

The role of supply management innovativeness and supplier orientation in firms' sustainability performance



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ABSTRACT

Questions about the influencing factors and measurement of firms' sustainability performance have attracted growing research interest, as the requirements for sustainability have steadily increased. This study examines whether supply management innovativeness and supplier orientation make positive impacts on firms' overall sustainability performance. An empirical study based on a survey targeting large- and medium-sized manufacturing companies in Finland shows that innovativeness in supply management considerably influences a firm's overall sustainability performance and that supplier orientation positively relates to sustainability performance. The benefits of innovativeness in supply management and strategic supplier orientation are directly realised in sustainability performance. Therefore, supply management is not only a gatekeeper against sustainability risks arising from the supply base but is also a function by which new ideas aiming to influence supply markets and firms' sustainability are presented.

1. Introduction

The movement towards innovative sustainable solutions and the adoption of cleaner technologies amongst companies has been evident in recent years. According to Eurostat, (2017) most recent innovation statistics, 52.7% of innovative companies in EU member states have introduced innovations with environmental benefits for themselves or their customers. Clearly, firms are aiming to improve their sustainability performance by building their business on new innovations. The creation of business opportunities based on innovations that are born from customers' and other stakeholders' sustainability requirements was noted more than 20 years ago by Porter and van der Linde (1995). Sustainability evidently motivates companies to innovate and seek fresh solutions from their supply chains (Porter and van der Linde, 1995; Nidumolu et al., 2009).

Eccles and Serafeim (2013) stated that the concepts of innovation and sustainability are closely related; however, as evidenced from the existing literature, the causality and interdependency between these concepts remain ambiguous. Recent studies show that the development of innovations can improve sustainability (Bönte and Dienes, 2013) and that a firm's innovation power is a factor that defines its capability to design sustainability strategies and approaches (Van Bommel, 2011). Studies have also shown that innovativeness is a prerequisite to the adoption of sustainable supply chain management practices (e.g. Pagell

and Wu, 2009) and that innovativeness increases the use of sustainable processes in supply management (Gualandris and Kalchschmidt, 2014). The opposite logic, however, is exemplified in the approach of Porter and van der Linde (1995), in which sustainability is considered a driving force that increases the innovativeness of firms. For example, Nidumolu et al. (2009) found supporting results by showing that growing sustainability requirements enhance the innovativeness of firms and their supplier networks and that sustainable innovations arise from supply chains in which suppliers aim to satisfy their customers' needs. Thus, innovativeness and sustainability seemingly form a self-feeding cycle because organisations need innovation capabilities to exploit sustainability, whilst sustainability drives organisations to innovate.

Previous studies (e.g. Schiele, 2006; Azadegan and Dooley, 2010; Mazzola et al., 2015) demonstrate that supply management has a significant role in firms' innovativeness, and suppliers greatly contribute in creating new innovations. Because supply management operates at the intersection of a company and its suppliers, the company's participation in the early phases of innovations and product development in collaboration with suppliers, especially in terms of sustainability, is important (Hallstedt et al., 2013). In addition, suppliers' ability to provide innovative and sustainable solutions and the development of integrated solutions in supply chains generate value in terms of both sustainability and business success (Windahl and Lakemond, 2006). To gain the

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business benefits of investments in sustainability, a company therefore needs to enhance its own innovation capability and use also the innovativeness of its suppliers. According to Hollos et al. (2012), a company can have a strategic orientation towards suppliers in its upstream supply chain, which considerably enhances supplier cooperation with the buyer organisation in sustainability matters. This strategic supplier orientation of a firm and the integration of the inter-firm capabilities of buyers and suppliers are the triggers of sustainable innovations arising from supply bases (Hollos et al., 2012).

However, studies that examine the connections between innovativeness and sustainability remain rare and are mainly at the conceptual level (Gualandris and Kalchschmidt, 2014). The overall link between innovations and sustainability also remains underdeveloped (Neutzling et al., 2018). Although buyer–supplier cooperation is acknowledged as significant for a firm's sustainability (Grosvold et al., 2014), the influence of an organisation's strategic approach to its suppliers on the firm's sustainability performance remains under-examined (Hollos et al., 2012). More research is needed to examine the value of supplier collaboration in specific types of performance, such as sustainability (Ralston et al., 2017). Therefore, the objectives of this study are to clarify the meaning of supply management innovativeness, examine how it may affect a firm's sustainability performance and explore how the firm's strategic orientation towards its supply base may contribute to its sustainability performance. Consequently, the main research question in this study is as follows: *What kinds of roles do a firm's supply management innovativeness and supplier orientation play in the firm's overall sustainability performance?*

Supply management is found to contribute to a company's sustainability performance (Gualandris et al., 2014), and supply management strategies are developed to support a company's sustainable development at both the strategic and operational levels and to foster innovations (Tchokogué et al., 2017). Close buyer–supplier collaboration regarding sustainable product designs and innovations in manufacturing and supply chains is also found to be an essential driver of the sustainability performance of a firm (Paulraj et al., 2017; Gualandris et al., 2014; Hollos et al., 2012). To increase the understanding of the significant role of the supply management function and its capability to improve firm-level sustainability, in general, a study that clarifies the relationships of supply management innovativeness and supplier orientation and their impact on sustainability performance in one research setting is needed. In this paper, these links are examined by using the survey data of 113 Finnish firms in several industries. In the following section, the key concepts of the study are clarified, and hypotheses based on the existing literature are developed. The methodological section follows, and the analysis of the empirical data is presented. The final two sections include a discussion of the results and conclusions.

2. Theoretical background

2.1. Dynamic capability view as a theoretical lens

Sustainability is a multidimensional and complex concept to which divergent views and theories are applicable. However, because today's changing business environment requires a dynamic approach to firms' capability development (Eisenhardt and Martin, 2000), the dynamic capability view (DCV) (Teece et al., 1997) offers a theoretical background and assumptions that support current requirements. The DCV suggests that a firm's internal and external resources should be reconfigured, and a strategy should be created by considering the dynamics of the business environment (Teece et al., 1997). Dynamic capabilities can change the existing resource configurations of a firm, strengthening its long-term competitive advantage (Eisenhardt and Martin, 2000).

According to Teece (2007), dynamic capabilities can be divided into sensing, seizing and reconfiguring (or transforming) capacities. Sensing

refers to the capacity to scan, detect, identify and interpret new opportunities and threats, and it involves understanding latent demand, the structural evolution of markets and supplier and competitor responses. As suppliers can be the drivers of innovations (Teece, 2007), sensing supply markets as a part of the business environment can help companies detect not only the changes required in the resource base on the basis of the dynamism of the environment but also new innovation opportunities. The strategic supplier orientation of a firm implies the capacity of supply management to sense the innovation opportunities prevailing in supply markets. Firms that want to take an early mover advantage regarding sustainability must integrate their suppliers with adequate management and development processes, and they must promote collaboration throughout the entire supply chain (Reuter et al., 2010). Seizing capacity, on the other hand, refers to how a company can capture the opportunities sensed by creating structures and procedures for decision-making (Teece, 2007, 2012). Being at the intersection between the supply base and product development where innovation opportunities arise requires the seizing capacity of supply management. Seizing the opportunities identified from the supply base can significantly affect resource reconfiguration. Reconfiguration is about the alignment and realignment of specific assets to enable renewal and to keep the resource base in line with the detected changes and sensed opportunities (Teece, 2007, 2012). The ability to recombine and reconfigure assets and organisational structures when markets change is the key to sustained profitable growth (Teece, 2007). Thus, organisationally dynamic firms are able to exploit and combine their external resources with internal ones successfully in order to respond to market changes and create competitive advantage. Coping with the dynamism of the business environment requires both innovation capability and the ability to build and implement sustainable strategies based on the needs and values of company stakeholders. To create profit from sustainability, firms need both their internal and external resources; more importantly, however, capabilities to sense and seize opportunities and to reconfigure resource bases are highly critical in the long run.

2.2. Sustainability of a firm

Sustainability performance indicates a firm's ability to meet the needs of its current stakeholders without compromising those of its future stakeholders (Dyllick and Hockerts, 2002). Thus, a firm's profit generation and growth are tied not only to economic aspects but also to social and environmental capital. Improving a firm's sustainability performance requires clear actions, such as formulating strategies and designing and developing systems of sustainable performance measurement (Epstein and Roy, 2001). Recent studies have shown that sustainability generates profit for companies in the long run and often indirectly (Pullman et al., 2009; Golicic and Smith, 2013); dynamic capability development is required to ensure long-term benefits from a firm's sustainability efforts (Reuter et al., 2010). However, because of the multidimensionality and long-term focus of sustainability, establishing a sustainability performance measurement system in organisations is complicated (Searcy, 2012). Defining and measuring sustainability performance are difficult both in companies and in scientific studies, and the operationalisation of the concept is demanding. Moreover, although sustainability performance measurement is an essential part of corporate performance management, it has received little research attention (Searcy, 2012; Schaltegger and Burritt, 2014).

Instead, more attention has been placed on studies examining the links between a firm's sustainability efforts and profit. For example, Waddock and Graves (1997) showed that corporate social performance is associated with financial performance. They stated that companies with strong financial performance are more conscious of sustainability or have more financial resources to spend on resolving sustainability issues. Additionally, Wagner (2010) revealed a connection between a firm's sustainability performance and financial performance, arguing

that only environmental performance has a direct effect on a firm's financial performance, and the impact of social performance is moderated by advertising intensity. Pullman et al. (2009) found that the return of investment to sustainability programmes is difficult to calculate, and the benefits of sustainability improvement actions are realised indirectly. Paulraj (2011) presented that by being a first mover in the market in terms of creating a sustainable business, a firm can enhance its market share and image, thus influencing its profit generation.

According to Pagell and Wu (2009), the triple bottom line (Elkington, 1997) is a measure of sustainability performance that addresses not just profit but also the impacts of the supply chain on social and environmental systems; it is a measure of the supply chain's impacts on people, profit and the planet. In terms of increasing sustainability performance and creating competitive advantage, the actions of the upstream supply chain should therefore be counted, as well (Montabon et al., 2016). The improvement of sustainability performance requires taking care of organising, controlling and reporting sustainability issues and actions in supply management according to a company's sustainability strategy and vision in a holistic way.

In today's business, risks and opportunities regarding sustainability have spurred innovations in an increasing number of industries and markets, and they have become major competitiveness drivers amongst companies (Schaltegger and Burritt, 2014). Van Bommel (2011) suggested that a firm's capability to design sustainability strategies and approaches depends on both the company's own innovation power and its supply network. Drawing on this, the influence of supply management on a company's overall sustainability performance is arguably based on the innovation power of the supply management function and its orientation towards its suppliers. Innovativeness in supply management is considered an internal resource of a firm, and supplier orientation is considered a firm's ability to exploit external resources. A company's long-term competitive advantage can be strengthened by following the DCV—taking into account the dynamics of the supply market and the business environment regarding sustainability and re-configuring internal and external resources and strategy (Eisenhardt and Martin, 2000; Reuter et al., 2010). Fig. 1 shows the research framework.

To meet the sustainability requirements and the needs and values of stakeholders, a company must be able to innovate and then build and implement sustainable strategies. Both the innovativeness of a firm and the innovations arising from its supply base can be linked to the supply management function. In the following section, the connections between a firm's sustainability performance, innovativeness in supply management and supplier orientation are justified more deeply, and hypotheses are developed accordingly.

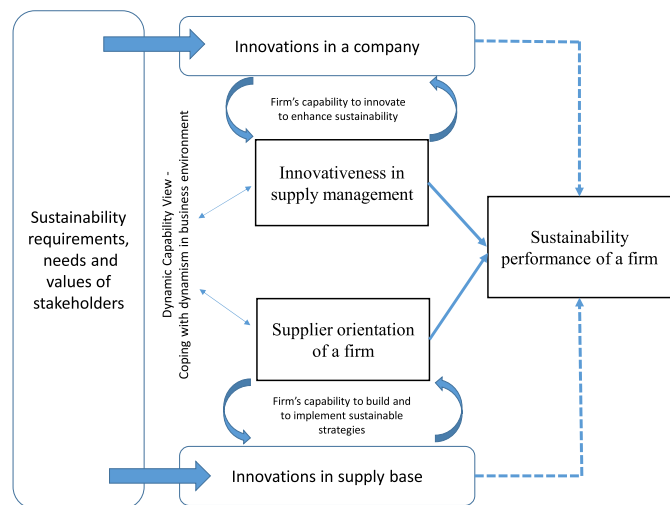


Fig. 1. The framework of the study.

2.3. Innovativeness in supply management

Innovation is a widely examined concept in many studies, as Crossan and Apaydin, (2010) comprehensive literature review points out. According to Damanpour (1996, p. 694), 'innovation is conceived as a means of changing an organisation, either as a response to changes in the external environment or as a pre-emptive action to influence the environment. Hence, innovation is here broadly defined to encompass a range of types, including new product or service, new process technology, new organisation structure or administrative systems, or new plans or program pertaining to organisation members'. Bargeh et al., (2009, p. 1334) complemented this definition to consider business and company success as a main driver of innovations by arguing that 'innovation is the multi-stage process whereby organisations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace'. Crossan and Apaydin, (2010, p. 1155) summarised innovation as 'both a process and an outcome' and included examples of innovation drivers, such as the existence of innovation capability and resources in a company, the detection of a market opportunity, the uncertainty of the business environment and the changes that force firms to innovate.

Innovation in a company refers to an outcome from an intellectual process, whereas innovativeness refers to a company's collective openness to new ideas embedded in the corporate culture (Hurley and Hult, 1998). A company's ability to produce or adapt to new innovations, with the aim of influencing the markets in which it operates, reflects its level of corporate innovativeness (Garcia and Calantone, 2002). According to Calantone et al. (2002), a firm's innovativeness can be measured by the frequency of activities through which the company tries out new ideas, seeks novel operating procedures, develops its operations creatively and succeeds in being the first to market new products and services. Innovativeness—as a company's intra-organisational capability—has been found to be one of the key antecedents of business performance and competitive advantage (Burns and Stalker, 1961; Porter, 1990; Hult et al., 2004; Prahalad and Krishnan, 2008). Hence, a company's ability to introduce innovations can determine its future success and survival. In line with the works of Hurley and Hult (1998), Calantone et al. (2002) and Garcia and Calantone, (2002), innovativeness in supply management can be defined as purchasing professionals' collective ability to innovate and their openness to new ideas with the aim of influencing supply markets, whereas innovation is a process in which new ideas and practices are created.

Supply chains have great innovation potential for sustainable development (Isaksson et al., 2010). Hence, firms' capability to innovate and capture ideas from their suppliers has become an important driver of collaboration and a source of power in supply chains. Buyer–supplier collaboration and supplier involvement in product development projects are widely studied research streams (Hoegl and Wagner, 2005; Van Echtelt et al., 2008) that produce mixed results about their influence on company performance and the success of product development (Wynstra et al., 2001). Azadegan and Dooley (2010) showed that suppliers' innovativeness (the capacity to develop and introduce new products and processes) is positively associated with buyers' manufacturing performance. Suppliers can be the drivers of innovations (Teece, 2007), and, thus, companies are increasingly using external sources of innovation management; in this regard, knowledge is needed on which suppliers can contribute to firms' innovativeness (Schiele, 2006). This requires the capacity to sense opportunities by understanding supplier markets and by developing structures and procedures for decision-making to be able to seize the opportunities sensed (Teece, 2007, 2012). According to Multaharju et al. (2017), collaboration with suppliers is also one of the best ways to enhance the transparency of supply chains and mitigate sustainability-related risks. Therefore, companies should recognise the innovation potential of suppliers and exploit supply management's openness to new ideas, with the aim of

influencing supply markets to increase overall sustainability.

Christmann (2000) stated that innovative organisations will become leaders in sustainability, and it is said that the organisational capability to innovate is a precursor of successful and sustainable supply chain management (Pagell and Wu, 2009). The differentiation of products and services to increase the sustainability of the economy and society requires extensive product development, product or service system innovations and value chain redesigns, which are guided by sustainability criteria (Schaltegger and Burritt, 2014). The implementation of sustainability practices often leads to increased process innovations, and the innovative behaviour of employees creates greater organisational support (Porter and van der Linde, 1995; Hollos et al., 2012). Innovativeness adds the adoption of sustainable processes in supply management (Gualandris and Kalchschmidt, 2014) and thus increases a company's overall sustainability. Moreover, supply management's critical role in sensing and detecting innovation opportunities from the supply market (Azadegan and Dooley, 2010; Mazzola et al., 2015) and the capacity to seize innovation opportunities (Teece, 2007, 2012) may lead to better sustainability. Hence, supply management's capability to innovate and dynamically respond to changing requirements can be regarded as a strategic organisational resource and a source of competitive advantage in line with the assumptions of the DCV. Based on these views, the first hypothesis is proposed:

H1. Innovativeness in supply management positively influences a firm's sustainability performance.

2.4. Supplier orientation of a firm

Strategic orientations are widely acknowledged by scholars as drivers of firm performance. Relatively enduring patterns of strategic behaviour that actively align a firm with its environment can be understood as strategic orientation (Miles and Snow, 2003). Many studies have shown that a firm which successfully pursues a specific orientation will demonstrate better financial performance (Ruekert, 1992; Baker and Sinkula, 1999; Langerak, 2001), and a strategic orientation has been considered a competitive edge. Strategic orientation defines a company's interaction and the fit of its strategic choices with its external resources, environment, competitors and customers (Zhou and Li, 2010). Not only the capacities of sensing and seizing are needed to ensure this fit but also reconfiguration capacity, which is required to realign and recombine assets in order to make them match with the structures of the supply market. Furthermore, companies choosing a specific strategic orientation to enhance their competitive advantage and performance must have adequate capabilities to implement the strategy in practice. For example, operational flexibility and collaboration are strategic orientation capabilities for influencing market performance (Sinkovics and Roath, 2004). A company's strategy needs to be synchronised with its strategic orientation, and the strategy formation capability can be regarded as a dynamic capability (Slater et al., 2006) because the capacities of sensing, seizing and reconfiguring (Teece, 2007) are needed.

Mentzer et al. (2001, p. 7) stated that one of the core characteristics of the supply chain management philosophy is 'a strategic orientation toward cooperative efforts to synchronise and converge intrafirm and inter-firm operational and strategic capabilities into a unified whole'. Hollos et al. (2012, p. 2974) defined the strategic orientation of supply management as 'the function's integration in strategic planning, its knowledge of and contribution to corporate strategic goals and the visibility of its contribution to these goals'. Shin et al. (2000, p. 318) described supply management orientation as involving the 'management efforts or philosophy necessary for creating an operating environment where the buyer and supplier interact in coordinated fashion'. In line with these definitions, in this study, strategic orientation is regarded as supplier orientation, that is, a firm's effort to cooperate with its suppliers by aiming for a strategic fit when choosing

external resources in the upstream supply chain. Hence, supplier orientation refers to the organisational activity of managing supplier relationships to achieve the firm's goals and is considered a possible strategic orientation of a firm.

According to Pulles et al. (2014), suppliers' professionalism, specialisation and collaborative attitude, together with the characteristics of buyer-supplier relationships (e.g. supplier development programmes and buyers' statuses as preferred customers), increase innovativeness in the supply base. Research has shown examples of innovations achieved through collaboration and partnerships (Darnall et al., 2008), as well as how intensive buyer-supplier collaboration promotes inter-firm learning and innovative ideas (Sofka and Grimpe, 2010). Overall, cross-organisational integration is a critical issue that should be connected to innovations (Rizzi et al., 2013). However, overstepping the boundaries of a firm and dictating the sustainability rules to suppliers in upstream supply chains is difficult. Therefore, powerful companies should be role models (Amaeshi et al., 2008) and use their strengths to boost the capabilities of weaker parties in the supply chain through education and collaborative value creation.

The more deeply suppliers are integrated into product design, however, the less visible the innovation process becomes from buyers' perspective (Petersen et al., 2005). Completely outsourcing product development to suppliers creates a *black box*, thereby blocking a buyer from any further view of the innovations in the upstream supply chain. Bönnte and Dienes (2013) argued that companies following a cooperation strategy do not have a higher environmental innovation performance than firms that do not collaborate with their suppliers. Consequently, contradictions remain in scientific discussions on the effects of inter-organisational collaboration on innovations, sustainability and performance.

Shin et al. (2000) found that supply management orientation constitutes a long-term orientation to supplier relationships, supplier involvement in product development, a reduced number of suppliers and a quality focus. Min and Mentzer (2004) and Miocevic and Crnjak-Karanovic (2012) stated that credibility, benevolence, commitment, norms, compatibility and top management support comprise supply chain orientation. Hollos et al. (2012) included adaptation to changing business plans, long-range planning and profound knowledge in their measurement of supply management orientation. In their view, a firm's strategic orientation towards purchasing and supply management has a positive impact on sustainable supplier cooperation. Furthermore, as Grosvold et al. (2014) pointed out, a firm's supplier base largely defines the level of sustainability of both the firm and the entire supply chain. Thus, collaborative buyer-supplier relationships and a strategic orientation towards suppliers need to be connected to the company's sustainability strategy. Based on this argument, the second hypothesis is proposed:

H2. Supplier orientation positively influences a firm's sustainability performance.

2.5. The research model

According to Russo and Fouts (1997) and Pullman et al. (2009), defining the causality and the relationship between intangible resources, such as sustainability and performance outcomes, is difficult. Moreover, sustainability is a complex and multidimensional phenomenon, so finding one universal way to measure it is difficult (Searcy, 2012). Because countless issues might influence a firm's sustainability performance directly or indirectly, this study focuses on the supply management function and is limited to examining the role that a firm's supply management innovativeness and supplier orientation play in the firm's overall sustainability performance. A previous study found that sustainable supply management practices affect sustainability performance (Kähkönen et al., 2018). Clearly, reporting sustainability practices and using these practices in upstream and downstream supply

chains improve a firm's sustainability performance.

Innovations linked to supply management have been studied in terms of the collaborative actions between buyers and suppliers, such as early supplier involvement (e.g. Petersen et al., 2005; Johnsen, 2009) and supplier orientation (Kähkönen et al., 2015). Early supplier involvement more likely occurs in collaborative rather than in arm's-length relationships (Bidault et al., 1998), and trust in suppliers has been found to increase innovativeness in supply chains (Panayides and Lun, 2009). Organisations' ability to manage these collaborative operations and knowledge further increases innovations (Soosay et al., 2008). Moreover, Gualandris and Kalchschmidt (2014) found that innovativeness increases the use of sustainable processes in supply management. Thus, supply management innovativeness and supplier orientation might be intertwined, and studying the possible interaction effects of these two concepts on sustainability performance is reasonable.

Moreover, a firm's size may influence its adoption of sustainability (Zhu et al., 2008). It is suggested that large firms with high brand equity are more likely to implement sustainability practices and collaborate within their respective industries and with nongovernmental organisations (Plambeck et al., 2012). Therefore, a company's size should be considered and controlled for in the research testing model. Fig. 2 presents the testing model of the study.

3. Methodology

This empirical study is based on a survey that targeted large- and medium-sized manufacturing and logistics companies in Finland. The choice of Finnish companies is justified because in terms of investments in new technologies between 2012 and 2014, the share of novel sustainable innovations and technologies adopted in Finland's manufacturing industry was 71%, with the service sector accounting for 50% of these (Official Statistics Finland, 2016). Moreover, the country's renewed innovation policy (Organisation for Economic Co-operation and Development (OECD, 2017) encourages Finnish companies to innovate in terms of sustainability by stating that coping with challenges in adapting to technological changes caused by sustainability, such as energy efficiency, water constraints, health issues and green growth, should become a permanent feature of firms' strategies. The Finnish government also supports the innovation, renewal and international growth of Finnish companies. As a result, Finland is an attractive and competent environment for experimentation and innovation, for the practices and processes of making strategic choices and for innovation partnerships and ecosystems that renew the economy (OECD, 2017). The Finnish context fits the research focus well.

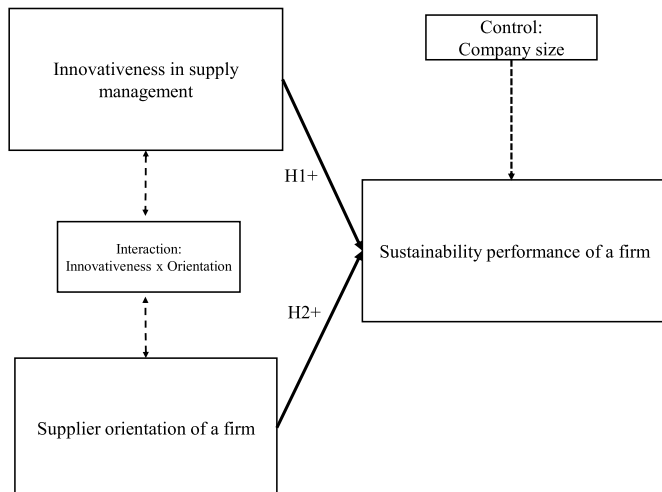


Fig. 2. Testing model.

The objective of this study is to examine if supply management innovativeness and supplier orientation are connected to a company's overall sustainability performance. According to Creswell (2014), quantitative methods are suitable for empirical studies examining the relationships between concepts or the influence of drivers on an outcome. Therefore, a survey was designed to perform a quantitative analysis and increase the generalisability of the results, and a questionnaire was developed to collect the data. The unit of analysis in this study was a firm.

3.1. Data collection

Firms with at least 30 million euros in operating capital, 100 employees and activities in Finland were extracted from the commercial Amadeus database (Bureau van Dijk). The sample consisted of 387 firms. Key informants were identified based on their capacity to view the supply management function at both the operational and managerial levels. In this study, the use of single respondents was justified because the experiences of one party provided sufficient data to examine the links between innovativeness, sustainability performance and orientation in a firm (Krause et al., 2018). Using single respondents is valuable because of their knowledge and experience-based insights that increase the relevance of the research (Montabon et al., 2018). Therefore, all the companies were first contacted by phone to find the most suitable and experienced informants in the field of supply management, and then the web link to the questionnaire was emailed to them. Reminder emails were sent to those who had not answered within two weeks. Finally, 113 completed questionnaires were received, with a response rate of 29.2% (113/387). However, the screening of the returned forms revealed two incomplete and non-usable questionnaires, which were removed from the data file, resulting in a total of 111 usable responses for quantitative analysis. The non-response bias was assessed by comparing the early and the late respondents (Armstrong and Overton, 1977) in terms of industry, turnover and spending. Because no significant differences were found, non-response bias was not a concern in the data.

Of the respondents, 46% belonged to middle management, 32% represented top management, 17% were experts in the field, 4% occupied operations positions, and 1% held other positions. On average, the share of turnover expenses was 53%. Of all the purchases, 35% were manufactured abroad (11% of these came from low-cost countries) and, on average, were sourced from 14 countries. The responses were grouped into six main industry categories, which were construction; manufacturing of machinery, equipment, metal, non-metal, plastic and electronic products; chemical, paper and wood; logistics services; food; and other industries. Table 1 presents the basic information about the respondents' companies.

3.2. Variables

Statements and existing scales reflecting performance, orientation and innovativeness in business research were found from the existing literature and modified for the purposes of this study. Previous studies

Table 1
Numerical data of the sample.

Industry	N	Turnover (t€)	Employees
Construction	23	176,521	458
Machinery, equipment and industrial manufacturing	39	388,969	1696
Chemical, wood and paper	18	1,269,497	3223
Logistics services	18	99,117	189
Food	4	613,046	1371
Other	9	137,322	618
Total	111	428,404	1344

found that a company's size influenced its adaptation to sustainability practices (e.g. Zhu et al., 2008); therefore, firm size was included in the model as a control variable and measured by using the operating revenue of each respondent company. Logarithmic transformation was used to normalise the variable in order to meet the assumptions of regression analysis (Cohen et al., 2003). The interaction variable was calculated by multiplying the variables of innovativeness in supply management and supplier orientation.

Because of the complexity of sustainability performance measurement and a lack of reliable firm-level objective measures (Searcy, 2012), subjective assessments of the respondents were used, and the scale applied in the study of Kähkönen et al. (2018) was utilised. Studies using single respondents and subjective assessments of performance are commonly used in business research (Montabon et al., 2018). Moreover, the subjective assessment of sustainability performance has been utilised in many studies (e.g. Gualandris et al., 2014; Golini et al., 2014; Gualandris and Kalchschmidt, 2016). Companies' sustainability performance was assessed by asking the respondents to evaluate their current level of sustainability performance with six statements concerning reporting, organising, strategy and communication on a seven-point Likert scale (from 1 = *extremely low success* to 7 = *extremely high success*). In the guidelines of the questionnaire, the respondents were asked to think of all sustainability aspects when evaluating sustainability performance and not specifically concentrate on the social or environmental perspective.

The measurement of innovativeness in supply management was based on the studies of Hurley and Hult (1998), Panayides and Lun (2009) and Seo et al. (2014). Six statements were provided regarding innovation capabilities in supply management, processes and operation models to collect ideas about supplier networks, participation in companies' innovation processes and coordination/facilitation of new ideas. The scale applied by Kähkönen et al. (2015) was used to measure supplier orientation. The respondents were asked to provide their experience (on a scale of 1 = *do not agree at all* to 7 = *fully agree*) regarding how suppliers are treated in a company in terms of collaboration, relational procedures and strategy. Table 2 shows the components, items and loadings. Principal component analysis (PCA) with varimax rotation was performed to examine the unidimensionality of the model variables. The Kaiser-Meyer-Olkin measure with a value of 0.879 confirmed the suitability of the items for PCA. A three-component solution

was suggested, explaining 66% of the total variance. The reliability of the suggested scales was checked by calculating the Cronbach's alpha. All values were above 0.8, showing good reliability (Hair et al., 1998), and composite measures were formed from each of the components by calculating the mean values of the items (see Table 2). Table 3 shows the correlations between the composite variables.

3.3. Analysis and results

Regression analysis (SPSS software) was performed to test the hypotheses. However, the small number of respondents (N = 111) made it impossible to include industry dummies (six different dummy variables) in the regression model. Therefore, the influence of the industry was checked separately by performing a one-way ANOVA. The results showed no evidence that industries differed in terms of sustainability performance, innovativeness in supply management and supplier orientation ($p < 0.05$).

Regression analysis was performed in three phases. In the first phase (model 1), only the control variable of firm size was included, and the results showed that it had no significant effect on sustainability performance ($R^2 = 0.024$). In the second phase (model 2), the linearity of supplier orientation and innovativeness in supply management with a firm's sustainability performance was tested. The result was significant ($R^2 = 0.194$, $p < 0.01$). In the third phase (model 3), an interaction term was included in the analysis to detect the possible interaction of the concepts. For the analysis, the variables were standardised to prevent the possible problem of multicollinearity, which is common when testing the interactions between independent variables. The results showed that the R^2 of change (0.013, Sig. of change = 0.185) between models 2 and 3 was not significant; therefore, no interaction effect was found. Table 4 summarises the regression results.

The values of the variable inflation factor (VIF) scores were examined to assess the problem of multicollinearity. In model 3, the highest value was 42, which was higher than the cut-off level of 10 suggested by Cohen et al. (2003). Despite the standardisation of the variables, it seems that after the inclusion of the interaction term in model 3, the high value of VIF appears, indicating a problem of multicollinearity caused by the interaction term. However, the condition index in collinearity diagnostics showed a value of 13.159 only, which is clearly less than the rule of thumb of 30 (Cohen et al., 2003). Because

Table 2
The items, loadings and reliability of the variables in this study.

Rotated Component Matrix	1	2	3
<i>Supplier orientation</i> , $\alpha = 0.910$, (Kähkönen et al., 2015)			
Supplier collaboration is measured regularly.	0.822	0.118	0.180
In supplier relationships, there are clear procedures concerning errors.	0.789	0.051	0.143
Supplier relationships have clear and concrete objectives.	0.784	0.104	0.101
Supplier relationships are identified and categorised.	0.760	0.169	0.098
Business processes are developed jointly with suppliers.	0.758	0.099	0.245
The measurement criteria for supplier collaboration are jointly agreed upon.	0.751	0.231	0.247
Joint strategic planning is included in supplier relationships.	0.718	0.160	0.203
New areas of collaboration are actively sought with suppliers.	0.697	0.095	0.179
<i>Sustainability performance</i> , $\alpha = 0.898$ (Kähkönen et al., 2018)			
Sustainability is performed together in the whole organisation.	0.205	0.875	0.141
Our company takes care of organising and managing sustainability issues.	0.247	0.870	0.131
Our company takes care of the control and reporting of sustainability issues.	0.196	0.860	0.042
We act according to a sustainability strategy and vision.	0.157	0.830	0.141
Sustainable actions are seen in the results of the business.	0.001	0.794	0.127
We actively communicate with end customers about sustainability values.	0.074	0.740	0.137
<i>Innovativeness in supply management</i> , $\alpha = 0.914$			
The purchasing process supports finding innovative solutions.	0.202	0.015	0.824
Supply management participates in the innovation processes of a company.	0.151	0.130	0.823
The capability to innovate in supply management is systematically developed.	0.254	0.210	0.762
Goals and measures related to innovations are set for supply management.	0.147	0.240	0.719
The collaboration between supply management and research and development is seamless.	0.141	-0.019	0.706
Supply management coordinates and facilitates new ideas in the organisation.	0.255	0.233	0.675

Extraction method: Principal component analysis (PCA); Rotation method: Varimax.

Table 3
Correlations between the composite variables.

Variables (N = 111)	Mean	Standard Deviation	1	2	3	4
1. Sustainability performance	4.835	1.143	1.000			
2. Supplier orientation	4.866	1.150	0.359**	1.000		
3. Supply management innovativeness	4.072	1.140	0.348**	0.475**	1.000	
4. Turnover (ln)	11.351	1.472	0.154	0.072	-0.080	1.000

*p < 0.05; **p < 0.01.

the inclusion of an interaction term did not improve the model significantly (Sig. F-change 0.185) and no interaction effect between supply management innovativeness and supplier orientation on the firm's sustainability was found, the interaction model was ignored and the results of model 2 were reported, in which multicollinearity was not a problem (highest VIF value: 1.291). The standardised residuals of the regression varied between -3.114 and 1.73, indicating that heteroscedasticity was not a problem in this case. The normality of the variables was estimated graphically. No serious violations of the assumptions of regression analysis were found, and the test was considered successful.

The final results showed that only model 2 was significant (F -value: 8.576; $p < 0.01$). From the analysis, it can be concluded that innovativeness in supply management positively influences a firm's sustainability performance (standardised $\beta = 0.229$; $p < 0.05$), as proposed in hypothesis 1. Hypothesis 2, suggesting that supplier orientation positively influences a firm's sustainability performance, is also supported (standardised $\beta = 0.252$; $p < 0.05$). Moreover, in line with the results of [Zhu et al. \(2008\)](#), a weak connection between a company's size and sustainability performance was found, although it was significant only on level $p < 0.1$ (standardised $\beta = 0.158$; $p < 0.1$). In the following section, the results are discussed in detail.

4. Discussion

In this study, the influence of supply management innovativeness and supplier orientation on a company's overall sustainability performance was examined. The possible underlying factors that affect company sustainability performance were found. The interaction effect of these two concepts on sustainability performance was also examined. The empirical results show that innovativeness in supply management has a positive effect on a company's sustainability performance. A firm's supplier orientation was also found to have the same effect. Moreover, the lack of an interaction effect between supply management innovativeness and supplier orientation on a firm's sustainability performance was confirmed. The results also indicate that a firm's size might

influence sustainability performance (note: significant only on the $p < 0.1$ level, Sig. 0.075 in model 2), showing that large companies perform better in terms of sustainability than do smaller ones. This finding is in line with those of [Zhu et al. \(2008\)](#) and [Plambeck et al. \(2012\)](#), who reported that large firms and firms with high brand equity are more likely to take sustainability actions, further contributing to their sustainability performance.

Hypothesis 1 proposed that innovativeness in supply management positively influences a firm's sustainability performance. Several previous studies have discussed the critical role of the supply management function in a company's research and development and innovation development; the benefits of cross-functional collaboration between product development and supply management are also widely acknowledged (e.g. [Hallstedt et al., 2013](#); [Rizzi et al., 2013](#)). However, to the best of our knowledge, there is no previous conceptualisation of innovativeness in supply management. In this study, supply management innovativeness is defined as purchasing professionals' collective ability to innovate and their openness to new ideas, with the aim of influencing and developing supply markets. Studies have pointed out the impact of innovativeness on supply chain performance ([Panayides and Lun, 2009](#); [Seo et al., 2014](#)) and the sustainability of supply chains ([Gualandris and Kalchschmidt, 2014](#)). However, in this study, innovativeness in the supply management function is found to be linked to a company's overall sustainability performance. This finding supports the arguments that sustainability and innovativeness are linked, as suggested by [Eccles and Serafeim \(2013\)](#), and that increased innovation capability may enhance a firm's sustainability performance, as suggested by [Pagell and Wu \(2009\)](#) and [Van Bommel \(2011\)](#). Innovativeness in supply management increases not only supply chain performance but also a firm's sustainability performance.

Hypothesis 2 suggested that supplier orientation positively influences a firm's sustainability performance. This hypothesis is supported by empirical findings and is in line with [Hollos et al., \(2012\)](#) study, which showed that a strategic orientation towards supply management contributes to environmental and social sustainability practices. In the present study, the focus is specifically on a firm's orientation towards its

Table 4
Results of the regression analysis.

	Model Coefficients	Unstandardised β	Std. Error	Standardised β	t -value	Sig.
1	Turnover (ln)	0.176	0.108	0.154	1.627	0.107
2	Turnover (ln)	0.180	0.100	0.158	1.796	0.075
	Supplier orientation	0.288	0.114	0.252	2.529	0.013*
	Supply management innovativeness	0.261	0.114	0.229	2.299	0.023*
3	Turnover (ln)	0.191	0.100	0.167	1.907	0.059
	Supplier orientation	-0.274	0.436	-0.240	-0.629	0.531
	Supply management innovativeness	-0.155	0.332	-0.136	-0.467	0.641
	Orientation \times Innovativeness	0.854	0.641	0.747	1.333	0.185
Dependent variable: sustainability performance						
	R	R Square	Adjusted R Square	R Square Change	F -value	Sig. F Change
1	0.154	0.024	0.015	0.024	2.648	0.107
2	0.440	0.194	0.171	0.170	8.576	0.000**
3	0.455	0.207	0.177	0.013	6.923	0.185

*p < 0.05; **p < 0.01.

suppliers, and the study's results enhance this view by showing the direct link of supplier orientation (as a firm's strategic orientation) with sustainability performance. Supplier orientation is defined as a firm's efforts towards cooperation with its suppliers and the strategic fit regarding its choices of external resources in the upstream supply chain. In the long term, supplier orientation can have positive implications for company success and can provide competitive advantages by contributing to the development of a sustainable business. Building on the DCV, Teece (2007) stated that suppliers can be the drivers of innovations, therefore highlighting the need for sensing the supply markets and detecting suppliers' capabilities for innovating. Supplier orientation enables sensing and seizing supply bases because if the firm has no strategic orientation towards its suppliers, sensing the supply base and the supply market may not be that efficient, may not be strategically managed or may not occur early enough. Being a first mover in terms of sustainability is critical to enhance a firm's market share or influence profit generation (Paulraj, 2011). In addition, supplier orientation is an important factor for a firm's sustainability performance because the firm's supplier base determines the level of the firm's overall sustainability, as pointed out by Grosvold et al. (2014).

5. Conclusions

This paper contributes to questions regarding the influencing factors and measurement of firms' sustainability performance by studying the issue from the viewpoint of purchasing and supply management. Its main contribution is finding the link between supply management innovativeness and the sustainability performance of a firm. Moreover, a connection between supplier orientation and sustainability performance is examined, revealing more evidence about the criticality of the purchasing and supply management function in the sustainability of a firm. The paper also contributes to the intersection of innovations and supply management by forming a definition of the concept of innovativeness in supply management. The results highlight the role of suppliers in sustainability and show that how firms interact with suppliers and the nature of their approach towards their supply markets may ultimately affect their sustainability performance.

On the basis of the findings of this study, it can be concluded that supply management plays a vital role in boosting a firm's overall sustainability performance. Firm managers must understand this when formulating a company's sustainability strategies and implementing sustainable values in practice. Supply management is not only a gatekeeper against sustainability risks arising from the supply base but also a function by which new ideas that aim to influence supply markets are presented. For a firm's management, recognising this twofold impact of supply management on sustainability performance is essential. The results also show that if companies search for improvements in their sustainability performance, innovativeness in supply management seems to be a significant driver. Thus, managers in the purchasing and supply function should encourage actions that nurture new ways of doing things and aim at achieving innovative approaches to supply markets. It could be argued that companies should adopt sustainability requirements in their purchases to find innovative solutions, as well. This implies that goals and measures related to innovations should be connected to the sustainability requirements set for suppliers. Consequently, sustainability performance in purchasing and supply management can be improved by tightening sustainability requirements that foster innovations in supply management.

5.1. Theoretical contribution

The capability of a firm to innovate is a key antecedent of business performance (Calantone et al., 2002; Prahalad and Krishnan, 2008), and the significance of sustainability as a driver of innovations is widely acknowledged (Nidumolu et al., 2009; Porter and van der Linde, 1995). Moreover, sustainability and innovativeness form a self-feeding cycle,

as firms must have innovation capability for the successful implementation of sustainability (Gualandris and Kalchschmidt, 2014; Pagell and Wu, 2009). This study develops these views further by emphasising the innovation capability of the supply management function as a significant determinant of a firm's sustainability performance. In addition, this study provides a clear definition of the concept of supply management innovativeness. Supply management innovativeness and supplier orientation are shown to directly contribute to a firm's sustainability performance and are separate concepts without interaction. This clarifies the discussion regarding supply management's internal ability to innovate versus the innovations acquired from the supply base. These results are in line with the DCV by supporting the arguments that supply management innovativeness (as an internal capability of a firm), the proactive management of external resources (i.e. supplier orientation) and taking account of the dynamism of the business environment are valuable resources in a firm's value generation (Reuter et al., 2010; Barney, 2012). Hence, supply management innovativeness and supplier orientation are elements of the supply strategy that contribute to sustainability performance and can provide competitive advantages in the long run. The results also strengthen the notion that supplier orientation is a strategy for value-creating collaboration (Kähkönen et al., 2015). Another conclusion is that the supply management function provides a twofold impact on a firm's overall sustainability performance. The benefits of strategic supplier orientation and innovativeness in supply management are directly realised in sustainability performance.

5.2. Managerial implications

Company managers need to recognise the significance of supply management as a central contributor to sustainability performance. By fostering innovativeness amongst supply management personnel and nurturing the supply base, a company mitigates the sustainability risks of the supply chain whilst enhancing the company's value. Our results showed that innovativeness in supply management is important for a company's sustainability performance, and, thus, a firm's top management should encourage the management and personnel of their purchasing and supply management to find and create more innovative means and strategies on how to perform purchasing and supply. Sensing supplier markets and detecting and identifying new opportunities and possibilities may help find new innovative solutions not only for sustainability but also for other aspects of the business, for instance, new product development. However, to be able to sense supplier markets efficiently, a firm must have a strategic orientation towards its supplier relations. The results of this study therefore provide significant support for managers to boost their supplier orientation because it was also found to have a positive effect on sustainability performance. The ability to seize the opportunities sensed requires an understanding of supplier markets because managers must have knowledge of suppliers and their behaviour to be able to recognise both the best opportunities and the biggest threats. In addition, understanding the long-term implications of sustainability is crucial, and the benefits of innovativeness in supply management and supplier orientation are realised not only in monetary terms but also in terms of new sustainable business opportunities.

5.3. Limitations and further research

Similar to all research, this study has some limitations. The sample size is relatively small and consists only of Finnish companies. The relatively low explanation power (R^2 of 0.207) of the model also clearly indicates that other factors can influence a firm's sustainability performance; more empirical research in other contexts is therefore required. The use of single informants in the data collection involves the risk of common method bias. The study's cross-sectional design means that the causal relationships are difficult to define. According to Russo

and Fouts (1997) and Pullman et al. (2009), defining the causality and the relationship between intangible resources, such as sustainability and performance outcomes is difficult, so more empirical research is needed.

These findings and limitations, however, offer opportunities for future research. Because of the relatively low explanatory power of the model, several other factors that influence a firm's overall sustainability performance can be identified. This paper investigated the issue from the viewpoint of purchasing and supply management, which is just one firm function that affects sustainability performance. Thus, studying other possible influencing factors from the viewpoint of purchasing and supply management, as well as the overall influence of the purchasing and supply management function when compared with the other functions of a firm, would be interesting. Finally, the self-feeding cycle between the concepts of innovation and sustainability are worth studying more closely.

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