

Sustainable supply management practices: making a difference in a firm's sustainability performance

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Abstract

Purpose – This study aims to investigate the role of sustainable supply management (SSM) practices in a firm's overall sustainability performance and reflect the significance of supply management in this performance. The paper uses dynamic capability view as a theoretical foundation for the research of SSM practices and differentiates between reactive and proactive practices.

Design/methodology/approach – The research design includes a focus group session with nine supply management professionals and survey data collected from 111 companies. The research objectives are examined by means of quantitative analyses.

Findings – The empirical results show that SSM practices represent a significant share of the firm's sustainability performance overall. However, the significance of the practices differs depending on the strategic type and importance of the practice. SSM practices reflecting reporting and upstream SCM activities aim to ensure sustainability of the entire supply chain and have a focal role in improving firm's sustainability performance.

Originality/value – A three-dimensional matrix for the categorization of SSM practices is proposed. This is a novel theoretical contribution to the SSM literature. Reactive practices are basic ones where the strategic importance regarding the development of new capabilities is low. Proactive practices are dynamic in nature and aim toward the development of new capabilities. Thus, proactive practices have a long-term effect and are necessary for gaining higher sustainability performance.

Keywords Performance, Sustainability, Supply-chain management, Purchasing, Dynamic capabilities

Paper type Research paper

Introduction

Successful firms are able to build proactive strategies, modify their competencies and capabilities to fit to these strategies, and develop new capabilities when needed. In the current business environment, these abilities are highly needed, partly because of the continuously changing and increasing sustainability requirements (Reuter *et al.*, 2010; Beske, 2012). Firms have to be able to adjust to changes and, more importantly, be proactively ahead of upcoming or even unexpected development requirements. As firm's supplier base greatly defines the level of sustainability of the firm and the entire supply chain (Grosvold *et al.*, 2014; Lu *et al.*, 2018) and since the stakeholders have turned their attention to what happens at supplier sites (Foerstl *et al.*, 2018), firms need to not only proactively extend their strategies and actions outside their boundaries but also develop their suppliers and their capabilities.

Akhavan and Beckmann (2017) found that proactive, opportunity-oriented strategies, where suppliers and their capabilities are developed, address sustainability requirements more effectively than risk-oriented strategies. Proactive environmental strategies are found to lead to the development of unique organizational capabilities (Sharma and Vredenburg,

1998). Organizations have been shown to move toward sustainability and engage in sustainability practices primarily in reaction to external pressures (Beske, 2012). Mere reaction, however, is insufficient in the context of sustainability; firms need dynamic and proactive strategies to develop the capabilities required for sustainable supply management (SSM). Once developed, such capabilities can, for example, ease the implementation of green supply and disseminate environmental practices throughout the entire supply network (Hervani *et al.*, 2005). Firms with highly mature purchasing and supply management can develop capabilities for efficient management of purchasing and supplier relationships (Schiele, 2007; Lintukangas *et al.*, 2016), which is required in proactive and competent SSM.

Sustainability practices are part of a firm's capabilities (Pullman *et al.*, 2009), and several studies (Reuter *et al.*, 2010; Beske, 2012; Dabhilkar *et al.*, 2016) have defined SSM practices as a firm's dynamic capabilities. Firms' SSM practices shape how they manage and implement sustainability in their purchasing and supply management. Tate *et al.* (2012) argued that firms are increasingly engaging in environmental practices because not only it is the right thing to do but also it provides a means to either minimize costs or increase revenues. By contrast, firms implementing SSM practices are value-driven and follow sustainable policies while aiming to improve

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Supply Chain Management: An International Journal
23/6 (2018) 518–530
© Emerald Publishing Limited [ISSN 1359-8546]
[DOI 10.1108/SCM-01-2018-0036]

Received 28 January 2018
Revised 3 May 2018
29 July 2018
30 July 2018
Accepted 31 July 2018

their sustainability performance, not only their financial performance (Beske and Seuring, 2014). Green *et al.* (2012) have further shown that SSM practices can improve both environmental and economic performance.

Previous studies focused mainly on environmental or green practices related to purchasing and supply management (Min and Galle, 2001; Vachon and Klassen, 2006; Tate *et al.*, 2012; Schmidt *et al.*, 2017), but fewer studies have addressed the applicable social practices (Klassen and Vereecke, 2012; Marshall *et al.*, 2015b). In this study, we do not limit practices to certain dimensions of sustainability, but we do limit practices to those related to and implemented by a firm's purchasing and supply management. Scholars have called for more research on the topic. For instance, Tate *et al.* (2012) stated that more research is needed on how buyers impose sustainability practices on a supply chain. Hong *et al.* (2018) further argued that agreement regarding how to measure sustainable supply chain management (SSCM) practices is lacking. However, with such a wide range of previously identified SSM practices (Tate *et al.*, 2012), it is not plausible for firms to adopt all of them. As a result, firms should choose which practices to implement (Vanalle and Santos, 2014) by identifying which SSM practices are the most important and influential. Considering the topic more widely, Pagell and Wu (2009) stated that although the traditional best practices for purchasing and human resources are tied to all elements of sustainability, not all best practices are necessary for becoming a leader in SSCM. In this paper, we build a three-dimensional theoretical framework for understanding and defining SSM practices and the different types. We also further explore the connection between SSM practices and sustainability performance. Previous studies explored the impact of SSM practices on firm performance (Carter *et al.*, 2000; Zhu *et al.*, 2012; Schmidt *et al.*, 2017). However, our study investigates the role of supply management practices in firms' overall *sustainability performance*, in line with the recent movement toward highlighting sustainability performance instead of firm performance (Montabon *et al.*, 2016; Matthews *et al.*, 2016). Therefore, the aim of this paper is to find out how adopting of SSM practices might contribute to a firm's overall sustainability. We use empirical survey data collected in Finland in 2015–2016. The research objectives are examined via quantitative analyses.

The remainder of this paper is structured as follows. First, we review the relevant literature relating to SSM practices and introduce the connection to sustainability performance and the proactive, dynamic viewpoint by utilizing dynamic capability (DC) view as a theoretical foundation. Next, we describe the research methodology and analyses. Subsequently, we discuss the findings and the theoretical and managerial implications of our study. The limitations and possibilities for future research conclude the paper.

Theoretical foundation

Defining sustainable supply management

According to Pagell and Wu (2009, p. 38), SSCM can be defined as “the specific managerial actions that are taken to make the supply chain more sustainable with an end goal of creating a truly sustainable chain.” Seuring and Müller (2008, p. 1700) defined SSCM as:

[...] the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e. economic, environmental and social, into account which are derived from customer and stakeholder requirements.

These managerial actions define the practices and principles for fulfilling the sustainability requirements of the stakeholders, for example, for the purchasing and supply management function. SSM, on the other hand, has been defined as “the extent to which supply management incorporates environmental, social, and economic value into the selection, evaluation and management of its supply base” (Giunipero *et al.*, 2012, p. 206). These definitions apply to this study as we focus on firms' actions to ensure sustainability in selecting, evaluating and managing suppliers.

SSM is implemented using SSM practices. When compared to the traditional purchasing and supply management practices, SSM practices present a wider lens that incorporates the need to consider environmental and social values, in addition to economic values, that will help the organization to achieve its overall goals in a profitable and sustainable manner (Giunipero *et al.*, 2012). Many customers and stakeholders do not distinguish between the sustainability practices of the firm and of its supply base, and the failures and problems in suppliers' sustainability reflect directly on the firm (Dai and Blackhurst, 2012) and the firm's risk realization (Kähkönen *et al.*, 2016; Lintukangas *et al.*, 2016). Thus, we follow the definitions for SSCM provided by Seuring and Müller (2008) and Pagell and Wu (2009) and argue that a wider perspective on the supply chain is necessary regarding sustainability issues. Thus, supply chains as collaborative entities should aim for high sustainability performance.

The role of supply management in a firm's sustainability performance

The performance of a supply chain should be measured not merely by profits but also by its impact on ecological and social systems (Pagell and Wu, 2009). A sustainable supply chain is one “that performs well on both traditional measures of profit and loss as well as on an expanded conceptualization of performance that includes social and natural dimensions” (Pagell and Wu, 2009, p. 38). Whereas firm performance traditionally refers to a firm's financial success measured by economic performance measures (e.g. profit, ROI), the *sustainability performance*, on the other hand, refers to “a company's environmental and social performance” (Gualandris *et al.*, 2014, p. 263). Several recent studies on SSCM (Montabon *et al.*, 2016; Matthews *et al.*, 2016) have called for viewpoints and research beyond instrumental logic, where the main goal is to achieve economic performance. Measuring performance purely by means of financial and economic factors creates a paradox in the current business environment, largely because it provokes tradeoffs by prioritizing profits over people and planet (referring to the three dimensions of sustainability) and takes a firm-level perspective instead of examining a supply chain or network (Montabon *et al.*, 2016). Overall, sustainability performance management is an integral part of performance management, but it has received scant attention in the research (Schaltegger and Burritt, 2014).

The success of a firm's sustainability depends highly on supply management and, as [Gualandris et al. \(2014\)](#) argued, supply management directly and positively affects a firm's sustainability performance. By guiding suppliers to improve manufacturing capabilities, the firm reduces its waste significantly, and by seeking win-win solutions rather than the lowest price, a firm can benefit from an enhanced social reputation ([Gualandris et al., 2014](#)). This emphasizes the need for a proactive, dynamic strategy where the development of suppliers' capabilities is directly reflected in the sustainability performance of a buyer firm. The basic assumptions of the resource-based view (RBV) also apply because, according to the RBV, those resources that are valuable, rare, inimitable and nonsubstitutable are critical to value creation and competitive advantage ([Barney, 1991](#)). Thus, if a firm has special resources and expertise regarding SSM and is able to define practices for effectively managing sustainability in its purchasing and supply, it may perform better in terms of sustainability when compared to other firms. However, because the markets are not static, firms face requirements for proactive development, especially in the context of sustainability ([Beske, 2012](#)). Thus, an extension of the RBV, the DC view, is needed. As [Teece et al. \(1997\)](#) pointed out, the RBV focuses on strategies for exploiting existing firm-specific assets; whereas, the DC also includes strategies for developing new capabilities. Developing the SSM capabilities of a firm as well as the capabilities of the suppliers helps to ensure sustainability in the long term. SSM capabilities enable the development of practices needed to achieve high levels of sustainability performance.

Firms that are able to outperform their competitors on sustainability issues utilize SSM practices that aim to consolidate, upgrade and coordinate the supply base ([Gualandris et al., 2014](#)). Given the general slowness in adopting SSM practices, a firm embracing sustainability along the supply chain can benefit from being a first mover in the market and ultimately enhance its image and market share ([Paulraj, 2011](#)). [Leppelt et al. \(2013\)](#) identified corporate strategy alignment, risk perception and a firm's listing in sustainability indices as the key factors that motivate leading firms in sustainability to differentiate themselves through outstanding SSM practices and that, conversely, keep sustainability followers from implementing them. Sustainable supply chain measurement activities are required to assess the status quo, monitor progress against the targets, develop improvement plans and evaluate risk exposure ([Grosvold et al., 2014](#)). Hence, it is important to identify the supply management activities and practices that ensure the sustainability of a supply chain and that might thus lead to better sustainability performance.

Sustainable supply management practices

Firms have various practices related to managing, implementing, and ensuring sustainability in their supply chains. Firms may pursue sustainability practices due to different drivers and goals, such as motives that are instrumental (driven by self-interest), relational (concerned with relationships among group members) or moral (concerned with ethical standards and moral principles) ([Paulraj et al., 2017](#)). Practices, on the other hand, have been divided into internal and external practices ([Gualandris et al., 2014](#); [Vachon and Klassen, 2006](#)), based on the nature of the

practices ([Beske and Seuring, 2014](#)), or categorized as green and social practices based on the dimension of sustainability ([Hollos et al., 2012](#)). Moreover, [Marshall et al. \(2015a\)](#) categorized SSM practices, first, according to the sustainability dimension and, second, into process-based (emphasizing learning and routines between the supply chain actors) and market-based (generating new markets for products or supply chains) practices. The maturity of practices has also been used to differentiate, as [Marshall et al. \(2015b\)](#) categorized social practices into basic and advanced where advanced practices go beyond monitoring and compliance to make fundamental changes in a supply chain.

[Gualandris et al. \(2014\)](#) divided supply management practices into internal (within the firm) and external (among organizations). Internal practices include environmental management systems, certifications, designs for the environment and life-cycle analysis, which aim to reduce a firm's direct environmental and social impacts. By adopting such practices, firms can develop innovative technologies to prevent pollution or minimize emissions, effluents and waste, thus improving their sustainability performance ([Gualandris et al., 2014](#)). External practices are those mechanisms implemented at a corporate level to assess and improve the sustainability performance of a supplier base. According to [Gualandris et al. \(2014\)](#), these include suppliers' codes of conduct, environmental requirements and collaboration with suppliers to resolve sustainability issues.

[Hollos et al. \(2012\)](#) divided practices into social and green based on the sustainability dimension. [Hollos et al. \(2012\)](#) stated that a firm can be only as sustainable as its suppliers, so green practices, for example, must encompass the firm's internal operations and the activities of its external supply chain members. The categorization of [Hollos et al. \(2012\)](#) differs from that of [Gualandris et al. \(2014\)](#) because [Hollos et al. \(2012\)](#) divided the practices according to a buying firm's efforts, both internally and with regard to the supplier. Social practices are:

[...] the buying firm's efforts to induce socially responsible behavior, such as good working conditions, avoidance of child labor, appropriate and fair wages and high safety standards in its own operations and the operations of its suppliers ([Hollos et al., 2012, p. 2974](#)).

Green practices, on the other hand, are "the buying firm's efforts for waste reduction and preservation of natural resources in its own operations and the operations of the members of its supplier base" ([Hollos et al., 2012, p. 2974](#)). Furthermore, the available SSM practices are sufficiently extensive that subcategories have also been defined. For example, the study by [Tate et al. \(2012\)](#) lists a total of 61 environmental purchasing and supplier management practices, which they further divided into the subcategories of general practices and philosophy (11 practices), supplier involvement (11), supplier development (12), supplier selection criteria (20) and supplier environmental outcomes (7).

[Grosvold et al. \(2014\)](#) studied inter-organizational SSM practices and highlighted practices that take place in a buyer-supplier relationship. These practices include codes of conduct, third-party certification, supplier training, investment in emission-reducing technology, changes to the manufacturing process and product design to be less resource-intensive, reduction of pollution, the use of carbon, more efficient use of raw materials and rewards and sanctions ([Grosvold et al., 2014](#)). By contrast, [Leppelt et al. \(2013\)](#) studied practices

related to sustainable supplier relationship management by using a framework in which the key idea was that sustainable business behavior and business practices should be in line with the ethical concerns of a firm's internal and external stakeholders. They identified 20 sustainable supplier relationship management practices, which include codes of conduct, supplier self-declarations, sustainable procurement training, monitoring of compliance at the first- and second-tier level and measurement of the impact of sustainability initiatives. The practices defined by Grosvold *et al.* (2014) and Leppelt *et al.* (2013) are not separated into internal and external practices but reflect those within the firm and beyond its boundaries.

Beske and Seuring (2014) followed a similar logic to Grosvold *et al.* (2014) and Leppelt *et al.* (2013) by categorizing practices based on the nature of the practice, thus forming the categories of orientation, continuity, collaboration, risk management, and proactivity. Orientation includes, for example, top management involvement and an organizational culture with a sustainability view. This category would be categorized as an internal practice by Gualandris *et al.* (2014), because it refers to the strategic values and the strategic management of a firm. Other categories refer more to the external practices because those are built on the expectation that supply chain members cooperate. Continuity includes partner selection, supplier development and long-term relationships. This category is based on the assumption that continuity considers the overall supply chain performance and not merely the performance of each supply chain member. The collaboration category, by contrast, is placed both at the structural and operational levels. Certain organizational structures are required for collaboration yet it also must be operationalized and thus, both external and internal SSM practices are needed. This category includes, for example, transparency, joint development, and collaboration to enhance sustainability performance (Beske and Seuring, 2014). More importantly, in this category, exists the development of capabilities that result in new capabilities that are hard to replicate, producing dynamic capabilities (Beske, 2012; Beske and Seuring, 2014). Risk management, according to Beske and Seuring (2014), contains practices related to standards and certification, information sharing, and monitoring. However, risk-oriented strategies are seen as traditional cost-focused approaches, where the aim is to reduce supplier-related risks rather than increase asset specificity (Akhavan and Beckmann, 2017). In risk-oriented supplier screening strategies, suppliers are selected and evaluated based on the sustainability criteria, but the main focus is on risk avoidance (Vachon and Klassen, 2006; Akhavan and Beckmann, 2017). Here, the SSM practices are more reactive than proactive, and thus the development of new capabilities may not exist.

In their classification, Beske and Seuring (2014) actually have a category named proactivity that includes practices such as learning, sharing buyer behavior information and communicating proactively with stakeholders. These practices reflect the ability and willingness to learn from others and to use the founded knowledge for improving activities and products and, eventually, sustainability performance (Beske and Seuring, 2014). These proactive SSM practices are needed to build and implement proactive strategies that are equally key in

responding to sustainability requirements (Sharma and Vredenburg, 1998; Akhavan and Beckmann, 2017). Table I summarizes the categorization of the SSM practices and presents examples of the reported practices.

Many studies have also presented practices without any distinct categorization. For example, Leire and Mont (2010) found several practices but did not specifically categorize these. According to them, following the international standards, the use of codes of conduct, the pre-selection of suppliers, continuous monitoring and auditing of suppliers and the development of a scoring system to rank suppliers based on their sustainability performance can be used to ensure sustainability in supply management. Hoejmose and Adrien-Kirby (2012) found that the most common way of implementing, ensuring and extending sustainability practices in buyer-supplier relationships is the use of codes of conduct. We concur, as codes of conduct have been cited as important in several previous studies (Preuss, 2009; Leire and Mont, 2010). Furthermore, Pagell and Wu (2009) found that collaboration with suppliers and supplier certification are practices that have received significant attention in regard to sustainability. Ni and Sun (2018) state that firm's mechanisms to govern their supplier relationships regarding sustainability mainly fall into two categories of supplier assessment practices and supplier collaboration. Several studies have also highlighted the role of supplier auditing (Leire and Mont, 2010; Grosvold *et al.*, 2014). The management of sustainability-related risk relies to a great extent on supplier audits (Foerstl *et al.*, 2010). Audits are valuable in detecting further improvement potential, mostly related to the quality of supplied products, the security of the supply, and process innovativeness. Externally verified standards and certification are also commonly used SSM practices, but these have been criticized because they do not directly address sustainability issues in the supply chain and must be coupled with top management support (Grosvold *et al.*, 2014).

Building on previous studies and their categorizations of SSM practices, we present that SSM practices can be categorized into a three-dimensional matrix, where practices are placed based on three continuums:

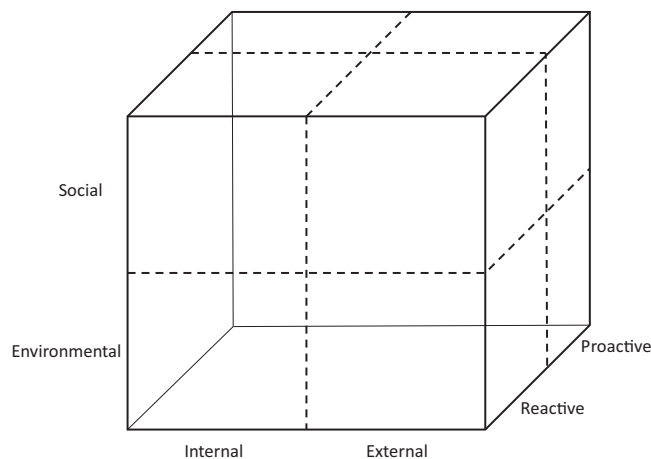
- 1 organizational structure (internal vs external);
- 2 sustainability dimension (environmental vs social); and
- 3 strategic type and importance (reactive vs proactive) (Figure 1).

Whereas the dimensions of organizational structure and sustainability are directly adopted from the studies of Gualandris *et al.* (2014) and Hollos *et al.* (2012), the dimension of strategic type and importance was built for the purposes of the matrix based on the studies of Beske and Seuring (2014), Marshall *et al.* (2015a, 2015b) and Akhavan and Beckmann (2017). Marshall *et al.* (2015b) drew a specific distinction between basic and advanced practices, where the maturity of the practices and strategic importance by means of the development of the supply chain were reflected. The strategic type and importance dimension has its foundation in the reactive and proactive SSM strategies by Akhavan and Beckmann (2017), as the dimension reflects practices' strategic nature. We argue that this dimension is the most significant when developing dynamic capabilities because of the nature of

Table I Summary of categorization of the sustainability practices

Categorizing factor	Authors	Category	Examples of practices
Internal/external	Gualandris <i>et al.</i> (2014)	Internal	Environmental management systems Life-cycle analysis
		External	Supplier's codes of conduct Collaboration
Dimensions of sustainability	Hollos <i>et al.</i> (2012)	Ecological	Efforts to create environmentalism
	Marshall <i>et al.</i> (2015a)	Social	Efforts to create socially responsible behavior
		Process-based practices	Environmental supply chain monitoring Social supply chain management systems
	Market-based practices	Environmental new product and process development Social supply chain strategy redefinition	
Nature of the practice	Marshall <i>et al.</i> (2015b)	Basic practices	Auditing supplier's sustainability compliance
		Advanced practices	Product or process redesign focused on reducing health risks for consumers
	Beske and Seuring (2014)	Orientation	Top management involvement
		Continuity	Long-term supplier relationships
		Collaboration	Joint development of transparency
		Risk management	Standards and certification
	Tate <i>et al.</i> (2012)	Proactivity	Learning and information sharing
		General practices and philosophy	Management principles and responsible buying
		Supplier involvement	Supplier self-assessment
		Supplier development	Improvement plans
Grosvold <i>et al.</i> (2014)	Supplier selection	Environmental reporting	
	Supplier environmental outcomes	Industry collaboration	
	Buyer-supplier relationship	Technology development Third-party certification	
	Supplier relationship management	Supplier training Control of compliance Training of sustainable procurement Measurement of sustainability initiatives	
Leppelt <i>et al.</i> (2013)	Supplier relationship management	Supplier auditing	
		Supplier's codes of conduct	
Foerstl <i>et al.</i> (2010) Hoejmose and Adrien-Kirby (2012)	Risk-management		
	Sustainability assurance		

Figure 1 Dimensions of SSM practices



these practices and their high strategic importance. SSM practices that are characterized as highly strategic and proactive are most likely to lead to the development of dynamic capabilities (Beske, 2012).

Owing to increasingly complex supply chains and networks, disseminating the practices is a significant challenge (Tate *et al.*, 2013). SSM practices should be disseminated throughout the firm and the chain or network to achieve the full potential impact. As stated earlier, firms are unable to apply all SSM practices because of the large number of practices and limited amount of resources. The number of SSM practices is substantial when all dimensions are taken into account. Thus, firms must recognize which practices are most important and influential in SSM.

Methodology

The purpose of this study is to examine how the use of SSM practices may influence a firm's overall sustainability performance. According to Creswell (2014), when identifying the factors that may affect the outcome, quantitative methods are the appropriate choice in empirical studies. Therefore, a quantitative approach was selected to examine which practices are the most important and influential in SSM and can increase a firm's sustainability performance.

The empirical examination was undertaken in three phases. First, to identify which sustainability practices are utilized in companies, a focus group session with nine supply

management professionals was arranged. Second, a list of sustainability practices named by focus group members was compared to the practices found from previous studies, and a survey instrument was developed accordingly and validated by the focus group members. Thirdly, a survey was executed, and empirical data were collected from supply management professionals.

Principal component analysis (PCA) was run to compress the survey data for sustainability practices into components. The possible impact of each component on the company's overall sustainability performance was examined by conducting a linear regression analysis. To examine possible industry-level differences among the respondents, a one-way ANOVA analysis was run. In the following, the sampling and analysis procedures are described in detail.

Data and sample

Finland was selected as the target country because it is one of the top countries in terms of sustainability in several international rankings, such as the Environmental Performance Index (Hsu, 2016) and the Sustainability Adjusted Global Competitiveness Index (Schwab, 2014). Moreover, manufacturing and services related to sustainability have a great impact on the Finnish economy. According to Statistics Finland (2017), in 2016 the turnover from Finland's environmental goods and services sector was €36bn and the value added of the environmental goods and services sector was €12bn, which means around 6 per cent of the value added of the entire Finnish economy.

The data were collected from manufacturing and logistics companies in Finland. To ensure that purchasing and supply management has a sufficient role in companies' business, and the business has some environmental and social impacts in general, relatively large and medium-size companies were selected for the sample. Firms having at least €30m, 100 employees and activity in Finland were extracted from the commercial AMADEUS (Bureau van Dijk) database. The sample consisted of 387 firms. All companies were first contacted by phone to find the most suitable informant in the field of supply management and to increase the response rate. Finding a key informant who possesses broad knowledge of the subject and company practices is crucial when using single respondents in a survey design (Montabon *et al.*, 2018), and prenotification of the respondents may increase the response rate (Fox *et al.*, 1988). A Web link to the questionnaire was emailed to the informants who agreed to participate in the survey. Finally, 113 answers were received, giving a response rate of 29.2 per cent (113/387). However, the examination of the responses revealed two incomplete and non-usable responses, which were removed from the data resulting in 111 usable responses from supply chain professionals for quantitative analysis. The non-response bias was assessed by comparing early and late respondents in terms of turnover, number of employees and spend, following Armstrong and Overton's (1977) suggestion. A nonparametric Mann-Whitney test was used to compare the responses of the first 30 respondents and the last 30 respondents. There was no evidence of non-response bias except that the number of employees among the late respondents was smaller (mean 1,458 employees) when the number of employees among the early respondents was bigger (mean 1,729 employees). As there

were no other significant differences between respondents and non-respondents, it can be concluded that the data were not biased.

Of the respondents, 32 per cent represented top management, 46 per cent middle management, 4 per cent an operative position, 17 per cent experts in the field and 1 per cent were in other positions. On average, the share of spend from turnover was 53 per cent. Of all the purchases, 35 per cent were made from abroad (11 per cent of those were from low-cost countries) and from 14 different countries on average. The responses were grouped into six main industry categories: construction; manufacture of machinery, equipment, metal, nonmetal, plastic and electronic products; chemical, paper and wood; logistics services; food; and other industries. Table II presents the basic information about the respondent companies.

Impact of sustainable supply management practices on firm's sustainability performance

The SSM practices were included in the questionnaire as 18 statements, and the respondents were asked to indicate whether their supply management processes incorporated these practices. The respondents evaluated the use of each SSM practice in their company on a seven-point Likert scale, ranging from 1 ("I completely disagree") to 7 ("I fully agree"). Due to the high number of different practices, it was meaningful to reduce the information into smaller data sets. Summarizing the data and the examination of which of the practices form coherent components that are independent of the other components may reveal the underlying structures of the practices (Tabachnik and Fidell, 2013). Therefore, the survey responses regarding sustainability practices were grouped into components using PCA. PCA is applicable in situations where there are no theoretical assumptions in the background and when the research is in the early stages (Tabachnik and Fidell, 2013). The results of the PCA were satisfactory. The values of Kaiser-Meyer-Olkin of Sampling Adequacy and Bartlett's Test of Sphericity (0.895; df. 153; Sig.0.00) showed the suitability of the data for the PCA. The total variance explained by initial eigenvalues was 68.04 per cent, and the PCA revealed four components. The practical relevance of the items for each component was checked, and items that had a loading below 0.500 were removed as Hair *et al.* (1998) suggested. Moreover, items with high-cross loadings and without clear identification of any component were removed, and a composite variable of the items in each component was calculated.

The first component, named "Guidelines," includes items describing guidelines, standardization, certification, and labeling to ensure the sustainability in supply activities. This component

Table II The Sample descriptive

Industry	N	Turnover (t€)	Employees
Construction	23	176,521	458
Machinery, equipment, industrial manufacturing	39	388,969	1,696
Chemical, wood and paper	18	1,269,497	3,223
Logistics services	18	99,117	189
Food	4	613,046	1,371
Other	9	137,322	618
Total	111	428,404	1,344

reflects the use of guidelines and standards in purchasing and supplier relationships. The second component, "Reporting," includes statements reflecting the reporting of sustainability and its visibility, such as "We use an external evaluator to examine how well the suppliers follow the principles of CSR" and "The image of sustainable supply management is built systematically, e.g. with sustainability reports." The third component, "SCM Upstream," included arguments concerning sustainability practices and actions in the upstream supply chain and in the management of the supplier base. The fourth component, "SCM Downstream," was formed from statements describing activities downstream in the supply chain and reflects the transparency of sustainability from the viewpoint of end-customers. Table III shows all the statements regarding different practices and the components found. The items with high-cross loadings and without a clear identification of any component were removed, and a composite variable of the items in each component was calculated. Cronbach's Alpha was calculated to check the reliability and internal consistency of the components found. The values of the Cronbach's alpha were in acceptable level; being for "Guidelines" 0.845, "Reporting" 0.828, "SCM Upstream" 0.751, and "SCM Downstream" 0.721; when the generally agreed lower limit for Cronbach's alpha is 0.700 (Hair *et al.*, 1998). The results of PCA and Cronbach alpha's are shown in Table III.

Table III Results of the PCA and reliability analysis

Sustainability practices in supply management	1	2	3	4	Cronbach's alpha
Guidelines					0.845
When auditing and selecting suppliers we make sure that the supplier follows ethical guidelines and environmental values	0.803	0.114	0.294	0.250	
International standards are followed in supply management (ISO14000, ISO26000, SA8000 etc.)	0.726	0.435	0.033	0.003	
Environmental and ethical values are considered in supply management	0.712	0.168	0.236	0.423	
We aim to find the principal causes and respond quickly in case there are CSR problems in our supply network	0.703	0.081	0.355	0.154	
We expect that our suppliers follow CSR standards (for example ISO 14001) ^a	0.567	0.534	0.104	0.143	
We ensure that the supplier understands the CSR clauses written in contracts ^a	0.497	0.357	0.114	0.462	
Reporting					0.828
We use an external evaluator to examine how well the suppliers follow the principles of CSR	0.023	0.799	0.087	0.158	
The image of SSM is built systematically e.g. with sustainability reports	0.169	0.729	0.090	0.247	
We utilize the lists of sustainable suppliers	0.303	0.665	0.397	0.063	
We expect that our suppliers have CSR strategy and/or reporting	0.239	0.578	0.354	0.122	
We examine the sustainability of the products specifications ^a	0.365	0.572	0.504	0.014	
Following CSR is one of the indicators to measure supplier performance	0.424	0.547	0.060	0.306	
SCM Upstream					0.751
Suppliers complete self-assessments regularly concerning sustainability issues	0.108	0.104	0.796	0.365	
Regular supplier auditing is performed to ensure the sustainability of the supply chain	0.399	0.225	0.689	-0.059	
The origin of the goods and sustainability is traceable in the whole supply chain	0.444	0.256	0.501	0.330	
SCM Downstream					0.721
Supply management enhance supply chain transparency to the end-customer	0.116	0.142	0.096	0.808	
In supply management the principles of responsible buying are followed	0.287	0.148	0.130	0.734	
The process of sustainability assurance is documented and applied ^a	0.068	0.407	0.534	0.578	

Notes: Extraction Method = PCA; Rotation Method = Varimax with Kaiser Normalization; ^athe item was removed because of high cross-loadings

Based on the responses, it was found that in Finnish companies, the applied practices were targeted mainly to downstream of the supply chain (mean 5.70) and following guidelines of sustainability (mean 5.04). The practices concerning reporting (mean 3.37) and creating visibility of sustainability in the upstream supply chain (mean 4.26) were less adopted among the industries. The considerably higher means in the food industry suggested that this industry adopts different types of SSM practices compared to other industries (Table IV). Therefore, to examine industry-level differences, a one-way ANOVA analysis was run. It was found that no significant differences ($p < 0.05$) existed between the industries concerning the adoption of practices. Table IV shows the average adoption of the practices by industry.

The sustainability performance of a company was measured using seven different statements that asked respondents to evaluate how well they thought their company had succeeded in realizing sustainability in terms of reporting, organizing, strategy and communication (seven-point Likert scale, where 1 = extremely low success and 7 = extremely good success). Table V shows the firm's sustainability performance statements and the reliability of the scale.

To examine the kind of role SSM practices might play in a company's overall sustainability performance, the components of the SSM practices were included in the regression analysis as

Table IV The Adoption of practices by industry

Industry	Guidelines	Reporting	SCM upstream	SCM downstream
Construction	5.04	3.37	4.26	5.70
Machinery, equipment, industrial manufacturing	4.96	3.08	4.08	5.23
Chemical, wood and paper	5.18	3.53	4.58	5.39
Food	5.31	4.45	5.13	6.00
Logistics services	5.29	3.31	4.50	5.47
Other	5.03	2.80	3.72	4.72
Total	5.08	3.28	4.27	5.38

Table V Sustainability performance of a firm

Sustainability performance, $\alpha = 0.925$	Loadings
Our company takes care of the organizing and management of sustainability issues	0.902
Sustainability is performed together in the whole organization	0.893
Our company takes care of the control and reporting of sustainability issues	0.872
We act according to a sustainability strategy and vision	0.847
Sustainable actions are seen in the results of the business	0.808
Our company has innovations and experiments related to sustainability	0.762
We actively communicate with end-customers about sustainability values	0.741

independent variables, and the sustainability performance of a company was included as a dependent variable. Normal diagnostics were run to examine whether the analysis met the assumptions of the regression analysis regarding the normality, multicollinearity and homoscedasticity. To test for multicollinearity, the values of the variable inflation factor (VIF) scores and Condition indices were examined. We followed the guidelines provided by Cohen *et al.* (2003, p. 423) who stated that “a common rule of thumb is that any VIF of 10 or more provides evidence of serious multicollinearity.” All the VIF values were within acceptable bounds; the largest was 2.071. The Condition index reached a value of 16.98, which is less than 30, Cohen *et al.*'s (2003) rule of thumb. Thus, multicollinearity was not a problem. The examination of the residuals and scatterplots showed that heteroscedasticity in the regression was not a problem.

Table VI Results of regression analysis

Components	Unstandardized β	Std. Error	Standardized β	t-value	Sig.
Guidelines	0.095	0.085	0.111	1.115	0.268
Reporting	0.270	0.073	0.338	3.684	0.000**
SCM upstream	0.219	0.081	0.263	2.718	0.008**
SCM downstream	0.160	0.089	0.152	1.794	0.076*

^aDependent variable: sustainability of a firm

R	0.711
R ²	0.506
Adjusted R ²	0.487
F-value, Sig. 0.000	26.63**

Notes: * $p < 0.1$; ** $p < 0.01$

The highest residuals value was 1.891 and lowest -2.504 . The normality of the variables was estimated graphically. As no violations of the assumptions in the regression analysis were found, it could be concluded that the tests were performed successfully. Table VI summarizes the results of the analysis.

The results of the regression analysis indicated that SSM practices represent a significant share of a firm's sustainability performance (Adj. R -square = 0.487; F -value = 26.63; $p < 0.01$). This result supports the notion that using SSM practices increases a company's sustainability performance. As Table VI shows, the SSM practices forming the components of “Reporting,” “SCM Upstream” and “SCM Downstream” have a positive impact on a firm's overall sustainability performance. However, according to these data, “Guidelines” did not have significant impact on sustainability performance. According to these findings, including sustainability in the supplier performance measurement and reporting ($\beta = 0.270$; $p < 0.01$) and the actions taken towards the upstream supply chain ($\beta = 0.219$; $p < 0.01$) are the most influential practices in sustainability performance. For example, the use of external evaluators, supplier auditing, listing sustainable suppliers and measuring suppliers' sustainability performance were found to be significant practices and they represented the majority (49 per cent) of the sustainability practices. The supply management's activity in enhancing transparency towards downstream supply chain toward end-customers ($\beta = 0.160$; $p < 0.1$) had a minor influence. However, setting guidelines, such as applying international sustainability standards and requiring suppliers to follow these standards, was not found to have an impact on sustainability performance at the company level ($\beta = 0.095$). It is clear that improving a firm's sustainability performance requires comprehensive and diverse

practices from the supply management personnel, but it also requires their commitment to sustainable values and their recognition of the importance of the supply management function in the company's overall sustainability performance. The next section discusses the possible reasons for and the effects of these results.

Discussion and contribution to theory and practice

Based on the theoretical study, we proposed a three-dimensional matrix for categorizing SSM practices which is the key theoretical contribution of this study. We found that previous studies have divided SSM practices into internal and external practices (Gualandris *et al.*, 2014), based on the nature of the practices (Beske and Seuring, 2014; Grosvold *et al.*, 2014; Leppelt *et al.*, 2013), or into environmental and social practices based on the sustainability dimension (Hollos *et al.*, 2012), thus forming the different dimensions for categorizing SSM practices. In the empirical study, we did not however limit the practices in this way and instead included the practices that came up in the focus group session with nine purchasing and supply management professionals. Based on the survey responses of 111 supply management professionals, we categorized these practices into four main categories using PCA. Our empirical results showed that SSM practices can be categorized into four main groups:

- 1 sustainability guidelines – including standardization, certification, and labelling – to ensure the regulation of activities;
- 2 reporting and formalization of the visibility of sustainability using external evaluators, writing CSR reports, using lists of sustainable suppliers and including CSR indicators for supplier performance measurement;
- 3 upstream supply chain management actions, such as supplier sustainability auditing and putting effort into the traceability of the origin of purchased materials and products; and
- 4 downstream supply chain actions that aim to enhance the transparency of the supply chain for the end-customer.

In these categories, SSM practices were observed to follow the logic presented by Leppelt *et al.* (2013), Beske and Seuring (2014) and Grosvold *et al.* (2014), who categorized SSM practices based on the nature of the practice and reflected practices both within the organization and beyond its boundaries. This viewpoint supports the supply chain perspective instead of focusing on one single firm because the goal of these SSM practices in these four categories is to ensure and secure the sustainability of the entire supply chain and to achieve high levels of sustainability performance for every company within the supply chain. Thus, Seuring and Müller's (2008) and Pagell and Wu's (2009) definitions of SSCM fit the aims and scope of this study, and it answers the call of Tate *et al.* (2012) and Hong *et al.* (2018) by addressing the research gap relating to SSM practices in the supply chain context.

The sustainability performance of a firm is a sum of the actions of all firm activities and operations. Purchasing and supply management is only one part of a firm's operations. To recognize and evaluate the effects of supply management and its practices on a firm's overall sustainability, we examined the

issue empirically. Thus, we also contribute to filling the research gap highlighted, for example, by Schaltegger and Burritt (2014), who stated that sustainability performance management has received scant research attention. The results of our study show that SSM and its practices have a positive impact on a company's overall sustainability.

Practices regarding the reporting of the sustainability greatly influence a firm's sustainability performance. This category reflects the reporting of sustainability and the measurement of sustainability from a supply base by using, for example, external evaluators, lists of sustainable suppliers and including CSR indicators for supplier performance measurement. Careful partner selection and sustainability performance measurement and enhancement are seen as practices aiming toward continuity and collaboration as defined by Beske and Seuring (2014). Especially in the category of collaboration, there exists the joint development of capabilities that result in new capabilities that are hard to replicate, thus producing dynamic capabilities (Beske, 2012; Beske and Seuring, 2014). Firms should therefore focus on these proactive development-focused practices because they were found to have a significant role in improving firm's overall sustainability performance. This finding fits the assumptions of the RBV and DC perspectives, and with these SSM practices, firms should create strategies for developing new capabilities and thus, for achieving competitive advantage.

Practices directed toward suppliers ("SCM Upstream") that concern the traceability of the supply chain were also found to have a significant impact on a firm's sustainability performance. Closer examination of the practices in this category revealed that these are specifically and directly meant to ensure the sustainability of the suppliers of a firm and of the entire supply chain. For example, regular supplier auditing and supplier self-assessments are particular practices that improve the traceability of the supply chain. However, this requires also close collaboration between the supply chain parties. In addition, these practices belong to the category of collaboration by Beske and Seuring (2014) and can thus be argued to be more proactive in nature. These findings also accord with the findings of Gualandris *et al.* (2014) regarding the significance of external SSM practices in improving the sustainability performance of a firm.

Based on the regression analysis, we found that the actions of supply management that aim to ensure sustainability towards end-customers and downstream in a supply chain have minor role in a company's overall sustainability compared to actions regarding the upstream supply chain and reporting. The "SCM Downstream" component reflected the transparency of sustainability from the viewpoint of the end-customers. The transparency of the entire supply chain and its visibility to the end-customers and other stakeholders is an obvious part of sustainability. However, as the supply management function has no direct end-customer interaction, it is reasonable that these SSM practices were not found to have a great impact on a firm's overall sustainability performance. The fact is that the visibility of sustainability does not improve the sustainability of the supply chain, and the true impact on sustainability performance has to be done with the supplier base in the upstream supply chain.

We also found that SSM practices forming the category "Guidelines" did not have a significant role on a firm's overall

sustainability performance. This category reflects standardization and certification. However, following standards and regulations is not directly influential sustainability practice. This finding was predictable because following standards and legislation is rather mandatory than voluntary and represents reactive practices. In the categorization of Beske and Seuring (2014), practices related to standards and certification belonged to the category of risk management, where the main focus was on risk avoidance (Vachon and Klassen, 2006; Akhavan and Beckmann, 2017), and which are traditional cost-focused approaches with practices representing a reactive nature (Akhavan and Beckmann, 2017). Thus, the firms' emphasis should be placed on activities and practices beyond legislation requirements.

Theoretical contribution

As a result of the theoretical study, we proposed a three-dimensional matrix for categorizing SSM practices where practices are placed based on three continuums:

- 1 organizational structure (internal vs external);
- 2 sustainability dimension (environmental vs social); and
- 3 strategic type and importance (reactive vs proactive).

This theoretical framework helps to understand and define SSM practices and their types. This is a novel theoretical contribution to the supply chain management literature because a huge number of SSM practices exist and have been studied, but in the existing literature, there is no framework for categorizing such practices. Thus, by presenting this theoretical matrix as a result of this study, we contribute by showing the multidimensional character of different practices which enables categorization and management of these practices.

Reactive practices are basic practices, have low strategic importance regarding the development of new capabilities and are relatively stable. These practices are more focused on activities at a firm level than a supply chain level, as Marshall *et al.* (2015b) also found. Proactive practices are more advanced, aim to develop and create new capabilities, and are dynamic. Those practices take the wider view of supply chain or network. We argue that the dimension of the strategic type and importance, dividing practices into reactive and proactive ones, is most significant when developing dynamic capabilities and achieving competitive advantage because of the nature of these practices and their high strategic importance. Practices that are highly strategic and proactive are most likely to lead to the development of dynamic capabilities. By presenting the categorization as proactive and reactive practices, we combine the literature of SSM practices with the RBV and DC theories and contribute by showing the link between proactive development-focused practices and a firm's overall sustainability performance.

The dichotomy between reactive and proactive strategies in SSM can be illustrated in the context of supplier selection. Hollos *et al.* (2012) found that firms have two main options to increase the sustainability of their supply base:

- 1 select and accept only sustainable suppliers and drop those that do not meet certain standards; and
- 2 cooperate with existing or new suppliers to achieve higher levels of sustainability.

Selecting only suppliers who fulfill the sustainability requirements represents a reactive strategy that does not aim

toward development because the sustainability level is the given one. By contrast, collaboration is a proactive strategy, where the aim is to jointly develop new capabilities and achieve higher levels of sustainability for the entire supply chain. From the SSM practice categorization of Beske and Seuring (2014), the categories of continuity, collaboration, and proactivity particularly represent practices aiming toward proactive joint development and eventually, producing new, dynamic capabilities. However, proactive practices need to be built on proactive strategies where the aim is to develop something new and not only adopt the perceived changes. Thus, innovativeness and supplier development with joint innovation is required. Among the categories of our study, the category "Guidelines," which did not influence a firm's sustainability performance, represents more reactive than proactive practices. This category includes practices such as consideration of environmental and ethical values and the use of standards and certification, which also belong to the reactive categories of orientation and risk management in the study by Beske and Seuring (2014). However, the categories of "Reporting" and "SCM upstream" represent proactive practices belonging to the more proactive categories of Beske and Seuring (2014) and were found to have a positive impact on a firm's sustainability performance. Thus, we could argue that reactive practices are not directly reflected to the sustainability performance of a firm, whereas proactive practices aim towards the development of new capabilities, for the firm and for its suppliers, and will affect the sustainability performance in the long run.

Managerial implications

Our abovementioned results offer implications for supply chain managers and practitioners alike by shedding light on the significance of SSM practices in the context of supply chains. These results provide firm and SCM managers a three-dimensional matrix which helps define and understand SSM practices and their different types. Managers should recognize the strategic type of each sustainability practice, meaning that practices based on reactive strategies should be separated from those based on proactive strategies, and the strategic importance of each practice should be known. If the firm has special resources and expertise regarding SSM and is able to define practices for effectively managing sustainability in purchasing and supply, the firm may perform better in terms of sustainability when compared to other firms. Proactive strategies serve better in the current business environment, where sustainability requirements are constantly changing and developing. Emphasizing SSM practices that aim toward the development of new capabilities could help managers to succeed in the long term. It is not merely about adopting practices that have been used by other firms but rather about developing practices that have certain predefined strategic long-term goals. This further emphasizes the need for proactive, dynamic supply strategies in which the development of suppliers' capabilities is directly reflected in the sustainability. Proactive SSM practices are needed to build and implement proactive strategies that are equally key in responding to sustainability requirements.

In addition to categorizing, SCM managers should be able to prioritize their SSM practices. Our results show that some SSM practices are more important than others, which is critical,

considering that firms are unable to apply all existing SSM practices. For example, Tate *et al.* (2012) found 61 practices that purely represent environmental purchasing and supplier management practices, reflecting the substantial number of possible practices. To be able to choose the most important practices in relation to their actions and the resources available, managers need to be aware of different practices and their significance. The empirical results show that practices for reporting sustainability and practices directed toward suppliers and concerning the traceability of the supply chain greatly influence the firm's overall sustainability performance. Therefore, these practices can be regarded as the most important. These categories include practices that can be characterized as proactive. SCM managers should put high emphasis especially on this type of practices and these practices should be implemented and taken into practice in every company.

Conclusions and suggestions for further research

Sustainability practices in purchasing and supply management aim to complete and assure a firm's corporate social responsibility process. Previous studies (Tate *et al.*, 2012) showed that the number of SSM practices is substantial, and as Vanalle and Santos (2014) stated, it is impossible for firms to apply all sustainability practices, especially if resources are limited. Thus, this study investigated the role of SSM practices in a firm's overall sustainability performance and reflected the importance of supply management in this performance. The paper used the DC view as a theoretical foundation for the research of SSM practices and differentiated between reactive and proactive practices. Based on the theoretical study, we proposed a three-dimensional matrix for categorizing SSM practices. We found that in addition to categorization into internal and external or environmental and social practices, SSM practices can be categorized based on the strategic type and importance for reactive and proactive SSM practices, thus placing the practices on three continuums:

- 1 the organizational structure (internal vs external);
- 2 the sustainability dimension (environmental vs social); and
- 3 the strategic type and importance (reactive vs proactive).

Reactive practices are basic practices in which the strategic importance regarding the development of new capabilities is low. Proactive practices are dynamic and aim toward the development of new capabilities. Based on the empirical findings, we further argue that reactive practices are not directly reflected in a firm's sustainability performance, whereas proactive practices aim at the development of new capabilities and affect the sustainability performance in the long run.

As with all research, this study has some limitations. First, the use of single informants in the data collection might involve the risk of common method bias (Podsakoff *et al.*, 2003). In addition, given the relatively small number of respondents, future studies could use multiple respondents from each company for cross-validation. Second, as this study was based on a national survey, it should be acknowledged that the results could vary by context. Third, given the complexity of the concepts under scrutiny, the scales require further development and testing in the context of different data.

Notably, this study is explorative by nature. The extant research on the topic is still very limited. SSM practices have been extensively studied from the perspective of a single buyer organization. Nevertheless, more research about these practices in the context of supply chains and networks is needed. More research is also called for regarding the fundamental goals and strategic aims of different practices. It could be particularly interesting to study this issue using qualitative case study data by conducting comprehensive analyses in different firms.

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