sided sustainability' cluster reflects a buyer-supplier relationship in which the supplier is capable and willing to invest in sustainability, but where the buying company is not interested in sustainability. This cluster scores lowest on the performance level of sustainable procurement reached, but remarkably, the cluster scores by far the highest on connectivity. The very low joint dependency and the very low strictness of guidance also indicate that the buying company is reluctant to engage in sustainability, thereby resembling the one-sidedness of the sustainability performance that is reached.

Finally, cluster 4 is labelled 'inconclusive sustainability'. This cluster comprises of 23 companies or 37% of the sample. The cluster scores second highest for the performance level of sustainable procurement. Although both the buyer and the supplier care for sustainability, the supplier does not have the needed resources and the buying company does not do as much as it could. For example, the integration of sustainable procurement is good, but could be a lot higher, and the resources they provide to their suppliers could also be higher. Therefore, this cluster is termed 'inconclusive sustainability', as both parties do work on sustainability, but not to the extent that the highest sustainability performance is reached. Table 8 summarises the findings.

5.3 Division of Food & Beverage sectors over clusters

From Figure 1 it becomes clear that no real pattern can be found in the distribution of sectors within the Dutch F&B industry over the clusters[3]. It can be seen that all four dairy companies are in the two highest scoring clusters in terms of sustainability performance. Furthermore, most bakeries (13 out of 16) are placed in the middle two clusters in terms of sustainability performance. However, the main result that can be found in Figure 1 is that sustainability performance does not seem to be constrained to sub-sectors within the Dutch F&B industry, as the sub-sectors are very distributed over the clusters.

[3] We also made a breakdown of cluster members by company size. This didn't provide us with new insights.

Table 8. Description of the clusters.

	Cluster 1 (market relationship) (N=20)	**Cluster 2 (sustainability leader) (N=13)**	**Cluster 3 (one-sided sustainability) (N=6)**	**Cluster 4 (inconclusive sustainability) (N=23)**
Supplier characteristics	• Suppliers are characterised by a very negative attitude towards sustainability. • Suppliers do not have internal resources or access to resources from the buying company to invest in sustainability.	• The suppliers are characterised by a very positive attitude towards sustainability. • Suppliers have good access to resources from the buying company, but also have sufficient resources of their own to invest in sustainability.	• The suppliers are characterised by a very high degree of sustainable resources to deploy, whilst simultaneously no degree of access to resources from the buying company at all. • The suppliers are willing to invest in sustainability.	• The suppliers are characterised by their positive attitude towards sustainability. • Suppliers have limited access to resources from the buying company and they only have limited resources available themselves.
Buyer characteristics	• Buyers are characterised by very low purchasing skills and a low integration of sustainable procurement. • Employees don't really have anything against sustainability, but they are not enthusiastic about it.	• Buyers are characterised by a very high level of integration of sustainable procurement in the company and a positive attitude of the employees towards sustainability. • Buyers have very good purchasing skills.	• The buyers are characterised by no integration of sustainable procurement whatsoever and a very negative attitude towards sustainability. • The buyers do have very high purchasing skills.	• The buyers are characterised by a good integration of sustainable procurement, but only average purchasing skills. • The employees are not against sustainable procurement, but are only very slightly positive about it.
Buyer-supplier relationship	• The relationship is characterised by a very low intensity of communication and the absence of loyalty. • There is no joint dependency and also no strictness of guidance. • Remarkably, connectivity is quite alright.	• The relationship is characterised by the very high degree of strictness of guidance, combined with a very low degree of connectivity. • Both the intensity of communication and the loyalty towards each other is high, but they are only to some degree dependent on each other.	• The relationship is characterised by a very high degree of connectivity and quite a lot of communication. • The relationship is also characterised by a small degree of loyalty, but no strictness of guidance or joint dependency at all.	• The relationship is characterised by a small degree of loyalty and joint dependency. • Connectivity is limited, but there is a reasonable intensity of communication and there is some degree of strictness of guidance.
Performance	• The buying companies did not experience cost reductions, increase in market share or higher profits as a result of their sustainability activities.	• The buying companies experienced quite a lot of cost reductions and also a good increase in market share and higher profits due to their sustainability activities.	• The buying companies did not create any cost reductions, larger market shares or higher profits as a result of their sustainability activities at all.	• The buying companies experienced quite some cost reductions, created a larger market share and also saw their profit increase a bit due to their sustainability activities.

6. Conclusions

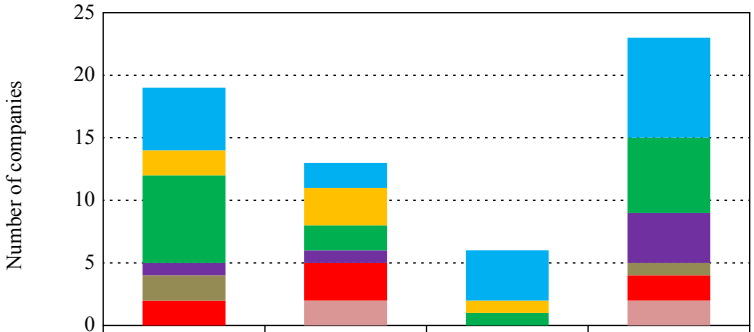
6.1 Buyer-supplier relationships

The results of the empirical research have provided some valuable insights into the relationship between aspects of buyer-supplier relationships and sustainable procurement performance. First of all, the analysis showed that loyalty, which encompasses aspects of trust and commitment, is positively related[4] to sustainable procurement performance. Additionally, the results showed that joint dependency was positively related to sustainable procurement performance. In the cases where both the supplier and the buyer were dependent on each other, sustainable procurement performance was higher than when there was no joint dependency. Thus, this research does not support scholars who advocate the use of power to force suppliers to act sustainable. However, the results do show an important role for the strictness of guidance in the buyer-supplier relationship. The positive relationship between strictness of guidance and sustainable procurement performance indicates that codes of conduct, rules and audit procedures have a positive influence on the level of sustainable procurement. Finally, the analysis showed two interesting results. The intensity of communication, which includes aspects of face-to-face communication and willingness to share information, has a positive relationship with sustainable procurement performance. This confirms the expectations from the literature study. However, connectivity, which includes aspects on the linkage and integration of information systems, has a negative relationship with sustainable procurement performance. This does not necessarily imply that connectivity has a negative influence on sustainable procurement, but it does indicate that connectivity is not a prerequisite for sustainable procurement.

6.2 Characteristics of the buying company

From the analysis it became clear that the integration of sustainable procurement in business processes is an important capability needed. This includes the integration of sustainability criteria in the purchasing process, sustainable supplier development activities and top management support. Additionally, purchasing skills

[4] The relationships described in this section are only indicative, i.e. not statistically significant, and deduced from the characteristics of the clusters.



	Cluster 1 (market relationships)	Cluster 2 (sustainability leader)	Cluster 3 (one-sided sustainability)	Cluster 4 (inconclusive sustainability)
Other (N=19)	5	2	4	8
Beverages (N=6)	2	3	1	0
Bakery (N=16)	7	2	1	6
Fruit and vegetables (N=6)	1	1	0	4
Fish and seafood (N=3)	2	0	0	1
Meat (N=8)	2	3	0	2
Dairy (N=4)	0	2	0	2

Figure 1. Cluster members per sector in the Dutch food and beverages industry.

are also positively related to sustainable procurement performance. Purchasing skills include aspects like stakeholder management, cross-functional cooperation and knowledge and skills of the purchasing personnel. Finally, the results showed the positive relation between attitude of the employees and sustainable procurement performance. This means that ethical and socially responsible personnel supports higher performance levels of sustainable procurement.

6.3 Characteristics of the supplier

The analysis showed as well that access to resources from the buying company is positively related to sustainable procurement performance. This means that when suppliers have access to funds and training or education from the buyer, this positively influences the maturity levels of sustainable procurement that can be reached. Additionally, the results present a positive relation between supplier sustainable resources deployment and sustainable procurement performance. This includes internal resources and knowledge available at the supplier and supplier's engagement in inter-firm sustainability knowledge transfer activities. Finally, the results showed the influence of supplier attitude on sustainable procurement. This means the higher the top management support, the willingness to engage in sustainability initiatives and the ethical and social responsibility of employees, the higher the performance level of sustainable procurement.

7. Discussion

7.1 Theoretical implications

This section will discuss the findings from this empirical research against the background of findings of other research along with a theoretical reflection on the results. First of all, the general findings of this empirical research are in line with those stemming from the earlier mentioned study of Pagell *et al.* (2010). Similar to the results of their study, this research has shown that more cooperative forms of buyer-supplier relationships, in which the buyer provides the supplier with the needed resources, contribute to ensure sustainability. Pagell *et al.* (2010) changed the dominant approach to purchasing portfolio models, because they found economically very viable companies that were not making decisions in the manner suggested by Kraljic (1983). Indeed, one of the most contradictory results from this research and the study of Pagell *et al.* (2010) compared to the traditional purchasing portfolios, is the purposeful increase of supply risk. Similar to the results of Pagell *et al.* (2010), this research shows that companies that invest in sustainability purposefully increase asset specificity through intense communication, providing resources to suppliers and creating strict guidance, thereby increasing the supply risk as defined by Kraljic (1983).

A second interesting reflection on this study includes the question whether a company's position in the supply chain has an effect on its performance level of sustainable procurement. Whilst asking the respondents to cooperate in this research, one of the respondents stated that they did not take part in any sustainability activities, because they were not selling to end-consumers. This suggests that the level of sustainable procurement may depend on the company's position in the supply chain. Indeed, Hoejmose *et al.* (2012) showed that green practices in business to business (B2B) supply chains were considerably underdeveloped compared to business to consumer (B2C) supply chains. González-Benito and González-Benito (2006) also stated that companies further down the chain, thus not directly visible to consumers, are more reactive in their approach to sustainability. This could be caused by what Hollos *et al.* (2012) stated, that particular consumers and other stakeholders are inclined to punish companies, especially those selling branded products to the end consumer, if they fail to comply with accepted sustainability standards. Although this research did not take into account the company's position in the supply chain, it could be an interesting addition for future research as it could explain some of the differences found between the clusters in this research.

Finally, another relevant theoretical reflection concerns connectivity. A surprising outcome of the empirical research was that connectivity was negatively correlated to sustainable procurement performance. The results show that the best performing companies in terms of sustainability, had no connectivity whatsoever

whilst the worst performing companies had a very high connectivity. Theoretically, it would be expected that connectivity should be high, since the buying company would need to know what the supplier is doing regarding sustainability. Following this assumption, information systems would be integrated enabling easy and quick information exchange about sustainability activities. Nevertheless, the results from the empirical research proved otherwise. As Fawcett *et al.* (2007) stated, information sharing and communication are too often mistaken for being a technology issue. Although information technology provides opportunities for enhanced communication and collaboration (Makkonen and Vuori, 2014), a company's willingness to share information ultimately determines the extent and quality of communication (Fawcett *et al.*, 2007). As the intensity of communication did appear to be positively related to sustainable procurement performance, it seems that the willingness to share information is indeed more supportive for sustainable procurement than connectivity. The 'sustainability leader' cluster confirms this, as it shows the highest intensity of communication and, at the same time, the lowest connectivity of all clusters. However, it should be noted that as information technology enables a free flow of information among companies (Spekman and Carraway, 2006), this could facilitate the enhancement of communication and could thereby potentially increase sustainable procurement performance even further.

7.2 Recommendations

This final section discusses recommendations for future research and practitioners. The first recommendation for future research would be to investigate factors that could stimulate a feeling of joint dependency, as this was found to be very important in reaching sustainable procurement. Secondly, an interesting reflection on this research involved the question whether a company's position in the supply chain has an effect on the integration level of sustainable procurement that is reached. Since business to business and business to consumer markets differ on quite some aspects, it would add to the current knowledge to investigate whether this is also the case for buyer-supplier relationships and how they facilitate sustainable procurement. Thirdly, the influence of geographical distance on buyer-supplier relationships could not be determined in this research. As it has the potential to influence the relationship and sustainable procurement, it would be relevant to know if and how geographical distance affects these concepts. Therefore, future research could be focussed in that direction. Fourthly, the nature of the identified clusters, also against the theoretical background of maturity levels, raises questions to whether transition from the one to the other cluster occurs and can occur 'smoothly', and if companies can skip stages. These questions warrant future research. Overall, since theory on the effect of buyer-supplier relationships on sustainable procurement performance is relatively under developed, more research is needed to confirm the results found in this study. In this light, it would also be relevant to perform a similar study in a different business environment, to check whether these results are bounded to the Dutch F&B industry or whether they also apply in other sectors, in other countries.

Finally, some recommendations to practitioners can be made. This research has shown that the integration of sustainable procurement throughout the company is necessary to achieve a high sustainable procurement performance. This involves integrating sustainability criteria in the purchasing process, sustainable supplier development activities and top management support. Furthermore, as a buying company one should have good purchasing skills, including stakeholder management, cross-functional cooperation and sufficient sustainability related knowledge and skills of the purchasing personnel. Additionally, it is important that the employees have a positive attitude towards sustainability. In the buyer-supplier relationship, special attention should be paid to creating a feeling of loyalty encompassing trust and commitment. Not only do trust and commitment increase sustainable procurement performance, they also increase the intensity of communication, which in turn is also important for reaching high sustainable procurement performance. Recommendations are directly aligned with these findings. Furthermore, it is advised to invest in strict guidance through codes of conduct and monitoring and control activities. Finally, this research has shown that a feeling of joint dependency positively influences sustainable procurement performance. It is therefore recommended to also create a feeling of joint dependency in the buyer-supplier relationship.

Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2017.0059.

Materials S1. Survey.

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