Sustainable supply management as a purchasing capability: A power and dependence perspective

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Purpose
Uses the relative power and total interdependence concepts as an intervening theoretical lens to explain why and how sustainable supply management initiatives by manufacturing firms differ across the Kraljic matrix according to purchasing capability.

Design/methodology/approach
Tested hypotheses by subjecting survey data from 338 manufacturers on buyer-supplier relationships in Europe and North America to regression analysis.

Findings
Shows three situations where relative power and total interdependence determine the effectiveness of purchasing capabilities. First, sustainability programs impact supplier compliance in all Kraljic categories but bottleneck items. Second, there are significant trade-offs between lower cost and higher social and environmental supplier compliance for noncritical components. Third, strategic alignment of sustainability objectives between corporate and supply function levels only leads to improved financial performance for strategic components.

Research implications
Further research could take power and dependence into account to explain when and how purchasing capabilities focused on sustainability can be achieved.

Practical implications
Shows how supply strategists could devise tailored approaches for different purchasing categories with respect to power and dependence when pursuing economic, social and environmental objectives in combination—the triple bottom line—along their supply chains.

Originality/value
Illustrates and provides a theoretical explanation for why sustainable supply management is a purchasing capability that must vary across purchasing categories defined by different situations of power and dependence.

Keywords: sustainability, supply strategy, procurement/purchasing/supply management processes, survey methods, IPS International Purchasing Survey, regression analysis.

Article classification: Research paper

SUSTAINABLE SUPPLY MANAGEMENT AS A PURCHASING CAPABILITY: A POWER AND DEPENDENCE PERSPECTIVE

INTRODUCTION

Sustainable supply management (SSM) is increasingly becoming a major managerial problem for supply strategists. Cost-cutting efforts drive firms to relocate production to geographic regions around the world where labor costs are lower and working conditions and care for the environment are often neglected. At the same time, these firms claim that they intend to take responsibility and strive to improve working conditions and reduce their environmental impact. The situation becomes even more complicated as production is outsourced to a greater extent to specialized contract manufacturers. As brand owners, the buying firms are still accountable for the economic, social and environmental impact of their products and services, while losing control over how these are actually produced (see, e.g., Huq et al., 2014; Walker et al., 2014).

The sustainable sourcing literature offers the advice to view SSM as a potential purchasing capability that can help a firm thrive (e.g., Paulraj, 2011; Reuter et al., 2010). Building upon the resource-based view (Barney, 1991) and in particular the dynamic capabilities view (Makadok, 2001; Teece et al., 1997), this refers to a buying firm's ability to integrate, build and reconfigure internal and external resources using organizational processes and practices to increase economic as well as social and environmental responsibility along the supply chain. With a few exceptions (e.g., Krause et al., 2009; Pagell et al., 2010), however, the previous sustainable sourcing literature tends to make sweeping statements about purchasing activities in general without greater discernment of individual differences among purchasing categories.

Krause et al. (2009) reflect on the relationship between purchasing management and SSM by drawing from Kraljic's (1983) seminal article on how "purchasing must become supply management." They argue that if SSM is viewed as a purchasing capability for the buying firm, and supplier selection decisions are being made to reflect that priority, then Kraljic's work, if used by these managers, needs to be critically reassessed, adapted or perhaps replaced. An example of this is the case study by Pagell et al. (2010), who observed that a number of purchasing managers implementing SSM were not developing relationship strategies in the manner Kraljic suggested. They found organizations buying leveraged commodities in a way that would be more appropriate for strategic suppliers.

Our intention with this paper is to further the work of Krause et al. (2009) and Pagell et al. (2010). Thus, we assert in a similar vein to Reuter et al. (2010) and Paulraj (2011) that SSM

can be developed into a purchasing capability that can help a firm thrive. However, such purchasing capability development has to take into consideration individual differences across purchasing categories, as Krause et al. (2009) and Pagell et al. (2010) suggest. The Kraljic matrix is often used to serve this purpose. Although conceptually appealing and often used in industrial practice, Kraljic's matrix is a practitioners' tool that lacks the scientific rigor to support further theory development (Gelderman and van Weele, 2003). In order to enable theory development and move the field forward in a meaningful way, we therefore follow the example of Caniëls and Gelderman (2005, 2007) and use the notions of power and dependence as an intervening theoretical lens.

The purpose of this study is to illustrate and provide a theoretical explanation for why SSM is a purchasing capability that must vary across purchasing categories defined by different situations of power and dependence. This will, among other things, help in pursuing economic, social and environmental objectives in combination—the triple bottom line—along the supply chain. For example, we can gain understanding of when trade-off and synergistic effects, respectively, will occur among these three objectives, which recently has been discussed as a future research direction (Walker et al., 2014). The study fills a gap in the literature by taking a power and dependence perspective on viewing SSM as a purchasing capability. The basic scientific idea is to use power and dependence as an intervening theoretical lens to explain why and how SSM initiatives differ, from a buying firm point of view, across the Kraljic matrix in three aspects that are relevant to viewing SSM as a purchasing capability.

First of all, we look at how heterogeneity in the implementation of management practices correlates with improved performance (Ketokivi and Schroeder, 2004). In the present study, management practices refer to socially and environmentally sustainable sourcing programs. The second aspect is the necessity of trade-offs among competitive priorities (Boyer and Lewis, 2002; Skinner, 1969, 1974). In this study, sustainable development is considered a competitive priority for supply management. Thirdly, we examine the alignment of functional competitive priorities with overall firm competitive strategies (González-Benito, 2007). Our study investigates the alignment of sustainability priorities and their impact on a firm's financial performance. Moreover, we also test our hypotheses through a novel survey approach that spans all four quadrants in the Kraljic matrix, in contrast to the previously mentioned case-based research, which has focused on leverage items only (Pagell et al., 2010).

THEORETICAL BACKGROUND AND HYPOTHESES

SSM as a purchasing capability

According to the report of the Brundtland Commission, sustainable development refers to meeting the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). In more concrete terms, this has come to span three different areas; namely, people, planet and profit, also known as the triple bottom line (Elkington, 1997). Elkington's idea is that firms should also measure themselves on the impact their operations have on the surrounding society and environment, and not just the traditional financial returns they generate for their owners. This enjoys broad acceptance in the operations and supply chain management literature (see, e.g., Blome et al., 2014; Brammer and Walker, 2011; Carter and Rogers, 2008; Fabbe-Costes et al., 2014; Giovanni, 2012; Jeffers, 2010; Pullman et al., 2009; Roehrich et al., 2014; Seuring and Müller, 2008; Wu and Pagell, 2011) and involves actions such as ensuring that suppliers refrain from using child labor or polluting the environment with hazardous chemicals.

However, ensuring supplier compliance with social and environmental standards requires major efforts. The firm, and especially the purchasing function, needs to develop a capability to ensure this compliance (Barney, 1991; Makadok, 2001; Teece et al., 1997). In earlier and closely related research, this is just referred to as supplier selection and development processes (see, e.g., Reuter et al., 2010). In order to move the field forward, we argue for a further qualification of the concept. We suggest that SSM as a purchasing capability can be defined as a buying firm's ability to integrate, build and reconfigure internal and external resources using organizational processes to increase economic returns as well as social and environmental responsibility along the supply chain. Our suggested definition is based on three premises.

The first premise concerns implementation of social and environmental improvement programs that aim to increase supplier compliance. From a resource-based view, heterogeneity in implementation of certain management practices correlates with improved performance (Ketokivi and Schroeder, 2004). The reason is that these specific practices are subject to inimitability and causal ambiguity and are context-specific, so they offer value for the firm that uses them. Furthermore, these practices are embedded in a system of organizational behavioral routines, and these complementarities provide higher contingent value from the implemented practice (Bessant et al., 2001). We propose that social and environmental improvement programs that aim to increase supplier compliance are examples of such practices (Blome et al., 2014; Prajogo et al., 2014; Pullman et al., 2009).

The second premise concerns the necessity for trade-offs among competitive priorities (Skinner, 1969). The idea originated in the early works of Skinner, who claimed that operations are technologically constrained systems and therefore cannot have it all. In order to compete successfully in a particular market, firms consequently have to prioritize among a set of competitive priorities in developing operating capabilities to meet those particular market needs. Initially, four competitive priorities were suggested: cost, quality, delivery and flexibility. In later works, Krause et al. (2009) provide a similar notion of competitive priorities for supply and add innovation and sustainable development as additional priorities. We suggest that as sustainable development is emphasized as a competitive priority for supply management, cost reduction becomes compromised due to significant implementation costs (see, e.g., Andersen and Skjoett-Larsen, 2009; Wu and Pagell, 2011).

The third premise concerns the alignment of the purchasing function's competitive priorities with overall firm competitive strategies for improved business performance (González-Benito, 2007; Koufteros et al., 2012). The underlying rationale is that the capabilities of the supplier are viewed as resources for the buyer. If firms increasingly include sustainability in their overall business strategies, sustainable development has to become a competitive priority for supply, manifested through the purchasing function's supplier selection and development decisions. We propose that firms that emphasize sustainability in their overall business strategies and also are able to reflect sustainable development in their selection and development of suppliers are more profitable (Krause et al., 2009).

In revisiting Elkington's triple-bottom-line framework, the first premise above reflects buyers that strive to take his social and environmental pillars into account, while the second and third premises reflect how such a pursuit impacts his economic pillar, with cost trade-offs in some occasions and positive synergistic financial effects in others.

Enforcing SSM through power and dependence

So far, we have defined SSM as a purchasing capability, and furthermore developed three premises and related propositions on which the definition is based. Remaining now is to add a power and dependence perspective to these premises and propositions to complete the framework. We choose this perspective because a firm is no more sustainable than its supply chain and therefore has to exploit its full buying and bargaining power to promote and ensure sustainable development along its supply chain (Krause et al., 2009). Exploiting a firm's full buying and bargaining power is a matter of developing distinct purchasing strategies for

different categories of purchased items (Kraljic, 1983; Caniëls and Gelderman, 2005; Gelderman and Van Weele, 2003).

The classification of different categories of purchased items and their distinct purchasing strategies has its theoretical basis in the notions of power and dependence (Caniëls & Gelderman, 2005, 2007). Although the short term "power and dependence" is often used for simplicity's sake, power actually refers to *relative power*, dependence to *total interdependence*. Caniëls and Gelderman define the relative power of an organization over another as the result of the net dependence of the one on the other. If A depends on B more than B depends on A, then B has power over A. Caniëls and Gelderman's definition builds on the work of Pfeffer (1981), which we also adhere to in this study. Moreover, Caniëls and Gelderman define total interdependence as the intensity of a buyer-supplier relationship. They build on the work of Bacharach and Lawler (1981) and Geyskens et al. (1996). According to Caniëls and Gelderman, a high level of total interdependence is an indicator of a strong, cooperative and long-term relationship in which both parties have invested. Both partners are furthermore faced with high exit barriers; mutual trust and mutual commitment characterize these relationships. We will use this perspective to specify the purchasing categories of Kraljic (1983).

Power and dependence in Kraljic's matrix

Purchased items are usually classified according to the following typology of four main purchasing categories (Kraljic, 1983).

1. Leverage items, which have high profit impact and low supply risk. Buying firms dominate the market, and the purchasing strategy for this category is to achieve economies of scale through large purchasing volumes. Buyer dominance is high in terms of relative power, since buying power is actively used to get better deals with interchangeable suppliers. Total interdependence is moderate because the buyer's dependence is quite low while the supplier's dependence is high.

2. Strategic items, which have high profit impact and high supply risk. The purchasing strategy for this category is to develop long-term, close, collaborative relationships with the suppliers, which furthermore should be seen as natural extensions of the buying firm. The relationship is balanced in terms of relative power, since buyers and suppliers are both heavily involved in the partnership. Total interdependence is highest since the relationship is very intense.

3. Noncritical items, which have low profit impact and low supply risk. The purchasing strategy is to enhance purchasing power by standardization and bundling of purchasing requirements. The routine character of the transactions implies that the mutual dependence between buyers and suppliers is balanced in terms of relative power. Total interdependence is low, since the buyer's dependence and the supplier's dependence will both be quite low.

4. Bottleneck items, which have low profit impact and high supply risk. Suppliers dominate the market, and the purchasing strategy for this category is to maintain supply continuity, which usually is achieved through single sourcing and long-term contracts, as well as searching for alternatives whenever feasible. Supplier dominance is high in terms of relative power. Total interdependence is moderate, since the buyers and suppliers are not highly involved in the relationship.

Figure 1 summarizes the different power and dependence situations in the Kraljic matrix.

Insert Figure 1 approximately here

Hypothesis development

If we follow this line of thought, i.e., taking a purchasing category perspective through the theoretical lens of power and dependence, and at the same time return to our three premises, there are strong reasons to think there might be individual differences among purchasing categories when viewing SSM as a purchasing capability.

The first premise concerned implementation of sustainable sourcing programs. Overall, from a purchasing capability perspective, the main reason to implement sustainable sourcing programs is for their positive effect on social and environmental supplier compliance. However, it is most likely that these programs will work well in buyer-dominated supply markets, i.e., leverage items, and perhaps also for strategic and noncritical items. But what about bottleneck items, where the buyer is in a dependent situation and in no position to pressure the supplier to operate sustainably? (See, e.g., Krause et al., 2009, p. 21.) We expect that in this situation, supplier dependence will negatively moderate the overall positive effect, leading to significant differences between purchasing categories in the Kraljic matrix. Consequently, no positive effects of sustainable sourcing programs are likely to be found for bottleneck items, due to high supplier dependence in this category. We therefore formulate hypothesis 1 as follows:

Hypothesis 1. *Implementation of sustainable sourcing programs has a positive effect on social and environmental supplier compliance in all categories but bottleneck components.*

The second premise concerned trade-offs between sustainable development and costs, manifested in both (a) competitive priorities and (b) actual supplier performance. This might not be a problem where a close collaborative relationship is already present, as with strategic components. But what about situations like those illustrated in Pagell et al. (2010), where adversarial relationships are common as a consequence of a balanced relative power and low total interdependence, and furthermore few suppliers that take sustainability seriously are available? Sourcing of noncritical items reflects such a situation. Previous research has recommended that this typically requires a higher involvement from the supply function to ensure the level of environmental and social supplier compliance demanded (Pagell et al., 2010). But higher involvement also implies increased costs for managing the purchasing process (Andersen and Skjoett-Larsen, 2009). Thus, adversarial supplier relationships, in combination with scarce responsible suppliers, should reinforce trade-offs, leading to significant differences among Kraljic's purchasing categories. Consequently, trade-offs are most likely to be found for noncritical components, since adversarial supplier relationships are most common for this category. Earlier studies investigating trade-offs in supply management demonstrate a need to differentiate between competitive priorities (i.e., supplier selection criteria) and actual supplier performance (see e.g., Dabhilkar, 2011). Therefore, we formulate Hypothesis 2a and Hypothesis 2b as follows:

Hypothesis 2a. *There are trade-offs between social and environmental sustainability and costs manifested in competitive priorities for purchasing noncritical components.*

Hypothesis 2b. *There are trade-offs between social and environmental sustainability and costs manifested in supplier performance for noncritical components.*

The third premise concerned alignment of the purchasing function's supplier selection and development decisions with overall firm competitive strategies. For strategic suppliers that are seen as natural extensions of the buying firm and where the relationship is very intense, this seems reasonable (see, e.g., Krause et al., 2009, p. 21). But what about categories where suppliers provide the same items to many other customers? Or in more exact terms, from a

power and dependence perspective, what about cases when total interdependence is low or moderate? Then, alignment of overall firm strategic orientation with supplier selection and development decisions in the domain of sustainable development will have a positive effect on a buying firm's net profits. However, this effect is positively moderated by situations when integration of suppliers is seen as critical to the development of competitive capabilities for the buying firm, leading to significant differences among Kraljic's purchasing categories. Consequently, a positive effect is most likely to be found for strategic components, since integration of suppliers is most common for this category and total interdependence is therefore high. Accordingly, we formulate Hypothesis 3 as follows:

Hypothesis 3. *Strategic alignment of social and environmental sustainability objectives between corporate and supply function levels only leads to improved net profits for the firm buying strategic components.*

RESEARCH METHODOLOGY

Data collection and sample

Data was collected in late 2009 through the International Purchasing Survey (IPS), focusing on various purchasing and supply management practices at both the business unit level and the purchasing category level. The researchers involved collected data through the same web-administered platform, and respondents filled in the form on their own. The population frame consists of respondents that are members of professional associations, personal contacts (e.g., alumni) or commercial databases. A detailed analysis of measurement equivalence (Rungtusanatham et al., 2008) was undertaken for selected constructs across different groups of key informants with respect to country of origin, job title and sampling techniques, showing that data can be pooled in this survey (Knoppen et al., 2010).

After the data had been collected, each country cleaned the data using the same rules and procedures, in order to obtain a common database. A total of 681 respondents answered the survey. The response rate differs across the countries involved but exceeds 10% across all countries. When analyzing nonresponse, we discovered that spam filters hindered access to respondents. The web platform showed that about 50% of all respondents who clicked the link in the initial email also completed the survey, which makes us believe that the effective response rate actually is much higher than 10%. For the present study we chose a subsample of 338 firms based on two criteria. Firstly, selected firms had to have stated that they had at

least some experience implementing sustainable sourcing programs. Secondly, selected firms had to be from the manufacturing sector.

In number of full-time equivalents (FTEs) there is a large variation in the sample used for this study. The smallest firm in the subsample has 5 FTEs and the largest firm has 225 000 FTEs. The mean value is 6239 FTEs; the median value is 365 FTEs. Data from ten countries were used. Numbers in parentheses indicate frequency: Italy (30), Netherlands (30), United Kingdom (34), Germany (27), Spain (28), Sweden (100), Finland (26), United States (27), Canada (10) and France (26). Due to the lack of representative samples of manufacturing firms in these countries, generalizations must be made with caution. However, in all regression analyses we have controlled for firm size, industry type, level of customization and implied demand uncertainty in ancillary analyses, and our results still hold, which implies the absence of any systematic error.

Main variables

Operationalizing Kraljic's matrix: To the best of our knowledge there is only one earlier survey study that has had a purchasing category focus: the work of Caniëls and Gelderman (2005, 2007). They described the four quadrants of Kraljic's matrix to the respondent and then posed repeated questions for each quadrant. We decided to use another approach in this study, since we were uncertain about if and how Kraljic's matrix was used in participating countries and industries. Another reason for choosing a different approach is that our survey is very broad in scope, containing more than 250 items, so repeated measures would have made it overly long.

The construct that was used to single out the particular purchasing category read as follows: "All the questions in this part of the questionnaire will refer to a category of your choice. The focus of our questions now shifts from the purchasing department or function as a whole, to one purchasing category in particular. Please select a group of purchased items that are similar. This may be in terms of technical content, suppliers, or purchasing tools and techniques applied. Such a group of items may be referred to in your organization as 'article group,' 'spend category,' 'commodity' or 'subcategory.' You can pick any category you are knowledgeable about, regardless of its importance or total cost. Please choose the category such that it is relatively homogeneous in terms of products and services within the category."

In the following questions the respondent was then asked to rate several indicators concerning (Y) the category's profit impact in terms of strategic importance and (X) the supply risk in terms of the difficulty of managing the purchasing situation for the chosen

category, which mirrors the two core dimensions in the Kraljic matrix (Kraljic, 1983). In our operationalization of the category according to the Kraljic matrix we followed the example in Olsen and Ellram (1997), who divided the two core dimensions into subdimensions such as (Y1) Economic factors, (X1, X2) Product characteristics and (X3, X4, X5) Supply market characteristics. We applied confirmatory factor analysis to replicate the work of Olsen and Ellram (1997), resulting in the six components in Table 1.

Insert Table 1 approximately here

The component values are all centered around zero and have values between -4 and +4. A positive value represents higher than average profit impact or supply market complexity, whereas a negative value indicates a lower than average profit impact or supply market complexity. Every survey response was positioned in one of Kraljic's quadrants according to the following rules: (1) Leverage items = $Y1 \geq 0$ AND $Xavg < 0$; (2) Strategic items = $Y1 \geq 0$ AND $Xavg \geq 0$; (3) Noncritical items = $Y1 < 0$ AND $Xavg < 0$; (4) Bottleneck items = $Y1 < 0$ AND $Xavg \geq 0$. In total we identified 99 Leverage items, 93 Strategic items, 73 Noncritical items and 73 Bottleneck items and positioned them as shown in Figure 2.

Insert Figure 2 approximately here

An important qualifier that applies to our operationalization of Kraljic's matrix is relativity. For example, observations of categories that we have positioned in the quadrant of Strategic items are more strategic than the other categories in the data set with respect to profit impact and supply market risk. The reason for this is that we split the sample according to lower or higher values than the mean for the sample on each dimension of the Kraljic matrix, that is, profit impact and supply risk. It is difficult to determine hard dividing lines between high and low profit impact and high and low complexity. Kraljic does not provide any guidance on where to draw the line. Although it would thus be more appropriate to speak about "relatively strategic items," "relatively noncritical items," etc., for reasons of brevity we use Kraljic's labels in the remainder of this paper.

In order to check if our approach to positioning observed categories into the Kraljic matrix is valid, we analyzed each observation to see if our classification were realistic given how the respondent filled in all the other questions in the questionnaire. The leverage item descriptions are of quite simple and straightforward products purchased, e.g., "Standard components to the

production" and "Cut sheet and, where appropriate, including simple prefabrication." On average the category spend as percentage of total purchasing spend is higher for leverage items than for noncritical items; moreover, there are more active suppliers for leverage items than for strategic items. The strategic items are more technologically complex. For example, "Purchasing diesel engines with service and after sales support" is a typical strategic item. Noncritical items are, as expected, described as simpler types of purchased goods such as glass, metal sheets and tubes. As a bottleneck item we find, for example, CAN-bus modules for intravehicle communication in caravans. This is a complex product that has a very limited number of suppliers and could therefore serve as a typical example of a bottleneck product.

Survey Questions

Sustainable sourcing programs: The question was formulated as follows: To what extent has your company/business unit pursued the following programs in the last two years? Fourteen different programs were listed that covered a wide range of aspects such as centralization of purchasing decisions, technological collaboration with suppliers, etc. Two programs concerned sustainability, namely, environmental sustainability programs and social sustainability programs. A mean value was computed for these two. Each program was assessed through a six-point Likert-type scale ranging from "not at all" to "completely."

Category-level competitive priorities: The question was posed as follows: Please indicate to what extent management has emphasized the following priorities for the chosen category over the past two years. (Note that the objectives for this category may have been different from those emphasized for the company as a whole). Twelve different priorities were listed, covering aspects of cost, quality, delivery, innovation and sustainability. Exact formulations of items used in the analysis are provided in Table 3. Sustainability was assessed through two different items, namely reducing ecological impact for this category and improving compliance with social and ethical guidelines for this category. A mean value of these two items was computed and used in the analyses. A six-point Likert-type scale was used for each item, ranging from "not at all" to "completely."

Category performance: The question was posed as follows: Please consider current category performance—compared to management targets—for the following objectives. Twelve different objectives were listed covering aspects of cost, quality, delivery, innovation and sustainability. Exact formulations of items used in the analysis are given in Table 4. Sustainability was assessed through two different items, namely, level of environmental compliance from suppliers and level of social compliance from suppliers. A mean value of

these two items was computed and used in the analyses. A seven-point Likert-type scale was used for each item, ranging from “much worse than target” to “much better than target.”

Firm-level competitive priorities: The question was posed as follows: “Below is a list of possible competitive priorities to win customer orders. Please indicate how important or unimportant each of them is to your main customer market today.” Twelve different priorities were listed, covering aspects of cost, quality, delivery, innovation and sustainability. Sustainability was assessed through two different items, namely, ability to offer products/services with less impact on the environment and ability to offer products/services that comply with social norms on safety, child labor, bonded labor, etc. A mean value of these two items was computed and used in the analyses. A six-point Likert-type scale was used for each item ranging from “very unimportant” to “very important.”

Strategic alignment: Alignment of overall firm strategic orientation with supplier selection and development decisions in the domain of sustainable development was computed as follows:

$$Strategic\ alignment = (6 - |Firm\ level\ competitive\ priority - category\ level\ competitive\ priority|)$$

This formula is based on the seminal work of González-Benito (2007). Alignment of priorities is rewarded, while misalignment is penalized. As an example, respondents who state that they win customer orders based on their ability to offer sustainable products/services and at the same time prioritize sustainability in their supplier selection and retention decisions are rewarded by obtaining high computed values in González-Benito’s formula. However, if respondents claim that sustainability is important to win orders but fail to prioritize this when selecting suppliers, they will obtain low values in González-Benito’s formula. The variables Firm-level competitive priority and Category-level competitive priority are measured as described in the above sections.

Net profits: The question was posed as follows: In relation to the following indicators, please rate your company/business unit in comparison to your best competitors today. Net profits is one of four financial performance indicators on the firm level. A seven-point scale is used for each indicator, ranging from “far worse” to “far better.”

Validity and reliability

Naturally, our approach raises questions about the key informant issue. Do our respondents have adequate knowledge to answer the survey questions? We believe so, since we specifically asked the respondent to select a category they are knowledgeable about, and only 15 respondents specified a job title other than Buyer, Senior Buyer, Purchasing Manager, Purchasing Director, Vice President of Purchasing or Chief Purchasing Officer. Having only one key informant per firm can be problematic in terms of common method variance. Therefore, we had to assess this issue. Following Doty and Glick (1998) and Podsakoff et al. (2003) we subjected all items of the main constructs at the same time to exploratory factor analysis with Varimax rotation. Several factors were derived that correspond to our main constructs and furthermore individually explain a significant share of unique variance. Thus, having a single rater for all constructs in the instrument is not significantly biasing the results of the study.

Content validity is defined as the degree to which the measure spans the domain of the construct's theoretical definition (Forza, 2002). Validity was improved in this study through literature studies that resulted in a construct book, agreement on the content adequacy among the researchers who developed the measures, as well as additional comments from practitioners when pilot-testing the instrument.

One threat to internal validity is erroneously attributing the cause of variation to a dependent variable (Forza, 2002). In order to validate the statistical relationships as well as our explanations of why our independent variables impact our dependent variables according to our three hypotheses, the authors of this paper arranged a workshop in Stockholm in collaboration with the Swedish association of purchasing and logistics professionals (SILF). Participants were purchasing professionals from major Swedish enterprises, such as Volvo, IKEA and ABB, who had experience implementing sustainable sourcing practices. Moreover, we can conclude that our results coincide with recent case study research that was undertaken independently of our study. One example of this is the situation for noncritical items, as earlier reported by Pagell et al. (2010).

External validity is defined as the extent to which results can be generalized to the wider population of studied firms. Since the response rate is low (≈10%), generalizations must be made with caution. Comparisons of early responses (within two weeks) and late responses (received within the third week or later) show no significant differences at the $p < 0.05$ level. It is therefore possible to conclude that respondents are not different from those who did not respond. The Swedish research team did follow up with nonrespondents by telephone and

found out that the two major reasons why respondents did not respond in Sweden were not receiving the survey due to effective spam filters and lack of time. No significant response bias was detected between those Swedish firms that responded and those who did not on five key questions. In ancillary analyses we have also controlled for contextual factors such as size and industry type, etc. These analyses show that our results still hold.

Construct validity is defined as whether the set of items constituting a measure faithfully represents the set of aspects of the theoretical construct measured and does not contain items that represent aspects not included in the theoretical construct (Forza, 2002). The empirical assessment of construct validity basically focuses on convergence between measures (or items of a measure) of the same construct (convergent validity) and separation between measures (or items of a measure) of different constructs (discriminant validity). Table 1 shows evidence of both convergent validity and discriminant validity as far as our operationalization of Kraljic's matrix is concerned, since high factor scores are obtained for items that a priori should load on a particular factor and low scores for items that a priori should not load on a particular factor (Olsen and Ellram, 1997). We used single items when measuring the other variables of interest in this study, and therefore it is not possible to assess construct validity for these.

Reliability is defined as the extent to which a test yields the same results on repeated trials (Forza, 2002). It is concerned with stability and consistency in measurement; lack of reliability introduces random error. Reliability is assessed after data collection. One approach is the internal consistency method, where Cronbach's alpha is assessed. Tests show that our scales obtained values in the range of 0.41 to 0.81. Thus, some values are clearly below and others clearly exceed the recommended threshold value of 0.60 for new scales according to Nunnally (1978). This needs to be taken into account when drawing conclusions; and the need for reliability suggests further research.

RESULTS

In order to test hypotheses, the data was subjected to regression analysis. We found support for Hypothesis 1. Results are shown in Table 2. Implementation of sustainable sourcing programs has a positive effect on category performance in terms of social and environmental supplier compliance, which is shown in the column "All categories," where the whole sample is used. The standardized beta coefficient is significant on the 1% level ($\beta = 0.27$, $p < 0.01$). Moreover, as the regression analysis is run separately for every quadrant in the Kraljic matrix, the analysis shows that compliance is difficult to obtain for Bottleneck items, which is the situation when supplier dependence is most significant and total interdependence is moderate.

Insert Table 2 approximately here

We find partial support for the trade-off hypotheses, that is, no support for Hypothesis 2a but strong support for Hypothesis 2b. A granular level of analysis is required to discern trade-offs; results are shown in Tables 3 and 4. In Table 3 competitive priorities for supply are used (relating to Hypothesis 2a) and in Table 4 category performance indicators are used (relating to Hypothesis 2b) to assess trade-offs through regression analysis. Significant negative beta values would indicate trade-offs (see, e.g., Boyer and Lewis, 2002). Table 3 shows that purchasing managers do not perceive any priority trade-offs between social and environmental sustainability and lower costs. On the contrary, sustainability has apparently turned into an order qualifier. Our interpretation is based on the fact that there are no negative significant statistical relationships between reducing unit prices for the purchased product or service and social and environmental sustainability as a competitive priority for supply.

Insert Table 3 approximately here

However, when analyzing category performance a clear trade-off can be discerned for Noncritical components, as shown in Table 4. There is a significant negative relationship between social and environmental sustainability and the cost of managing the purchasing process for Noncritical components ($\beta = -0.33$, $p = < 0.01$), which is the situation of balanced relative power and low total interdependence.

Insert Table 4 approximately here

The results indicate that the difference between competitive priorities (Table 3) and category performance (Table 4) reflects a situation where stated priorities do not always correspond to actual performance outcomes. Some managers are simply not aware of this trade-off situation or are unable to handle it (see, e.g., discussion by González-Benito (2007) on purchasing efficacy).

We find support for Hypothesis 3. Results are shown in Table 5. It is not possible to generalize over all purchasing categories regarding the importance of strategic alignment of social and environmental sustainability objectives. Alignment of overall firm business strategies and purchasing function's supplier selection and development criteria is only relevant for Strategic items, where relative power is balanced and total interdependence is highest.

Insert Table 5 approximately here

DISCUSSION

A firm is no more sustainable than its supply chain, and as buying firms increasingly become accountable for the products they sell while losing control over how they are actually produced due to global macro-trends such as global sourcing, SSM grows into an important purchasing capability to develop.

For the most part, existing sustainable sourcing literature oversimplifies the issues involved. It does not take a power and dependence perspective and therefore tends to make sweeping statements about purchasing activities in general. Through our novel survey research approach that collected data spanning all four quadrants of the Kraljic matrix to reflect typical (and different) power and interdependence situations, we are able to extend previous literature. In particular, we show that a differentiation between purchasing categories that reflects power and interdependence in three aspects is highly relevant when SSM is developed into a purchasing capability.

The first aspect relates to how heterogeneity in implementation of management practices correlates with improved performance (Ketokivi and Schroeder, 2004). In the present study, management practices refer to social and environmental sustainable sourcing programs. Our study shows that sustainability programs impact supplier compliance in all Kraljic categories except for bottleneck items. We suggest that a possible explanation for this is the weak bargaining situation for the buying firm vis-à-vis the supply market for bottleneck items.

Relative power is low. The buying firm is already in a dependent situation, and therefore in no position to pressure the supplier to operate sustainably. If possible, the buying firm should try to move the purchased item from the Bottleneck to either the Noncritical or the Leverage quadrant of the Kraljic matrix (Caniëls and Gelderman, 2005). It is also likely that promoting or developing industry-wide standards will aid in this situation (Krause et al., 2009).

The second aspect relates to the necessity of facing trade-offs among competitive priorities (Skinner, 1969). In the present study, sustainable development is considered a competitive priority for supply (Krause et al., 2001, 2009). The statistical computations indicate both that sustainability has become an order qualifier (as discussed in Seuring and Müller, 2008) and that implementation of sustainable sourcing practices implies cost-related trade-offs for noncritical items. Our analysis shows that there are significant trade-offs involved between achieving lower costs and higher social and environmental supplier compliance for noncritical components. We suggest that a possible explanation for this is that few suppliers at present are capable of complying with the sustainability objectives of buying firms. Therefore, arm's-length contracts that are typically used for noncritical components are no longer suitable. Instead these items must bear the costs of long-term relations and higher involvement from the supply function that follows from ensuring an increased level of environmental and social supplier compliance (Pagell et al., 2010). In other words, total interdependence is usually low for noncritical items but has to increase to ensure supplier compliance.

The third aspect relates to the alignment of overall firm competitive strategies with functional competitive priorities (González-Benito, 2007). The present study investigates alignment of sustainability priorities and the impact on firm financial performance. Our study shows that strategic alignment of sustainability objectives between the corporate and supply function levels only leads to improved financial performance when strategic components are concerned. A possible explanation is that supply chains that integrate social and environmental resources and knowledge may be more difficult to imitate, thus leading to enhanced competitiveness and firm financial performance. Significant integration of social and environmental resources and knowledge is more appropriate for strategic components where total interdependence is highest, because these are often highly customized and much more closely related to the buying firm's core competence (Prahalad and Hamel, 1990) than noncritical, leverage or bottleneck items are.

CONCLUSION

This study links Elkington's triple-bottom-line framework with supply management theory and in so doing helps the supply strategist to put Elkington's ideas into supply chain practice. In contrast to earlier SSM research, we conclude that differentiated configurations are needed to reflect the different power and dependence situations that buying firms face when pursuing economic, social and environmental objectives in combination—the triple bottom line—along their supply chains. For predictive reasons, which we explain, there are trade-offs between economic, social and environmental objectives in some power and dependence situations, and synergistic effects in others. In order to manage this balancing act, we argue, firms have to turn SSM into a purchasing capability.

In current literature, SSM as a purchasing capability is just referred to as supplier development and selection processes (see, e.g., Reuter et al., 2010). In order to move the field forward we argue for a further qualification of the concept. On the basis of earlier capability-related work (eg., Barney, 1991; Makadok, 2001; Teece et al., 1997) we suggest that SSM as a purchasing capability can be defined as a buying firm's ability to integrate, build and re-configure internal and external resources using organizational processes to increase economic returns as well as social and environmental responsibility along the supply chain.

Moreover, we also argue in this paper that such capability development has to take relative power and total interdependence into consideration. With few exceptions (i.e., Krause et al., 2009; Pagell et al., 2010) earlier SSM research tends to oversimplify the issues involved, neglecting individual differences between purchasing categories. Purchasing portfolio approaches such as the Kraljic matrix are often used to highlight differences between purchasing categories, but they lack sufficient theoretical basis. We therefore follow the example of Caniëls and Gelderman (2005, 2007) and use the notion of relative power and total interdependence as an intervening theoretical lens to explain differences between purchasing categories in pursuing the triple bottom line along the supply chain of buying firms.

The goals to ...*"integrate, build and (re-)configure internal and external resources using organizational processes"*… can have many different connotations. We give three concrete operations management examples of such capability development in this study, and while doing so, take power and dependence into consideration. First, the implementation of sustainable sourcing programs is an illustration of the concept of practice-performance relationships (Ketokivi and Schroeder, 2004). Secondly, management of supplier selection and sustainability performance illustrates the concept of trade-offs in operations (Skinner,

1974). Thirdly, alignment of firm-level sustainability strategy with purchasing competitive priorities illustrates the important link between corporate and operations strategy (González-Benito, 2007).

Thus, in pulling together our argument, we have had to synthesize three strands from the previous literature. All three are central to our argument but incomplete on their own. Hence, our contributions are to explain how these three complement each other and to support our claims with empirical evidence. The first strand is represented by the works of Reuter et al. (2010) and Paulraj (2011), who posit that SSM has to be developed into a purchasing capability but who use an incompletely developed definition of purchasing capability as well as overlook the purchasing category perspective. Secondly, we draw from the work of Krause et al. (2009), which takes a category perspective on SSM on the one hand, but overlooks capability development as well as power and dependence on the other. The third strand is the work of Gelderman and van Weele (2003), which provides the theoretical basis for differentiated relationship types in the Kraljic matrix through power and dependence but is detached from the SSM literature.

While most earlier SSM research tended to make sweeping statements concerning purchasing activities in general, this study explains how and why triple-bottom-line initiatives need to be configured differently according to different operations management practices and power and dependence situations. It is indeed a balancing act to pursue economic, social and environmental sustainability performance in combination along the supply chain. It is therefore important to understand what to expect from different practices in different power and dependence situations. For example, social and environmental sustainability compliance will be difficult to attain when implementing such programs for bottleneck components (due to supplier dominance). Higher costs for managing the purchasing process will have to be traded for noncritical components when social and environmental compliance from suppliers is enforced (due to balanced power, lack of alternative suppliers and changed relationship types owing to increasing levels of interdependence). But on the other hand, positive synergistic effects are likely to occur: buying firm net profits should increase when firm-level and purchasing function–level social and environmental objectives are aligned for strategic components (due to the high degree of interdependence).

The empirical analysis that we have undertaken supports our conceptual claims. There might be alternative approaches to test relative power and total interdependence, but we have chosen the Kraljic matrix as specified by Olsen and Ellram (1997) as an illustration of different power and dependence situations, following the example of Caniëls and Gelderman

(2005, 2007). We tested three main hypotheses that are relevant from a purchasing capability development point of view through subjecting survey data from 338 manufacturers in Europe and North America to regression analysis. Strong empirical support was found for the hypotheses; significant differences between purchasing categories that can be explained on the basis of power and dependence were revealed. That is, there is a lower likelihood to succeed with sustainable sourcing programs for Bottleneck type components, a higher likelihood of facing performance trade-offs for more Noncritical components, and a higher likelihood of deriving financial returns from aligning firm and purchasing function competitive priorities for more Strategic components.

Our findings have clear implications for operations management practice and research. The key takeaway for managers is guidance on how to manage the balancing act of putting Elkington's triple–bottom-line framework into supply management practice. That is, how to solve the pressing managerial problem of being held accountable for the economic, social and environmental impact of buying firm products and services, while losing control over how these actually are produced due to increasing levels of global sourcing. By adopting a power and dependence perspective, buying firm managers can use their resources more effectively. It will become clearer what to expect from SSM efforts in different types of relationships. For example, managers can determine when to expect supplier compliance to social and environmental standards, when to develop new types of relationships, when possible cost-related trade-offs will occur and when to expect financial returns.

The key takeaway for future research is to adopt a more nuanced view by taking power and dependence into account to explain the detailed circumstances when purchasing capabilities focused on sustainable sourcing can be achieved. Buying firms have a portfolio of differentiated supplier relationships. SSM scholars need to acknowledge this and refrain from references to "key suppliers" or "suppliers in general" as they otherwise do not take into account the full variation in the actual supplier base of buying firms. Thus, in view of our findings, future SSM research is to some extent incomplete unless power and dependence are taken into consideration.

As with all studies, this one is not without limitations. Manufacturing represents one sector of society. There are other important sectors as well, such as services, where other industrial and theoretical conditions apply. Therefore, we generalize this study's findings only to the manufacturing domain.

Finally, there is clearly a need for further research in the area. One drawback with current SSM research (the present study included) is its passive and reactive nature. At present, SSM

is mostly about avoiding doing harm (in contrast to battling current harms) and is pursued if suppliers provide it and it leads to buying firm competitiveness and profitability. Thus, buying firms are becoming accountable to a higher extent, but the responsibility for sustainable development is being pushed up the supply chain. Future research (and industrial practice) would therefore clearly benefit from a more active (rather than reactive) approach to developing SSM as a purchasing capability. How such an approach can be devised, where buying firms take the responsibility to initiate, lead change and get rid of barriers to SSM, is still an open question.

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Figure 1. Power and dependence in the Kraljic matrix

		Supply risk / Complexity of supply market	
		Low	High
Profit impact	High	*Leverage items* • Buyer dominated • Moderate level of interdependence	*Strategic items* • Balanced power • High level of interdependence
	Low	*Noncritical items* • Balanced power • Low level of interdependence	*Bottleneck items* • Supplier dominated • Moderate level of interdependence

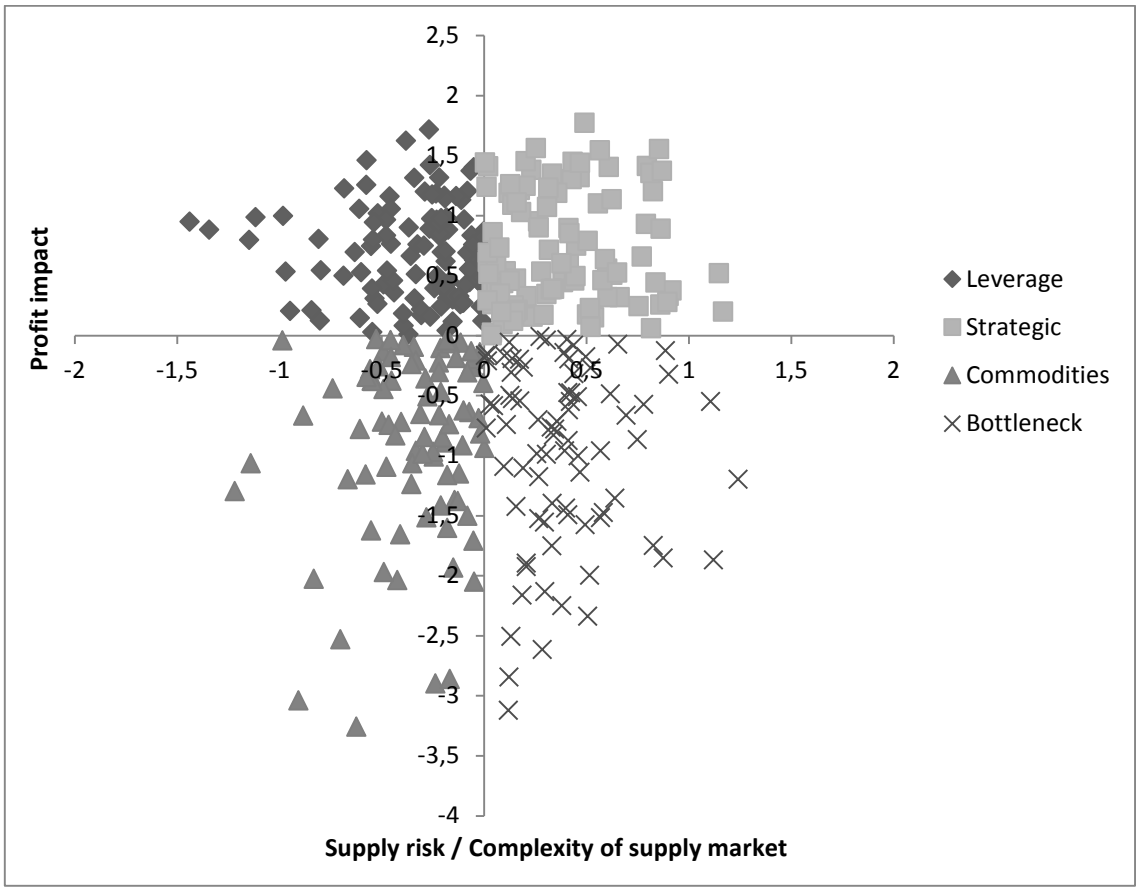

Figure 2. Graphical representation of the distribution of purchasing categories in the survey.

Table 1. Confirmatory factor analysis replicating the work of Olsen and Ellram (1997)

			Component					
			1	2	3	4	5	6
Factors influencing the strategic importance of the purchase	Economic factors	Category's impact on perceived quality of your end products/services in the eyes of your customers	0.13	0.72	0.14	0.15	-0.09	-0.04
		Category's impact on the cost of your products/services	-0.11	0.74	0.22	0.00	0.06	0.15
		Category's impact on the quality of your internal processes	0.01	0.73	0.01	-0.04	0.08	-0.02
Factors describing the difficulty of managing the purchasing situation	Product characteristics	The extent to which technologies in this category are new to your firm	0.83	0.02	0.06	-0.04	0.01	-0.03
		The extent to which technologies change in this category	0.80	0.05	-0.01	0.01	0.01	0.03
		The extent to which products/services are new to your firm	0.83	-0.04	0.08	-0.01	-0.01	-0.04
		The extent to which products/services can be specified unambiguously	-0.05	0.04	-0.03	-0.05	0.00	0.88
	Supply market characteristics	Level of concentration of the supply market for this category. The extent to which the supply market is dominated by a small number of large suppliers	0.00	0.18	0.69	-0.19	0.08	-0.09
		Entry barriers for new suppliers to enter the supply market for this category	-0.02	0.11	0.69	0.16	0.07	-0.04
		The extent to which suppliers of this category know each other and share information	0.15	-0.02	0.56	0.22	-0.15	0.25
		The extent to which suppliers of this category provide access to unique assets or resources	0.35	0.30	0.42	0.23	0.04	-0.07
		The average time span of supplier relationships	-0.01	0.03	0.15	0.74	0.03	0.32
		The rate at which you change suppliers for this category	0.12	0.02	-0.10	-0.74	0.13	0.25
		The extent to which products/services within this category are customized for your organization	0.29	0.37	-0.11	0.50	0.07	-0.23
		The volatility of prices	0.03	0.03	0.19	-0.08	0.80	0.00
		The volatility of volumes	0.05	0.09	-0.12	0.02	0.82	0.00

Note: Reliability of derived components was assessed through Cronbach's alpha: Component #1 = 0.81; #2 = 0.62; #3 = 0.55; #4 = 0.41; #5 = 0.53; #6 = N/A.

Table 2. Impact of sustainable sourcing programs on supplier compliance

	All categories	Leverage	Strategic	Noncritical	Bottleneck
Implementation of sustainable sourcing programs					
Standardized regression coefficients	0.27**	0.26**	0.36**	0.34**	0.05
Adj R^2	0.07	0.06	0.12	0.10	0.00
F-value	23.7**	6.67**	13.37	8.22**	0.14
N	313	91	90	65	67

Note: Category performance in terms of level of environmental and social compliance from suppliers is used as dependent variable. ** = $p < 0.01$.

Table 3. Assessing trade-offs between competitive priorities for supply

	All categories	Leverage	Strategic	Noncritical	Bottleneck
Priorities for the chosen category					
Reducing product/service unit price	-0.02	-0.05	-0.05	-0.10	0.07
Reducing internal purchasing process costs	0.16**	0.06	0.25*	0.08	0.21
Improving conformance quality of purchased inputs	0.26**	0.25**	0.08	0.37**	0.39**
Improving supplier lead time (time between order taking and delivery)	-0.06	-0.06	-0.18	0.05	-0.04
Improving supplier accuracy in delivery dates and quantities	-0.02	-0.13	0.15	-0.10	-0.07
Improving introduction rates of new/improved products/services	0.19**	0.42**	0.17	0.13	0.08
Adj R^2	0.17	0.22	0.09	0.09	0.13
F-value	12.07**	5.63**	2.47*	2.18*	2.77*
N	333	99	93	70	71

Note: Improving compliance with ecological and social guidelines for this category used as dependent variable.
* = $p < 0.05$, ** = $p < 0.01$.

Table 4. Assessing trade-offs among category performance indicators

	All categories	Leverage	Strategic	Noncritical	Bottleneck
Performance for the chosen category					
Purchasing price	-0.02	-0.07	0.03	0.00	-0.30*
Costs of managing the purchasing process	0.04	0.12	0.10	-0.33**	0.22
Level of supplier product/service quality	0.06	0.12	0.07	0.15	-0.08
Level of product/service delivery speed from suppliers	0.00	-0.21	0.02	0.20	0.12
Level of product/service delivery reliability from suppliers	0.19*	0.38**	0.28**	-0.12	0.13
Level of innovation in products/services from suppliers	0.27**	0.29*	0.22*	0.35**	0.03
Adj R^2	0.14	0.19	0.24	0.20	0.02
F-value	9.45	4.36**	5.59**	3.47**	1.22
N	304	88	90	62	64

Note: Level of environmental and social compliance from suppliers used as dependent variable.
* = $p < 0.05$, ** = $p < 0.01$.

Table 5. Impact of strategic alignment on firm financial performance

	All categories	Leverage	Strategic	Noncritical	Bottleneck
Alignment of corporate and purchasing function sustainability objectives					
Standardized regression coefficients	0.09	0.11	0.29**	0.05	-0.16
Adj R^2	0.00	0.00	0.07	0.00	0.01
F-value	2.52	1.17	7.32**	0.18	1.67
N	310	97	85	63	65

Note: Net profits used as dependent variable. ** = $p < 0.01$.