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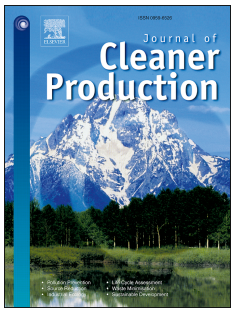

Supply chain perspective on competitive strategies and green supply chain management strategies

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SUPPLY CHAIN PERSPECTIVE ON COMPETITIVE STRATEGIES AND GREEN SUPPLY CHAIN MANAGEMENT STRATEGIES

Abstract

Due to strategic motivations and pressures from various stakeholders, firms are adopting green supply chain management (GSCM) practices to extend environmental sustainability objectives to suppliers. Although it seems that an increasing number of firms is seeing environmental sustainability as a source of competitive advantage, there is a large gap of research focusing explicitly on the connection between competitive strategy and GSCM. It is also necessary to examine GSCM practices in several operational contexts. This article refines the competitive strategy approach and examines external GSCM strategies along the tiers of supply chain from the perspective of logistics users and providers using a dataset of 128 manufacturing, 110 trading and 144 logistics firms operating in Finland. The results reveal a connection between competitive strategy and GSCM strategy. Marketing differentiators and firms pursuing hybrid strategies tend to use more advanced GSCM strategies to manage the environmental performance of their suppliers. For them, GSCM seems to be a way to differentiate products and services, and to minimise the risk of potential losses resulting from poor environmental performance by suppliers. The results highlight the need to understand the role of competitive strategy in GSCM adoption, both in academia and in business.

Keywords Strategy; Green supply chain management; Buyer-supplier relationships

1. Introduction

The role of firms in the society and their responsibility in minimising the environmental impacts has received increasing attention. Green supply chain management (GSCM) has emerged as a way to combine environmental management and supply chain management (Srivastava, 2007). While firms are becoming more and more reliant on their suppliers to gain competitive advantages (Yeung et al., 2008), managers are increasingly forced to deal with social and environmental issues. Firms might be held responsible not only for their own but also for the environmental and social performance of their suppliers (Seuring & Müller 2008). As a response to pressures from various stakeholders, such as regulators, customers, competitors and NGOs, firms have introduced supplier evaluation schemes that integrate environmental and social criteria (Seuring & Müller, 2008) and

required environmental audits or environmental certifications from suppliers (Vachon & Klassen, 2006; Lee et al., 2014).

On the other hand, there are several strategic motivations driving managers to greener supply chain management, such as positive corporate image, increased efficiency and innovation leadership (Testa & Iraldo, 2010). Properly designed environmental standards can create innovations that lower the total costs of a product or improve its value (Porter & van der Linde, 1996). Sustainability can be a valuable, rare, inimitable and non-substitutable resource that may become a source of competitive advantage (Hollos et al., 2012). In addition, GSCM is a way to minimise the risk of potential losses stemming from poor environmental performance. For example, environmental incidents can intensify regulatory pressures (Reid & Toffel, 2009), damage the firm's image, reputation and share price, and have customers boycott the firms or cancel their orders (Bansal & Clelland, 2004; Hajmohammad & Vachon, 2016).

In a global survey by McKinsey (2014), 43 per cent of respondents reported that their firm seeks to align sustainability with their overall business goals, mission or values. However, prior literature suggests that sustainable supply chain management is not at the core of every firm's competitive strategy (van de Ven and Jeurissen, 2005; Hoejmose et al., 2013), and some firms might deliberately choose a late adopter approach (Pajunen et al., 2016). Firms need to balance environmental issues and sound business practices in a dynamic, complex and uncertain environment (Wu & Pagell 2011). Environmental and social sustainability is deemed particularly difficult because of their complexity, their interrelations with traditional business objectives and a longer time period (Longoni & Cagliano, 2015). Pajunen et al. (2016) studied Finnish firms operating in process and mining industries and found out that although sustainability was embedded in many firms' values and communication, it is not reflected in the operational level. There is a need to increase the understanding of the relationship between competitive strategy and GSCM. Generic competitive strategies, such as cost leadership/differentiation framework by Porter (1980), could thus be used to extend the theory to discuss GSCM adoption.

Firms may also pass environmental risks through suppliers (Handfield et al., 2005). While upstream suppliers are usually under less pressure from consumers and authorities, they often need to respond to indirect regulations conveyed by customer firms (Green et al., 2000, Lee et al., 2014). Firms can use two broad categories of GSCM strategies, environmental collaboration or environmental monitoring, to improve environmental performance of their suppliers (Vachon & Klassen, 2006). A limited number of previous studies have addressed whether firms should choose a collaboration or monitoring-based approach in environmental sustainability (e.g. Green et al., 2012; Brockhaus et al., 2013) but they lack a supply chain perspective.

In order to contribute to the above discussion, this article has three primary objectives:

1) to refine the generic approach of competitive strategy that is applied to both logistics users and providers in different tiers in the supply chain;

2) to develop a taxonomy of GSCM strategies and use it to examine logistics users and providers in different tiers; and

3) to discuss how competitive strategy is connected with identified GSCM strategy approaches.

Transaction cost economics and resource dependence theory are integrated to explore buyer-supplier relationship with regard to environmental issues in multiple tiers by using survey data gathered from Finnish manufacturers, trading firms and logistics service providers.

In the next section, the theoretical background for the research is established. Following the research methodology, the results are presented. Finally, the results are discussed in the light of previous research, and implications for research and practice are suggested, along with limitations and future research opportunities.

2. Theoretical background

2.1. Competitive strategies

Numerous previous studies have focused on the development of definitions and typologies of competitive strategy. Many of them are based on the seminal work by Porter (1980) who suggested two generic strategies a firm can possess to achieve above-average performance: cost leadership and differentiation. Low cost leaders aim at superior financial performance by having a significantly lower cost structure than their competitors whereas differentiators convince current or prospective customers that their firm or products are superior to competitors (Beal & Yasai-Ardekani, 2000). Porter (1980) argues that simultaneous pursuit of cost leadership and differentiation is unlikely to produce sustainable competitive advantage and the firm would risk being “stuck-in-the-middle”.

However, several authors have challenged Porter’s view (e.g. Hill, 1988; Beal & Yasai-Ardekani, 2000; Pertusa-Ortega et al., 2009). Firstly, differentiation can create a low cost position for a firm. Secondly, there is rarely a unique low cost position, and thus firms have to pursue both cost leadership and differentiation strategies simultaneously (Hill, 1988). Companies focusing on a pure strategy might be less responsive to market changes and less agile and flexible in offering products combining costs and product features (Salavou, 2015). Thus, integrated or hybrid strategies combining cost leadership and differentiation have been suggested in order to deal with competition (Kim et al., 2004; Pertusa-Ortega et al., 2009). Hybrid strategies are argued to offer many strategic options of "grey shades”, irrespective of the sector the firm operates in (Salavou, 2015). They may help to obtain several sources of advantage, and thus enable safety against

competitors and higher performance levels (Pertusa-Ortega et al., 2009; Leitner & Güldenberg, 2010).

Furthermore, the classic manufacturing strategy literature has identified a number of dimensions on which firms compete. These competitive priorities include cost, quality, flexibility and delivery (e.g. Skinner, 1969; Stock et al., 1998; Ferdows & De Meyer, 1990). Cost as a competitive priority corresponds to cost leadership while others, such as flexibility, quality and delivery, would correspond to differentiation (Stock et al., 1998; Shavarini et al., 2013). Similar to Porter (1980), Skinner (1969) believes that strong trade-offs exist between the competitive priorities and firms need to focus on a single competitive priority in order to compete. Ferdows and De Meyer (1990) reject the traditional trade-off model and suggest that one competitive priority might not be at the expense of another. Instead, competitive priorities must be cumulative. Competitive priorities can be considered complementary, rather than mutually exclusive, as an existing capability can facilitate developing other capabilities (Boyer & Lewis, 2002).

2.2. Green supply chain management practices

Green supply chain management (GSCM) has emerged as a way to combine elements of environmental management and supply chain management (Zhu et al., 2008; Yang et al., 2013). GSCM integrates environmental thinking into supply chain management, ranging from product design to end-of-life management (Srivastava, 2007). Greening the supply is a potentially effective mechanism to improve the firm's record on corporate social responsibility, abate reputational risks, reduce wastes and increase flexibility to respond to new environmental regulations (Simpson et al., 2007). Therefore, environmentally proactive manufacturers will implement internal GSCM activities with an extension to their external supply chain partners (Zhu et al., 2013). Furthermore, recent literature implies that shippers' demands for environmentally friendly logistics services are also increasing (Martinsen & Björklund, 2012; Wolf & Seuring, 2010).

Several organisational theories have been applied to study GSCM, such as institutional theory, stakeholder theory and resource-based view (Sarkis et al., 2011; Carter & Easton, 2011). Transaction cost economics (TCE) and resource dependence theory (RDT) are of particular interest for this article.

Transaction Cost Economics. Today, many firms extend their production goals to their suppliers and count on them to lower costs, improve quality, and develop innovations faster than their competitors' suppliers can (Liker & Choi, 2004; Simpson et al., 2007). A central issue in buyer-supplier relationships is the firm/market governance decision, addressed by transaction cost economics (TCE) (Williamson, 1981). The TCE framework suggests that transactions can be made

internally or externally through market mechanisms. The traditional make-or-buy decision can be extended to environmental buyer-suppliers relations (Lu et al., 2007; Sarkis et al., 2011).

Building on the TCE, Vachon and Klassen (2006) define two sets of green supply chain practices: 1) environmental monitoring and 2) environmental collaboration. Environmental monitoring refers to activities using markets or arm's-length transactions conducted by the buying organization in order to select suppliers that have implemented environmental management systems, inform suppliers of environmental requirements, and monitor the compliance of suppliers with environmental requirements. Transaction costs incur for monitoring the sustainability performance of suppliers (Carter & Rogers, 2008). On the contrary, environmental collaboration comprises direct involvement of the buying organization with its suppliers to jointly set and achieve environmental goals that result in the reduction of the environmental impact of coordinated activities (Vachon & Klassen, 2006; Green et al., 2012). Given that each focal firm acts as a buyer to its suppliers and as a supplier to its customers, environmental collaboration and monitoring can take place simultaneously both upstream and downstream in the supply chain (Vachon & Klassen, 2008). Environmental monitoring corresponds to the externalization and environmental collaboration to the internalization dimension of the TCE framework.

Environmental monitoring and collaboration can also be referred to as governance mechanisms, i.e. practices used by firms to manage relationships with their suppliers (Gimenez & Sierra, 2013). Hoejmose et al. (2014) divide GSCM into coercive and cooperative approaches, while Brockhaus et al. (2013) use the terms "mandated" and "collaborative". Typically, monitoring-based approaches are concerned with requiring suppliers to behave in an environmentally responsible manner using formal ways of communication. In contrast, collaboration-based approaches are more flexible and incentive-based, and aim at gaining competitive advantage for the whole supply chain over a long period of time (Brockhaus et al., 2013; Hoejmose et al., 2014). Environmental monitoring is indirect and based on standards while environmental collaboration require direct management and significant investments in time, personnel, and resources (Gimenez & Sierra, 2013. They can also be divided on the basis of the used incentives (competitive vs. cooperative) (Terpend & Krause, 2015).

Resource Dependence Theory. Firms change their environmental performance in response to pressure from sources such as regulators, customers, competitors and society (Hall, 2000; Walker et al., 2008). Customer pressure has been identified as one of the main drivers of environmental initiatives (Thun & Müller, 2010; Lieb & Lieb 2010). However, the pressures for environmental sustainability vary along the supply chain (Hall, 2000). Large high-profile firms are under considerable pressure from external stakeholders to improve their environmental performance,

whereas smaller suppliers or suppliers far upstream from the final consumer have fewer obvious incentives (Hall, 2000; Lee et al. 2014).

The resource dependence theory (RDT) proposes that firms are dependent on resources, components or capabilities provided by others (Pfeffer & Salancik, 1978; Ulrich & Barney, 1984; Awaysheh & Klassen, 2010). The power development aspect of the RDT relates to the diffusion of environmental practices in the supply chain (Sarkis et al., 2011). The buying firm's ability to motivate suppliers to commit to environmental partnerships usually rests on the supplier's dependence on the buyer (Min & Galle, 2001). In keeping with the RDT, firms with strong bargaining power can exercise control over environmental policies and strategies of its suppliers and dictate supplier participation in green supply chain activities even though these might not be perceived as directly beneficial by suppliers (Crook & Combs, 2007; Nyaga et al., 2013; Caniëls et al., 2013). The drawback of coercive approaches is that the suppliers are likely to comply but only to reactively fulfil minimum requirements (Caniëls et al., 2013; Tachizawa & Wong 2015).

Due to their lack of capital and know-how, smaller firms try to comply with the environmental requirements of their larger partners in order to secure their continued access to resources in the supply chain (González et al., 2008). Manufacturers have increased their collaborative efforts with selected first-tier suppliers in order to address market demands, and many suppliers have strong justification to invest in and signal proactivity in their sustainability-related practices to be selected for these collaborative projects (Foerstl et al. 2015). Brockhaus et al. (2013) observed that powerful retailers forced their manufacturers and suppliers to implement sustainability measures rather than developed long-term competitive advantage for the supply chain as a whole. When the focal company is pressured, it tends to pass the pressure on to suppliers (Seuring & Müller, 2008). Lee et al. (2014) use the term "green bullwhip effect" to describe the phenomenon where demands for better environmental performance are amplified when moved upstream through successive tiers.

2.3. *Research gap*

Although the green supply chain management field has been rapidly evolving for the past 20 years, there still exists significant room for further development (Fahimnia et al., 2015). As outlined in the literature review, there are significant differences between environmental monitoring and collaboration-based approaches to GSCM. Yet the number and scope of especially empirical studies considering both of them is limited (Lee, 2015). Furthermore, Cousins (2005) emphasises that researchers should investigate what a firm sees as its strategic direction, as it is likely to have significant implications to its supply chain practices. There has been a call for research that helps

managers to understand the unique needs of competitive strategy and GSCM strategy and to manage the underlying relationships (Wu et al., 2014). Sustainability issues should make sense in terms of the overall competitive strategy (van de Ven & Jeurissen, 2005).

Despite the popularity of competitive strategy literature, the relationship between GSCM and competitive strategy is examined by a limited number of studies. Hoejmose et al. (2013) undertook a cross-sectional survey on the relationships between competitive strategy and socially responsible supply chain management (SR-SCM) and found that low-cost producers tended to neglect SR-SCM while firms pursuing differentiation strategies were more actively involved with SR-SCM. Longoni and Cagliano (2015) revealed that price-oriented firms were less committed to environmental and social sustainability priorities. There is a large gap of SCM research focusing explicitly on the connection between competitive strategy and environmental dimension of sustainability. It is also necessary to extend the examination from manufacturers to broader operational contexts.

Finland could be considered an interesting source of data. An international panel of experts expected that demand for green logistics services will increase in the Baltic Sea Region by 2025 due to regulation and end customer requirements (Ojala et al., 2013). Previous research has shown that there are Finnish consumers who are willing to pay more for a sustainable product (Bask et al., 2013). For these reasons Finnish firms are paying increasing attention to environmental issues. More than 70 % of respondents in the Finland State of Logistics 2012 survey had tried to reduce the environmental impact of their business (Solakivi et al., 2012). Nevertheless, Pajunen et al. (2016) noticed a lack of operational level sustainability management in Finnish process and mining industries. Lintukangas et al. (2015) conclude that generally the principles of GSCM are well applied in Finnish firms but call for further research to explain how green issues are implemented. In order to address the research gaps this article examines competitive strategies and GSCM strategies in Finnish manufacturing, trading and logistics firms.

3. Methodology

3.1 Dataset

The authors collected the survey data during April-May 2014 as part of the Finland State of Logistics 2014 survey, by means of a web-based questionnaire. The sample frame comprised all non-student members of the Finnish Association of Purchasing and Logistics (LOGY), members of the Finnish Transport and Logistics association (SKAL), and members of the Federation of Finnish Enterprises (SY) that were active in the industries covered in the survey. In order to improve the coverage of the sample, 100 largest manufacturing firms in Finland were identified and contacted by telephone asking them to answer the questionnaire. The overall response rate was 5.9 per cent.

Wagner and Kemmerling (2010) give a detailed summary of 229 survey studies in the field of logistics, including the respective response rates. Compared to their findings, the response rate of the Finland State of Logistics 2014 survey is well in line with other surveys on a similar scale. Members of SY, in particular, are typically self-employed entrepreneurs or micro-sized companies, which contributed significantly to the low response rate. Moreover, as the turnover of the used sample represents the majority of the Finnish manufacturing, trading and logistics industries, the sample can be considered to represent well these industries and the different tiers of the supply chain.

A set of procedural remedies suggested by Podsakoff et al. (2003) were applied in the questionnaire. The competitive strategy and GSCM strategy variables were placed in different phases of the survey to avoid consistency motive. To avoid the social desirability bias, respondents could choose if they wanted to give their email address and the name of the company or to remain anonymous. Content and substantive validity were addressed by using previous studies in scale development and discussing the individual items in the research group.

In order to analyse potential non-response bias, the early and late respondents were compared (Armstrong & Overton, 1977). The independent samples t-tests showed no significant differences on the two groups' perceptions of the research variables at the 0.01 level. Although the results do not reject the possibility of non-response bias, they suggest that non-response may not be a problem to the extent that the late respondents are similar to non-respondents (Armstrong & Overton, 1977).

For the purpose of this article, responses from construction, consulting and education were omitted. Construction was seen as providing more supportive functions for the multiple tiers of the supply chain. Consulting firms and teaching and research personnel were asked to express their opinion on the general level of GSCM in Finnish firms, as they would not have supply chains in the same manner as in manufacturing, trading and logistics. Furthermore, micro-sized companies were identified based on the turnover criterion in the European Commission's definition; i.e., firms with a turnover of less than two million euros. The questionnaires for these micro-sized firms did not contain GSCM related questions and were thus omitted. 11 LSPs which had not indicated which part of the value chain they are mainly serving were omitted from the analysis. Thus, the final sample comprises 382 firms of which 128 operate in manufacturing, 110 in trading and 144 in logistics services. Table 1 shows the sample demographics in terms of position in the supply chain, size and respondent's position in the firm. The majority of the companies fell in the small-sized company classification.71.5 per cent of the respondents identified themselves as the top or middle management of the firm.

Table 1 Sample demographics summary

----------Insert Table 1 here----------

3.2 Research model and variables

Several questionnaire items were constructed to measure GSCM with suppliers and with customers. To achieve content validity the measurement items were developed by using previous literature as the main source. In line with Vachon and Klassen (2006, 2008), GSCM activities with suppliers and customers were considered to consist of two types of activities: monitoring and collaboration. Using previous work (Vachon & Klassen 2006, Zhu et al. 2008, De Giovanni & Esposito Vinzi 2012), 7 measurement items for evaluating GSCM activities with suppliers and 7 measurement items for GSCM activities with customers were introduced. Each item was designed for response using a five-point Likert scale in which 1 corresponds to "strongly disagree" and 5 to "strongly agree." The two sets of items for external GSCM are identical apart from the one focusing on suppliers and the other on customers. Out of these 7 measures, 3 concentrate on environmental collaboration and the remaining 4 on environmental monitoring. The measurement set for manufacturing and trading contains an additional item related to product development. Given that this item was not considered to be relevant for LSPs, it was not included in the questionnaire of LSPs.

The scale for competitive priorities was developed using previous work by Ward and Duray (2000), Beal and Yasai-Ardekani (2000) and Krajewski et al. (2010). Furthermore, two single items measuring the importance of small environmental impacts and efficient SCM were added. The final scale consists of 13 items measuring differentiation, price and cost, the operational areas of competitive priorities, namely flexibility, quality, speed (Skinner 1969; Stock et al., 1998), and SCM and environmental impacts. The respondents were asked to assess which of the items are sources of advantage for their firm using a five-point Likert scale. Appendix 1 summarises the measurement items.

Competitive priorities were further divided into five broader categories: Cost leadership, marketing differentiation, operations differentiation, hybrid strategy, and stuck-in-the-middle. A summary of the operationalization can be found in Appendix 2.

An analysis revealed that flexibility, customization and quality were significantly correlated with variables measuring marketing differentiation and with variables measuring operations differentiation (Appendix 3). It was decided that if a respondent had given value 5 in combination with strong brand or marketing, it would be interpreted as marketing differentiation supported by these operational priorities. If a respondent was not competing with brand and marketing, and had given a value of 5 to flexibility, customization and/or quality, it was considered to represent

operational differentiation strategy. Moreover, the measurement scale comprised an item measuring wide variety and another measuring small variety. Wide variety was first reverse-recoded. Next, it was averaged with small variety to form a single variable.

Cost leadership includes firms that have given value 5 to low price and/or low cost but reach a medium or low score in other dimensions. Marketing differentiation includes firms that have given value 5 to strong brand and/or successful marketing while scoring a medium or a low value in other dimensions. Operations differentiation refers to firms that give a high value to at least one high operational capability (quality, speed, flexibility, capacity utilization, customization, SCM) but neither cost leadership and nor marketing differentiation reach a high score. Hybrid strategy includes firms that combine cost leadership with differentiation. Differentiation can be either marketing differentiation characterised by strong brand and marketing, or operations differentiation, such as quality, flexibility or speed (Hill, 1988; Stock et al., 1998; Beal & Yasai-Ardekani, 2000). Finally, a firm that does not obtain a high score in any competitive priority is considered to be stuck-in-the-middle. Following Pertusa-Ortega et al. (2009), they are firms with various combinations of medium and low values, failing to excel in any of the dimensions.

The manufacturing and trading firms were divided into different tiers of the supply chain based on the industry they operate in, using the industry classification NACE 2002 as reference. The retail (R) and wholesale (W) tiers of the value chain were considered to consist of firms that were classified as firms operating in retail and wholesale trade respectively. The manufacturing industries were divided into manufacturing of raw materials and components (M1) and manufacturing of end products (M2) based on the latest (2011) input-output tables of manufacturing in Finnish national accounts (Statistics Finland, 2015). The industries in which the majority (over 50%) of the outputs were distributed within the same industry were considered to belong to the M1 tier of the supply chain, whereas the industries where the majority (less than 50%) of the outputs were distributed outside the industry were considered to belong to the M2 tier of the supply chain.

The respondents in the logistics industry were requested to indicate which part of the supply chain they are mainly serving. Based on this questionnaire item, the LSPs were divided into four groups serving each tier in the manufacturing-trading supply chain.

The construct measuring GSCM with suppliers was used for identifying any differences between different tiers in manufacturing and trading. However, given the small firm size of the majority of the LSPs (62.5 %) in the sample, and thus their limited abilities to impose any environmental requirements on their suppliers, the items measuring GSCM with suppliers were considered unsuitable for LSPs. Instead, it was decided to use items measuring GSCM with customers to examine what are the differences in competitive and GSCM strategies between LSPs

serving different tiers in the manufacturing and trading supply chain. The research model is illustrated in Figure 1.

---------- Insert Figure 1 here----------

Figure 1 Research model

3.3. Data analysis methods

The scales for GSCM were tested for reliability using Cronbach's alpha. The scores of 0.887 and 0.864 for GSCM with suppliers and customers, respectively, demonstrate excellent scale reliability. The Cronbach's alpha value of 0.696 for competitive priorities is slightly below the threshold of 0.70 (Nunnally, 1978) but still above 0.60 considered acceptable for exploratory research (Churchill, 1979). Identification of GSCM strategies was done by means of a cluster analysis while analysis of variance (ANOVA) and cross-tabulations were used to analysing differences between groups.

4. Results

4.1. Competitive strategies

As illustrated in Table 2, the largest group of firms in manufacturing could be characterised as marketing differentiators whose competitive advantage is based on strong brand and marketing. Almost equally large group of manufacturers are operations differentiators. A hybrid strategy was pursued by 6 manufacturing firms and cost leadership by only 1 manufacturing firm. In trading, marketing differentiation is more uncommon while operations differentiation has the largest share of respondents. Compared to manufacturing, hybrid strategies are more widespread. In line with manufacturing, pure cost leadership seems to be rare. With 49 %, operations differentiation seems to be the trend in logistics services. Correspondingly, the share of marketing differentiation is the smallest among the three main industries.

Surprisingly, 27 manufacturing, 23 trading firms and 38 logistics firms stated that none of the factors was a very important source of competitive advantage, implying that these firms do not appear to have a clear competitive strategy and hence fall into the "stuck-in-the-middle" category. Interestingly, share of stuck-in-the-middle firms is also slightly larger among LSPs. A more detailed analysis of competitive strategies per tier confirms the findings (Appendix 4). For example, 65 % of LSPs serving retailers pursue operations differentiation, whereas only 29 % of raw material and component manufacturers use it.

Table 2 Competitive strategies per industry

---------- Insert Table 2 here----------

For the this article, it was decided to identify firms who considered small environmental impacts to be an important or a very important source of competitive advantage (4 or 5 in the Likert scale) as environmentally proactive. This led to a subsample of 39 manufacturing, 34 trading firms and 44 LSPs. Pearson correlations suggest that environmental proactivity is very rarely the only source of competitive advantage and it is typically combined with marketing, superior quality and capacity utilization (Appendix 3).

Table 3 presents the share of these environmentally proactive firms per each tier and per competitive strategy group. The results indicate that only 18 % of stuck-in-the-middle firms and 28 % of operations differentiators were competing with small environmental effects. In comparison, 45-50 % of firms in the other competitive strategy groups could be characterised as environmentally proactive. The share of environmentally proactive firms is the largest among LSPs serving retail (39 %), followed by LSPs serving end product manufacturers (37 %) and wholesalers (36 %). Furthermore, Tables 2 and 3 imply that the share of stuck-in-the-middle firms is lower among environmentally proactive firms compared to all firms. In addition, marketing differentiation seems to be more widespread in environmentally proactive trading firms compared to other trading firms.

Table 3 Competitive strategies of environmentally proactive firms per tier and competitive strategy

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4.2. GSCM strategies

To determine the potential differences in GSCM strategies of firms, a cluster analysis was performed. Logistics users (manufacturing and trading) and providers (LSPs) were analysed separately. Following Hair et al. (2010), both hierarchical and non-hierarchical cluster analysis methods were used. First, hierarchical cluster analysis was used to determine the candidate number of clusters. The Ward's method with squared Euclidean distance was adopted. Based on the coefficient changes in the agglomeration schedule, three- and four-cluster solutions were considered most appropriate for both manufacturing and trading as well as LSPs. Next, a K-means cluster analysis was performed to assign firms to three and four clusters. Although the ANOVA and Post Hoc Tukey's HSD and Tamhane's T2 did not indicate statistically significant results between all four clusters in terms of every measurement item, the profiles of the four clusters were considered sufficiently different and more insightful compared to the three-cluster solutions.

Hence, four clusters were formed for manufacturing and trading firms based on their GSCM practices with suppliers. The clusters were labelled low collaboration and low monitoring, average collaboration and average monitoring, average collaboration and high monitoring and high collaboration and high monitoring. Similarly, LSPs were divided into four clusters based on GSCM practices with customers, namely low collaboration and low monitoring, average collaboration and average monitoring, high collaboration and average monitoring and high collaboration and high monitoring. The ANOVA statistics and cluster means of GSCM strategies are presented in Table 4 for manufacturing and trading and in Table 5 for LSPs.

Table 4 ANOVA statistics and cluster means of environmental collaboration and monitoring of suppliers, manufacturing and trading (n = 188)

---------- Insert Table 4 here----------

Table 5 ANOVA statistics and cluster means of environmental collaboration and monitoring by customers, LSPs (n = 116)

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In manufacturing and trading 16 % of firms are characterised by low collaboration and low monitoring in their relationships with suppliers. Mean values below 2 suggest that the firms belonging to cluster 1 are neither collaborating nor monitoring their suppliers in terms of environmental issues. The largest group of manufacturing and trading firms, 38 %, belong to cluster 2, average collaboration and average monitoring. For this cluster, the average mean values for almost every measure are close to 3. However, in terms of in terms of requiring the suppliers to implement an environmental management system, these firms are similar to the inactive firms in cluster 1. The firms in cluster 3, average collaboration and high monitoring, largely resemble cluster 2 in environmental collaboration but have high mean values in for environmental monitoring. 22 % of manufacturing and trading firms that fall into this category. Firms in cluster 4 high collaboration and high monitoring (24 %) have the highest mean values for all dimensions.

With regard to LSPs, 16 % of firms report that their customers do not place a large emphasis on either environmental collaboration or environmental monitoring (cluster 1: *low collaboration and low monitoring*). The largest share of LSPs, 32 %, belongs to the cluster 2 *average collaboration and average monitoring* in which their customers pursue both environmental collaboration and monitoring to an average degree. 26 % of LSPs fall into cluster 3 *high collaboration and average monitoring.* The mean values for these firms are quite similar to clusters 2 and 4. However, contrary to these two clusters and similar to low collaboration and low

monitoring group, firms in this cluster give a below-average mean value to CUST5 and CUST6, implying that their customers are not keen on ensuring environmental compliance of sub-contractors or requiring a formal environmental management system. An equal share of LSPs, however, have the highest mean for every dimension and can thus be categorised as *high collaboration and high monitoring*.

The four clusters of manufacturing and trading (Table 6) and the four clusters of LSPs (Table 7) were cross-tabulated with the position in the supply chain in order to determine the number of different kinds of firms within each tier.

Table 6 GSCM strategies of manufacturing and trading (n = 188)

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Table 6 reports the results of the Chi-Square test and cross-tabulation of GSCM strategies and tiers in manufacturing and trading. The value of χ^2 (9) = 16.387, p = 0.059 implies significant differences association in GSCM strategies of tiers in manufacturing and trading at $p<0.10$. Low supplier collaboration and low supplier monitoring seems to be most widespread approach in retail. In wholesaling and manufacturing of end products the largest share of firms pursue average environmental collaboration and monitoring. In manufacturing of raw materials and components, the largest share of firms pursues both high collaboration and high monitoring of their suppliers.

TABLE 7 GSCM strategies of LSPs (n = 116)

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Table 7 shows the results of cross-tabulation of GSCM strategies and tiers in LSPs. For the Chi-Square test the four categories were collapsed into two new categories, LSPs serving manufacturing and LSPs serving trading, to meet the requirements for expected counts (Field, 2013). The Chi-Square test of significance does not reveal any statistically significant differences.

4.3 Competitive strategies and GSCM strategies

A Chi-Square test and cross-tabulation was used to test if there is a relationships between the competitive strategy category and the GSCM strategy cluster of a firm. Given that the number firms pursuing either cost leadership or hybrid strategies was limited, they were collapsed into one category (Field, 2013). The value of χ^2 (9) = 17.705, p = 0.039 implies a significant relationship between competitive strategies and GSCM strategies in manufacturing (Table 8). Analysis of standardised residuals indicates that significantly more ($p<0.05$) manufacturers competing with

operations than expected pursued the average collaboration and high monitoring strategy. A smaller than expected number of operations differentiators pursued high collaboration and high monitoring in their supplier relationships.

In trading, firms pursuing cost leadership/hybrid strategy are more likely to combine high environmental collaboration and high environmental monitoring. Moreover, none of these firms pursued average collaboration and average monitoring. While manufacturers competing with operations tend to monitor their suppliers, trading firms competing with operations seem to be more inactive as indicated by low collaboration and low monitoring. Furthermore, other trends can be observed. More than half of the stuck-in-the-middle firms pursue average collaboration and average monitoring.

Further analysis of environmentally proactive firms suggests that the high collaboration and high monitoring strategy of cost leaders/hybrid strategists and marketing differentiators is driven by seeking competitive advantage as 100 % and 57 % of manufacturers, and 50 % and 100 % of trading firms in these strategy groups, respectively, are also competing with small environmental impacts. Interestingly, there are firms that state to be competing with small environmental impacts but neither collaborate or monitor their suppliers environmentally. These firms might focus more on implementing internal activities rather than extending environmental sustainability upstream in the supply chain.

Table 8 Cross-tabulation of competitive strategies and GSCM strategies, manufacturing (n = 102)

---------- Insert Table 8 here----------

Table 9 Cross-tabulation of competitive strategies and GSCM strategies, trading (n = 102)

---------- Insert Table 9 here----------

Similar to manufacturing and trading, cost leadership and hybrid strategies were combined into one category for the analysis of LSPs. Furthermore, it was deemed necessary to combine low collaboration and low monitoring with average collaboration and average monitoring into a single category. Although the value of χ^2 (6) = 4.785, p = 0.572 is not statistically significant, the results seem to be in line with those of manufacturing and trading. Environmentally proactive firms appear to be more likely to form more collaborative relationship with their customers (Table 10).

TABLE 10 Cross-tabulation of competitive strategies and GSCM strategies, LSPs (n = 116)

---------- Insert Table 10 here----------

5. Discussion

This study examines the connection between competitive strategy and GSCM practices in Finnish manufacturing, trading and logistics firms. It is necessary to examine what kinds of competitive strategies firms pursue (Cousins, 2005), as it is likely to affect their GSCM practices. Our findings contribute to the broader discussion of the drivers of GSCM and provide insights of what kinds of strategic motivations firms might have to adopt environmental initiatives. The article also sheds light to what kinds of GSCM strategies firms use to manage the environmental performance of their suppliers, and whether this selection is connected to their competitive strategy.

Five competitive strategies were identified in this study: cost leadership, marketing differentiation, operations differentiation, hybrid strategy, and stuck-in-the-middle. Only a very limited number of firms appear to compete with cost leadership or a hybrid strategy. Instead, the largest group of manufacturers could be characterised as marketing differentiators competing with strong brand and marketing. Operations differentiation seems to be nearly as widespread. Trading firms and LSPs, on the other hand, compete more with operations differentiation. Given that logistics services are often non-differentiated or commoditized (Lieb & Butner, 2007), good operational capabilities are of essence (Coltman & Devinney, 2013). A further analysis of environmentally proactive firms revealed that they were more likely to be marketing differentiators, which confirms previous findings that pursuing better market image seems to be the most effective driver of GSCM practices (Testa & Iraldo, 2010).

Cluster analysis was used to classify firms based on their GSCM approach towards suppliers (manufacturing and trading) and customers (LSPs). Average environmental collaboration and average environmental monitoring is pursued by the largest share of firms in three out of four tiers in manufacturing and trading. Contrary to Brockhaus et al. (2013), retailers were found to be the most inactive tier in the present study. Many retailers are competing with operations differentiation, which was found to be positively connected with low collaboration and low monitoring among trading firms. Environmental sustainability might not be seen as a strategically important source of competitive advantage and thus not worth spending resources in extending practices outside organisational boundaries.

Although the resource dependence theory argues that more powerful supply chain members can exercise control over weaker members and favour coercive approaches (Brockhaus et al., 2013), it seems that the majority of Finnish firms favour low or average environmental monitoring of

suppliers or they combine high environmental monitoring with high environmental collaboration. There might be high mutual dependence between different tiers in Finnish manufacturing and trading. Under such conditions, cooperative relationship style leads to long term collaboration and competitive advantage (Vachon & Klassen, 2008; Caniëls et al., 2013; Brockhaus et al., 2013; Terpend & Krause, 2015). Furthermore, environmental monitoring can lead to increasing transaction costs (Seuring, 2011), exceeding those of environmental collaboration. Thus, collaboration or a combination of collaboration and monitoring could be more cost effective over a longer period of time. Traditional supply chain collaboration literature suggests that the collaboration process includes a leader whose approval is needed to initiate the collaboration (Kampstra et al., 2006). However, in Finnish manufacturing and trading there does not seem to be a tier who is clearly the leader of environmental collaboration. The results do not either provide evidence of the green bullwhip effect (Lee et al., 2014), since environmental requirements do not seem to be clearly amplified in the supply chain.

Interestingly, the results from the LSPs do not correspond to those of manufacturing and trading. Although retailers were the most inactive tier in terms if supplier collaboration and monitoring, LSPs serving retail have the highest share of firms who are subject to both high collaboration and high monitoring by customers. One reason might be that while retailers consider an approach to be collaborative, LSPs still perceive it as monitoring. Furthermore, despite one cluster of manufacturing and trading firms pursues average collaboration and high monitoring of suppliers, LSPs report that their customers do not pursue such a pure monitoring strategy with them. Manufacturing and trading firms might find passing environmental pressure to material suppliers easier compared to logistics service providers.

Finally, the relationship between competitive strategies and GSCM strategies was analysed. In manufacturing, operations differentiation was found to be connected with high level of environmental monitoring and average level of collaboration. Hajmohammad and Vachon (2016) suggest that a low level of perceived supplier sustainability risk is likely to lead to monitoring-based strategies. De Giovanni and Esposito Vinzi (2014) argue that it would not make sense for firms to spend plenty of money to environmental monitoring of suppliers without any collaboration. It seems that operations differentiators in manufacturing have tried to find a balance between the two approaches. In trading, operations differentiation was connected with lower levels of environmental supplier collaboration and monitoring. These firms are likely to have traditional, non-environmental relationships with their suppliers (De Giovanni & Esposito Vinzi, 2014).

In contrast, firms pursuing cost leadership/hybrid strategies and marketing differentiation were more likely to combine high collaboration with high monitoring. Notably, the vast majority of

these firms also compete with small environmental effects. Marketing differentiators might perceive GSCM practices as a way to charge premium prices for their green product or service offerings (see, e.g. Orsato, 2006; Wu & Pagell, 2011). Hence, the results support previous literature arguing that sustainable supply chain management has to make sense in terms of overall competitive strategy (van de Ven and Jeurissen 2005; Hoejmose et al. 2013). One possible reason is also that the risks associated with environmental non-compliance are particularly high for marketing differentiators. Previous studies have shown that the greater the level of perceived loss to the firm, the greater the likelihood that the firm will react in some way to minimise the expectation of loss (Cousins et al., 2004).

The findings also suggest that if environmental sustainability is included in the competitive strategy, the firm is more likely to choose a more complex approach in GSCM. It supports previous research (e.g. Zhu et al., 2008; Green et al., 2012a) proposing that when environmental sustainability is adopted as a strategic imperative and receives top management support, the organisation can proceed with more advanced forms of GSCM, such as environmental collaboration.

6. Conclusions

This research aimed at understanding the relationship between competitive strategy and GSCM strategy. The empirical comparison of several tiers of the supply chain using Finnish national logistics survey data shows that there is a linkage between competitive strategies and GSCM strategies. Firms pursuing marketing differentiation were more likely to compete with small environmental effects. Marketing differentiators and firms pursuing hybrid strategies tended to use more advanced GSCM strategies to manage the environmental performance of their suppliers, such as a combination of high environmental monitoring and environmental collaboration. This implies that environmental sustainability can be used to differentiate the product or service, and to obtain a price premium.

High environmental monitoring and collaboration is also a way of managing supplier sustainability risk, which might be considerably harmful to marketing differentiators. On the contrary, operations differentiators compete more with traditional operational capabilities, such as speed and flexibility, and are less affected by potential reputational losses. Hence, they are less willing to dedicate significant resources to GSCM practices. Thus, firms should define the competitive strategy of the firm and to choose the GSCM strategy accordingly.

6.1 Implications

The prevalent strategy in this study seems to be a combination of average environmental collaboration and average environmental monitoring. More complex GSCM strategies seem to be chosen mainly by firms who see small environmental effects as a source of competitive advantage. Firms should understand their position in the supply chain and the extent of mutual dependence and choose the GSCM strategy accordingly. The management in manufacturing and trading firms should notice that collaborative relationships might work better with large suppliers (Caniëls et al., 2013), and that coercive practices towards suppliers might lead to suboptimal results (Brockhaus et al., 2013). However, LSPs might have a different perception on what constitutes a collaborative relationship. Hence, a mutual understanding of the relationship is needed to ensure supplier commitment. Furthermore, LSPs might benefit from being prepared for growing environmental demands and thus avoid implementing environmental initiatives in considerably shorter time periods mandated by the customers.

Finally, managers should consider the alignment of competitive strategy and GSCM strategy. Combining environmental monitoring and collaboration in supplier relations seems to be facilitated if environmental sustainability is seen as a source of competitive advantage and an integral part of the firm's competitive strategy. On the other hand, if environmental sustainability is not a strategic imperative for a firm, it might be more reasonable to follow the lead of other members in the supply chain, such as customers, instead of using resources in overachieving. Yet, these firms need to remember that solely complying with minimum requirements may mean losing early-mover advantages, such as new customers, premium prices and maximum time to adapt to future regulatory policies.

6.2 Limitations and future research

First, the results of this study are based on survey research with a limited amount of respondents and geographical coverage only in Finland, implying limited generalizability. Future research might benefit from collecting data from other countries or by focusing on a variety of firm- or industry-specific supply chains. Second, the generic competitive strategy approach developed in this paper could be applied to other contexts. For example, it might be particularly interesting to examine whether logistics users tend to choose providers who pursue a similar type of competitive strategy.

Third, this research addresses external GSCM activities with suppliers and customers without taking firms' internal practices into account. A firm might have a high level of internal GSCM but it has not extended its focus beyond organisational boundaries. Hence, it might be interesting to compare the external GSCM strategies to the extent of internal environmental commitment. Fourth, environmental monitoring could increase transaction costs (Seuring, 2011), while early stages of

environmental collaboration might require significant start-up investments (Zhu et al., 2013). Hence, future research might address which type of GSCM practices are most effective in terms of performance. Finally, although this article gives some indications of the stringency of environmental requirements in different tiers of the supply chain, the present dataset could be complemented with data on timeline for such requirements in order to explore if evidence on the green bullwhip effect can be found.

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FIGURE 1 Research model

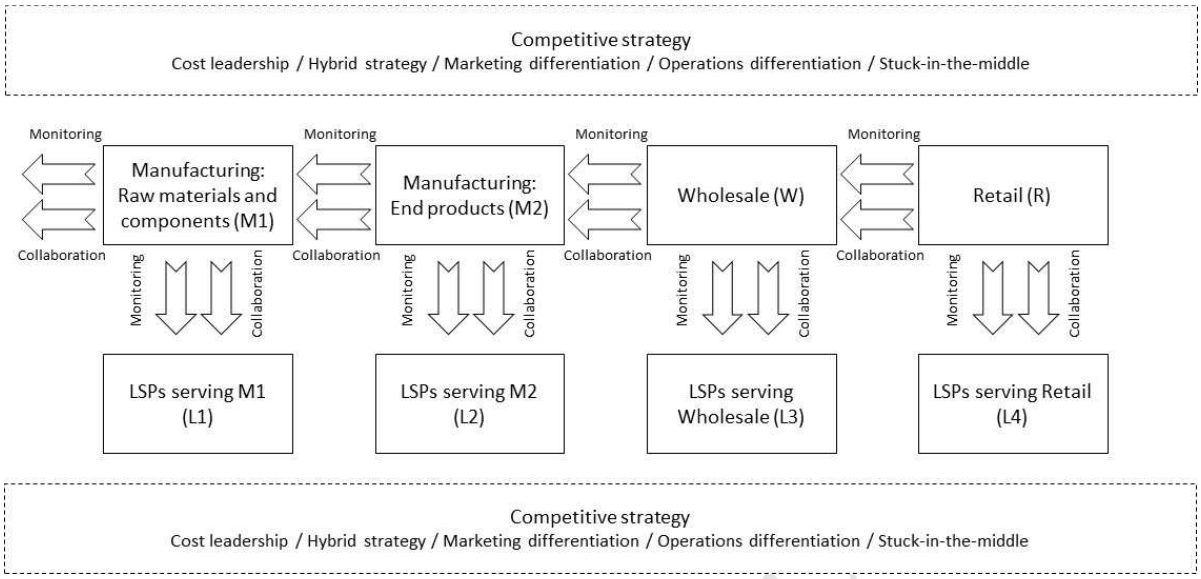

Table 1

		Firm size		
	Total	Small	Medium	Large
Tier				
Manufacturing: raw materials, components (M1)	74 (19.4 %)	26 (35.1 %)	15 (20.3 %)	33 (44.6 %)
Manufacturing: End products (M2)	54 (14.1 %)	24 (44.4 %)	9 (16.7 %)	21 (38.9 %)
Wholesale (W)	56 (14.7 %)	29 (51.8 %)	14 (25.0 %)	13 (23.2 %)
Retail (R)	54 (14.1 %)	40 (74.1 %)	4 (7.4 %)	10 (18.5 %)
LSPs serving mainly M1 (L1)	31 (8.1 %)	26 (83.9 %)	4 (12.9 %)	1 (3.2 %)
LSPs serving mainly M2 (L2)	57 (14.9 %)	37 (64.9 %)	10 (17.5 %)	10 (17.5 %)
LSPs serving mainly Wholesale (L3)	38 (9.9 %)	18 (47.4 %)	8 (21.1 %)	12 (31.6 %)
LSPs serving mainly Retail (L4)	18 (4.7 %)	9 (50.0 %)	6 (33.3 %)	3 (16.7 %)
Total	382 (100 %)	209	70	103
Respondent's position in the firm				
Top management	144 (37.7 %)			
Middle management	129 (33.8 %)			
Operational staff	56 (14.7 %)			
Expert	35 (9.2 %)			
Other	3 (0.8 %)			
N/A	15 (3.9 %)			

Table 2

	Cost leadership	Marketing differentiation	Operations differentiation	Hybrid strategy	Stuck-in-the-middle
Manufacturing	1 (1 %)	45 (37 %)	43 (35 %)	6 (5 %)	27 (22 %)
Trading	3 (3 %)	28 (27 %)	39 (38 %)	11 (11 %)	23 (22 %)
LSPs	2 (1 %)	23 (16 %)	69 (49 %)	9 (6 %)	38 (27 %)

$\chi^2 = 19.134$, $p = 0.014$, $df = 8$

Table 3

	Cost leadership	Hybrid	Marketing differentiation	Operations differentiation	Stuck-in-the-middle	Environmentally proactive firms, % of all firms within tier
Manufacturing: raw materials, components (M1)	0 (0 %)	1 (4%)	13 (54 %)	8 (33 %)	2 (8 %)	32 %
Manufacturing: End products (M2)	0 (0 %)	1 (7 %)	6 (40 %)	6 (40 %)	2 (13 %)	28 %
Wholesale (W)	2 (10 %)	4 (20 %)	8 (40 %)	6 (30 %)	0 (0 %)	36 %
Retail (R)	0 (0 %)	2 (14 %)	5 (36 %)	4 (29 %)	3 (21 %)	26 %
LSPs serving M1 (L1)	0 (0 %)	0 (0 %)	1 (14 %)	5 (71 %)	1 (14 %)	23 %
LSPs serving M2 (L2)	0 (0 %)	2 (10 %)	7 (33 %)	6 (29 %)	6 (29 %)	37 %
LSPs serving Wholesale (L3)	0 (0 %)	2 (22 %)	2 (22 %)	4 (44 %)	1 (11 %)	24 %
LSPs serving Retail (L4)	1 (14 %)	1 (14 %)	1 (14 %)	3 (43 %)	1 (14 %)	39 %
Environmentally proactive firms, % of all firms within strategy group	50 %	50 %	45 %	28 %	18 %	

Table 4

	Cluster 1 (n = 31) *Low collaboration and low monitoring*	Cluster 2 (n = 71) *Average collaboration and average monitoring*	Cluster 3 (n = 41) *Average collaboration and high monitoring*	Cluster 4 (n = 45) *High collaboration and high monitoring*		
	Mean	Mean	Mean	Mean	F-value	p-value
SUPPL1	1.61 (2, 3, 4)	3.24 (1, 4)	2.95 (1, 4)	4.16 (1, 2, 3)	84.127	< 0.001
SUPPL2	1.61 (2, 3, 4)	3.01 (1, 4)	3.10 (1, 4)	3.98 (1, 2, 3)	66.471	< 0.001
SUPPL3	1.74 (2, 3, 4)	3.08 (1, 4)	2.90 (1, 4)	4.11 (1, 2, 3)	89.764	< 0.001
SUPPL4	1.52 (2, 3, 4)	2.72 (1, 3, 4)	3.17 (1, 2, 4)	4.11 (1, 2, 3)	94.672	< 0.001
SUPPL5	1.45 (2, 3, 4)	3.10 (1, 3, 4)	4.02 (1, 2, 4)	4.40 (1, 2, 3)	138.363	< 0.001
SUPPL6	1.19 (2, 3, 4)	2.79 (1, 3, 4)	3.80 (1, 2, 4)	4.22 (1, 2, 3)	149.057	< 0.001
SUPPL7	1.13 (2, 3, 4)	2.07 (1, 3, 4)	3.59 (1, 2)	3.60 (1, 2)	84.361	< 0.001

Number in parentheses indicate clusters that are different at $p<0.05$ using Tukey's HSD and Tamhane's T2

Table 5

	Cluster 1 (n = 19)	Cluster 2 (n = 37)	Cluster 3 (n = 30)	Cluster 4 (n = 30)		
	Low collaboration and low monitoring	*Average collaboration and average monitoring*	*High collaboration and average monitoring*	*High collaboration and high monitoring*		
	Mean	Mean	Mean	Mean	F-value	p-value
CUST1	2.47 (2, 3, 4)	3.43 (1, 3, 4)	3.93 (1, 2)	4.37 (1, 2)	25.686	< 0.001
CUST2	2.00 (2, 3, 4)	3.08 (1, 3, 4)	3.73 (1, 2, 4)	4.37 (1, 2, 3)	42.486	< 0.001
CUST3	1.53 (2, 3, 4)	3.00 (1, 4)	2.70 (1, 4)	4.23 (1, 2, 3)	46.199	< 0.001
CUST4	1.89 (2, 3, 4)	3.73 (1, 4)	3.53 (1, 4)	4.57 (1, 2, 3)	44.871	< 0.001
CUST5	1.74 (2, 3, 4)	3.43 (1, 4)	2.83 (1, 4)	4.43 (1, 2, 3)	43.839	< 0.001
CUST6	1.21 (2, 4)	3.27 (1, 3, 4)	1.47 (2, 4)	3.93 (1, 2, 3)	97.036	< 0.001

Number in parentheses indicate clusters that are different at $p<0.05$ using Tukey's HSD and Tamhane's T2

Table 6

	Low collaboration and low monitoring	*Average collaboration and average monitoring*	*Average collaboration and high monitoring*	*High collaboration and high monitoring*
Manufacturing: raw materials, components (M1)	5 (8.5 %)	18 (30.5 %)	17 (28.8 %)	19 (32.2 %)
Manufacturing: End products (M2)	7 (15.6 %)	20 (44.4 %)	11 (24.4 %)	7 (15.6 %)
Wholesale (W)	7 (15.2 %)	20 (43.5 %)	9 (19.6 %)	10 (21.7 %)
Retail (R)	12 (31.6 %)	13 (34.2 %)	4 (10.5 %)	9 (23.7 %)
n = 188				

$\chi^2 = 16.387$, $p = 0.059$, $df = 9$

Table 7

	Low collaboration and low monitoring	*Average collaboration and average monitoring*	*High collaboration and average monitoring*	*High collaboration and high monitoring*
LSPs serving M1 (L1)	6 (24.0 %)	6 (24.0 %)	8 (32.0 %)	5 (20.0 %)
LSPs serving M2 (L2)	5 (10.2 %)	21 (42.9 %)	12 (24.5 %)	11 (22.4 %)
LSPs serving Wholesale (L3)	5 (17.9 %)	7 (25.0 %)	8 (28.6 %)	8 (28.6 %)
LSPs serving Retail (L4) n = 116	3 (21.4 %)	3 (21.4 %)	2 (14.3 %)	6 (42.9 %)

$\chi^2 = 3.164$, $p = 0.367$, $df = 3$ [a]

[a] L1 and L2; L3 and L4 collapsed into two categories for the X^2 test

Table 8

	Low collaboration and low monitoring	*Average collaboration and average monitoring*	*Average collaboration and high monitoring*	*High collaboration and high monitoring*	*Total*
Cost leadership/Hybrid	1 (16.7 %)	4 (66.7 %)	0 (0 %)	1 (16.7 %)	6 (100 %)
of which environmentally proactive	0 (0 %)	1 (25 %)	0 (0 %)	1 (100 %)	2 (33 %)
Marketing differentiation	6 (16.7 %)	8 (22.2 %)	8 (22.2 %)	14 (38.9 %)	36 (100 %)
of which environmentally proactive	2 (33 %)	3 (38 %)	2 (25 %)	8 (57 %)	15 (42 %)
Operations differentiation	4 (10.8 %)	14 (37.8 %)	15 (40.5 %)	4 (10.8 %)	37 (100 %)
of which environmentally proactive	1 (25 %)	6 (43 %)	4 (27 %)	2 (50 %)	13 (35 %)
Stuck-in-the-middle	1 (4.3 %)	11 (47.8 %)	4 (17.4 %)	7 (30.4 %)	23 (100 %)
of which environmentally proactive	0 (0 %)	1 (9 %)	2 (50 %)	0 (0 %)	3 (13 %)

n = 102

$\chi^2 = 17.705$, $p = 0.039$, $df = 9$

Table 9

	Low collaboration and low monitoring	*Average collaboration and average monitoring*	*Average collaboration and high monitoring*	*High collaboration and high monitoring*	*Total*
Cost leadership/Hybrid	2 (16.7 %)	0 (0 %)	4 (33.3 %)	6 (50 %)	12 (100 %)
of which environmentally proactive	1 (50 %)	0 (0 %)	3 (75 %)	3 (50 %)	7 (58 %)
Marketing differentiation	1 (4.3 %)	13 (56.5 %)	3 (13 %)	6 (26.1 %)	23 (100 %)
of which environmentally proactive	0 (0 %)	2 (16 %)	3 (100 %)	6 (100 %)	11 (48 %)
Operations differentiation	13 (43.3 %)	10 (33.3 %)	3 (10 %)	4 (13.3 %)	30 (100 %)
of which environmentally proactive	2 (15 %)	2 (20 %)	1 (33 %)	2 (50 %)	7 (23 %)
Stuck-in-the-middle	2 (13.3 %)	8 (53.3 %)	3 (20 %)	2 (13.3 %)	15 (100 %)
of which environmentally proactive	0 (0 %)	2 (25 %)	0 (0 %)	0 (0 %)	2 (13 %)
n = 80					

$\chi^2 = 26.469$, $p = 0.002$, $df = 9$

Table 10

	Low collaboration and low monitoring/ Average collaboration and average monitoring	*High collaboration and average monitoring*	*High collaboration and high monitoring*	*Total*
Cost leadership/Hybrid	2 (25.0 %)	3 (14.3 %)	3 (37.5 %)	8 (100 %)
of which environmentally proactive	0 (0 %)	2 (67 %)	2 (67 %)	4 (50 %)
Marketing differentiation	10 (47.6 %)	3 (14.3 %)	8 (38.1 %)	21 (100 %)
of which environmentally proactive	3 (30 %)	0 (0 %)	7 (88 %)	10 (48 %)
Operations differentiation	27 (49.1 %)	16 (29.1 %)	12 (21.8 %)	55 (100 %)
of which environmentally proactive	3 (11 %)	9 (56 %)	2 (17 %)	14 (25 %)
Stuck-in-the-middle	16 (51.6 %)	8 (25.8 %)	7 (22.6 %)	31 (100 %)
of which environmentally proactive	7 (44 %)	0 (0 %)	2 (29 %)	9 (29 %)
n = 116				

$\chi^2 = 4.785$, $p = 0.572$, $df = 6$

Appendix 1

		Mean	St. Dev.
	GSCM with suppliers		
Collaboration	SUPPL1 We have worked together with our suppliers to take environmental issues into account in product design	3.14	1.069
Collaboration	SUPPL2 We have developed our deliveries to be more environmentally friendly with our suppliers.	3.31	1.084
Collaboration	SUPPL3 Our company and our suppliers have a clear mutual understanding of responsibilities in environmental issues.	3.27	1.038
Monitoring	SUPPL4 We have used environmental impacts as an essential criterion in supplier selection.	3.04	1.053
Monitoring	SUPPL5 We have asked our suppliers for information on their environmental compliance.	3.30	1.197
Monitoring	SUPPL6 We have demanded our suppliers to ensure the environmentally friendly practices of second-tier suppliers.	3.07	1.229
Monitoring	SUPPL7 We have demanded our suppliers to implement an environmental management system (eg. ISO 14000, EMAS)	2.48	1.246
	GSCM with customers		
Collaboration	CUST1 We have developed our deliveries to be more environmentally friendly with our customers.	3.66	0.985
Collaboration	CUST2 Our company and our customers have a clear mutual understanding of responsibilities in environmental issues.	3.41	1.101
Monitoring	CUST3 Our customers have used environmental impacts as an essential criterion in supplier selection.	3.04	1.197
Monitoring	CUST4 Our customers have asked us for information on our environmental compliance.	3.60	1.188
Monitoring	CUST5 Our customers have demanded us to ensure the environmentally friendly practices of our suppliers.	3.24	1.252
Monitoring	CUST6 Our customers have demanded us to implement an environmental management system (eg. ISO 14000, EMAS)	2.59	1.328
	Sources of competitive advantage		
	COMP1 Supply chain management	3.87	0.891
	COMP2 Brand	3.84	0.933
	COMP3 Wide variety	3.76	0.944
	COMP4 Customization	4.13	0.920
	COMP5 Marketing	3.19	0.895
	COMP6 Price	2.63	0.970
	COMP7 Cost	3.05	1.051
	COMP8 Small variety	2.77	1.015
	COMP9 Capacity utilization	3.69	0.893
	COMP10 Superior quality	3.80	0.832
	COMP11 Speed	3.92	0.862
	COMP12 Flexibility	4.16	0.863
	COMP13 Small environmental impacts	3.28	0.889

Appendix 2

Construct	Measurement
Cost leadership	COMP6 Price = 5; and/or
	COMP7 Cost = 5
Marketing differentiation	COMP2 Brand = 5; and/or
	COMP5 Marketing = 5
Operations differentiation	COMP1 Supply chain management = 5; and/or
	COMP9 Capacity utilization = 5; and/or
	COMP10 Superior quality = 5; and/or
	COMP11 Speed = 5; and/or
	COMP12 Flexibility = 5
Hybrid strategy	Cost leadership and
	marketing differentiation or operations differentiation
Stuck-in-the-middle	All measurement items <5

Scale: 1 = lowest, 5 = highest

Appendix 3 Pearson correlation coefficients for competitive strategy measures

	SCM	BRAND	MARKETING	CUSTOM	PRICE	COST	VARIETY	CAPACITY	QUALITY	SPEED	FLEX	ENVIRONMENT
SCM	1.000											
BRAND	0.213**	1.000										
MARKETING	0.117*	0.395**	1.000									
CUSTOMIZATION	0.233**	0.126	0.196**	1.000								
PRICE	0.066	-0.142**	-0.063	0.016	1.000							
COST	0.180**	-0.060	0.037	0.073	0.428**	1.000						
VARIETY	-0.061	-0.253**	-0.079	-0.103	0.137**	0.269**	1.000					
CAPACITY	0.415**	0.118*	0.094	0.171**	0.075	0.284**	0.029	1.000				
QUALITY	0.337**	0.337**	0.293**	0.354**	-0.063	0.009	-0.169**	0.261**	1.000			
SPEED	0.390**	0.078	0.133*	0.367**	0.010	0.149**	0.006	0.327**	0.433**	1.000		
FLEXIBILITY	0.282**	0.016	0.148**	0.484**	0.009	0.173**	0.028	0.238**	0.407**	0.683**	1.000	
ENVIRONMENT	0.189**	0.200**	0.275**	0.152**	0.092	0.086	-0.144**	0.269**	0.272**	0.175**	0.134**	1.000

* Correlation is significant at the 0.05 level ** Correlation is significant at the 0.01 level

Appendix 4 Competitive strategies per tier

	Frequency							
	M1	M2	W	R	L1	L2	L3	L4
Cost leadership	0 (0 %)	1 (2 %)	3 (6 %)	0 (0 %)	1 (3 %)	0 (0 %)	0 (0 %)	1 (6 %)
Hybrid strategy	2 (3 %)	4 (8 %)	6 (11 %)	5 (10 %)	1 (3 %)	2 (4 %)	5 (13 %)	1 (6 %)
Marketing differentiation	28 (41 %)	17 (32 %)	16 (29 %)	12 (25 %)	4 (13 %)	12 (21 %)	5 (13 %)	2 (12 %)
Operations differentiation	20 (29 %)	23 (43 %)	19 (34 %)	20 (42 %)	11 (37 %)	28 (50 %)	19 (50 %)	11 (65 %)
Stuck-in-the-middle	19 (28 %)	8 (15 %)	12 (21 %)	11 (23 %)	13 (43 %)	14 (25 %)	9 (24 %)	2 (12 %)

- External GSCM practices of different tiers in the supply chain are identified
- GSCM strategies are compared to competitive strategies
- 128 manufacturing, 110 trading and 144 logistics firms in Finland are analysed
- There are differences in GSCM strategies between tiers
- Marketing differentiation is connected with high levels of GSCM, operations differentiation with low levels