Managing supplier sustainability risks in a dynamically changing environment—Sustainable supplier management in the chemical industry

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ABSTRACT

Varying definitions and interpretations of sustainability standards have become a major concern for purchasing and supply management (PSM). As the foremost interface to an increasingly global supply base, PSM plays an important role in the mitigation of sustainability-related risks. By conducting responsible purchasing and supplier management, the risk of corporate reputational damage to the buying firm, caused by supplier misconduct, can be avoided. However, resources for effective risk-mitigation are limited and the applicability of supply risk assessment and supplier assessment methods have not been evaluated for sustainability. In this paper, we explore how leading PSM functions identify, assess, and treat supplier sustainability risks and elaborate on the integration of sustainability risk management in supplier management processes. Based on the findings from a multiple case study in the chemical industry and by drawing on the dynamic capabilities view (DCV), we propose that mature and sustainable supplier management capabilities are a source of competitive advantage in terms of lower exposure to reputational risks and enhanced operational performance.

1. Introduction

Diverse definitions and interpretations of sustainability standards in global supply chains, along with differing levels of supplier compliance to these standards, have become major concerns for purchasing and supply management (PSM). The ongoing corporate social responsibility (CSR) movement exerts pressure on firms to address ecological and social sustainability around the world. Therefore, CSR has become one of the many competitive pressures that firms face in today’s business environment. Frequent changes to the standards issued by non-governmental organizations (NGOs) and by governmental regulatory bodies lead to continuous alterations in the amount of pressure exerted on firms (Hall, 2000). In order to respond to uncertainty and reputational risks, firms must perfect their capabilities to detect changes in CSR requirements and respond to these changes timely and rigorously to secure their competitive position in the marketplace (Campbell, 2007; Porter and Van der Linde, 1995).

Throughout this paper, we use the term ‘sustainability’ to refer to the pursuit of the tripartite of economic, environmental, and social performance. The term ‘sustainability’ is also known as the triple-bottom line of the organization (Carter and Rogers, 2008: Kleindorfer et al., 2005). According to Campbell (2007), firms pursuing genuine sustainability practices distinguish themselves from other firms by not knowingly doing anything that could harm their stakeholders. As soon as any harm is discovered and brought to their attention, they rectify their behaviour and analyze the roots of the issue at hand. Scholars in the field have stated that firms, which are able to accommodate the changing attributes of CSR and to correct CSR violations on short notice, will experience competitive advantage (Hart, 1995; Russo and Fouts, 1997; Campbell, 2007).

In fact, in a study performed by Harwood and Humby (2008), 20% of the firms viewed sustainability issues as their largest supply chain risk and 25% of the firms required suppliers to adhere to social and ecological standards in order to mitigate supply chain risks.

Due to the cost-oriented outsourcing trend over the past decades (Krause et al., 2001), external stakeholders, such as NGOs and customers, expect the focal buying firms to assure socially and ecologically sound production at their suppliers’ sites. Thus, irresponsible supplier behaviour of any kind may be projected to the buying firm, causing adverse publicity, reputational damage, and costly legal obligations (Carter and Jennings, 2004). Thus, firms which outsource production to suppliers cannot transfer the risk related to unacceptable environmental and social standards...
at supplier premises, but must seek active management of the supply base for sustainability. As the foremost interface to an increasingly global supply base, PSM plays an important role in the mitigation of sustainability risks.

Hence, scholars reprimand that sustainable supplier management (SSM) must go beyond supplier self-declaration of compliance to standards and encompass effective identification, assessment and monitoring measures as well as compliance incentive systems (Baden et al., in press; Green et al., 1996; Jiang, 2009). Specifically, the increasing reliance on a global supply base enhances the need for supply risk management (Wagner and Bode, 2006) and, in particular, for active management of supplier sustainability risks (Baden et al., in press). However, risk-absorbing practices to protect the buying firm from adverse effects from supplier misconduct are not cost-free. In particular, supplier assessment, supplier qualification and monitoring of supplier sustainability, for instance by conducting supplier audits, require time and financial resources. Consequently, the PSM function must prioritize and concentrate its sustainability engagement on those suppliers which are perceived as most likely to cause an adverse event in terms of sustainability and those which are perceived to cause the most significant damage if the risk is realized (Harland et al., 2003). To this point, the applicability of supply risk assessment methods brought forward by supply chain scholars (Zsidisin et al., 2004) and practitioners (Kraljic, 1983) have not been evaluated in the research field of sustainability (Baden et al., in press). Moreover, knowledge as to how buying firms assure ecologically and socially sound supplier operations in an economically sustainable manner is limited (Carter and Rogers, 2008). Thus, the following research questions shall be addressed in our research:

1. How do firms configure sustainable supplier risk management processes in congruence with dynamically changing sustainability requirements?
2. How can supplier sustainability risk mitigation strategies and processes be a source of competitive advantage to the buying firm?

In order to approach these questions, we ground our research in the supply chain risk management framework by Ritchie and Brindley (2007). This framework enables us to integrate the established approaches to supply chain risk management with our research interest in sustainability-related risks in supply management. The overall notion of the framework is that a firm that adopts and invests in strategies for managing supply risks will do better than firms that neglect the type of risks faced in their selected risk management strategy (see Fig. 1). We adopt this notion to our research interest of supplier sustainability risk management (see Fig. 2).

The dynamic capabilities view (DCV) of the firm suggests that the ability of a function to contribute to competitive advantage depends on the fit of its strategy and processes to the external environment of the firm (Eisenhardt and Martin, 2000; Teece et al., 1997). Hence, the degree to which the PSM function accommodates stakeholder interests in the identification of sustainability risks has a considerable influence on the subsequent sustainability risk management processes. As presented in Fig. 1, the model commences with the identification of sustainability risks and continues with the assessment of these risks. The assessment leads to the decision of supplier sustainability risk, which in turn determines the risk management response at the individual supplier level. The framework terminates with the performance outcomes of the chosen sustainability risk management processes.

Our research approach is described best as theory elaboration (Lee et al., 1999) since the research model of supply chain risk management and the dynamic capabilities view affect our research design when studying firms’ supplier sustainability risk management processes.

The paper is structured as follows: First, we review extant literature on supplier classification and risk assessment, and the subsequent supplier management processes to mitigate risks focusing on sustainability. In the following section, the assumptions of the DCV are outlined. We elaborate on the multiple case study method applied in this paper and then present our research findings in light of our extended research framework and the DCV. In the conclusion, we summarize our results and suggest paths for further research.

2. Conceptual development of the supplier sustainability risk management framework

2.1. Supply risk management processes and sustainability

The risks inherent in enhanced reliance on upstream suppliers, common in global production, have caused enterprise risk management to address the supplier perspective more extensively (Hallikas et al., 2004; Wagner and Bode, 2006). The focus on supply risks and their assessment in a matrix of “profit impact” and “likelihood of occurrence” for developing a distinctive approach to supplier and commodity management has a long tradition in PSM research (e.g. Kraljic, 1983; Gelderman and Van Weele, 2003). However, the separate research stream on supply risk management has emerged only recently. Following the pioneering contributions of Ritchie and Brindley (2000) and Zsidisin et al. (2000), other scholars delivered conceptual frameworks on supply risk management (e.g. Juettner et al., 2003; Ritchie and Brindley, 2007). Subsequent literature has predominantly focused on the initial stages of the supply risk management process, as depicted in Fig. 1, namely risk identification and risk assessment (e.g. Zsidisin et al., 2004; Schoenherr et al., 2008). Risk assessment and subsequent prioritization are typically based on two components: (1) the consequences (potential losses) if the event occurs and (2) the probability of occurrence of that event (Manuj and Mentzer, 2008). By applying this assessment logic, PSM management is able to effectively absorb the identified risks and to protect the buying firm from adverse effects from unpredictable events (Juettner, 2005).

Conceptual and case-based research has been complemented by operations research models, resulting in robust mitigation strategies (Tang, 2006a). Moreover, Manuj and Mentzer (2008) gave insights on antecedents of effective risk management strategies in the context of global supply chains, such as supplier development. Integrating supply risk in supplier selection and continuous supplier evaluation is highlighted as an efficient supply risk mitigation strategy (Micheli et al., 2009). Thus, in order to effectively implement supply risk mitigation strategies, supply risk management must be tightly interlocked with the core supplier management processes of supplier selection, supplier evaluation, and supplier development (Craighead et al., 2007; Koplin et al., 2007). In particular, supplier assessment has been acknowledged as contributing to the mitigation of upstream supply risks, providing the firm with strategic choice on how to manage the supply risks the company is facing (Matook et al., 2009; Tang, 2006).

Ecological and social supply risks are generally not, or at least not in their entire content breadth, part of the supply risk management discussion (e.g. Chopra and Sodhi, 2004; Harwood and Humby, 2008), as stated by current research in the field.

Although the risk assessment approaches available from supply risk management literature have been valued as applicable to the context of supplier sustainability risks, their effectiveness has not yet been empirically investigated (Cousins et al., 2004). The dynamically changing regulations and liabilities, but also the enhanced stakeholder pressure from NGOs and customers, put the damage potential stemming from supplier misconduct in the centre of the debate. Several damage potentials of adverse sustainability incidents, such as liability for damage, non-compliance fines, negative media exposure, pressure group threats, and the loss of corporate reputation, have been identified (Russo and Fouts, 1997; Cousins et al., 2004). Consequently, PSM employees must become inspectors and promoters of corporate reputation.

The literature review highlights that research in identifying, assessing, and treating risks imposed by potential supplier violation of ecologic and social standards is still missing. Moreover, little is known about how firms reach a decision about the sustainability risk of their suppliers and how they structure their risk management responses. Moreover, firms need to identify sustainability risks, adapt supplier risk assessment and treatment processes (Prahalad and Hamel, 1990; Teece et al., 1997). Due to dynamics in the business environment, long-term competitive advantage can only be achieved if firms develop and apply capabilities “sooner, more astutely, or more fortuitously” than competitors (Eisenhardt and Martin, 2000, p. 1117). Dynamic capabilities are defined as a firm’s capacity to integrate, build, and reconfigure internal and external resources, using organizational processes to respond to changes in the competitive environment and to design new value-creating strategies (Eisenhardt and Martin, 2000; Teece et al., 1997). The idiosyncrasy within organizational routines differentiates the firm’s ability to deploy resources and thus, the productivity of the resources controlled by the firm compared to competitors. Capabilities are difficult to imitate because they are dependent on previous paths of asset accumulation within the firm which makes them socially complex and tacit. Thus, dynamic capabilities are difficult to imitate, therefore, they can be a source of competitive advantage to firms (Dierickx and Cool, 1989; Makadok, 2001). This advantage is enhanced when firms are able to achieve co-specialization and learning economies, which allow for a more diversified and broader use of the capability in related processes (Prahalad and Hamel, 1990; Teece et al., 1997).

For the research context of this paper, the assumptions of DCV suit our research questions. Firms must be responsive to the changes in regulations and stakeholder demands in order to identify sustainability risks, adapt supplier risk assessment and resulting risk management responses. Moreover, firms need to
accommodate measures of sustainability in these processes, both for legal and voluntary reputational reasons, if they would like to attain the cost benefits available from outsourcing, without having to bear the risk of lower sustainability standards of suppliers backfiring their own reputation (Walker et al., 2008). In particular, corporate reputation is stated to be the result of two organizational capabilities (Hall, 1993): (1) the positional capability determines the focal firm’s configuration of the value chain and, hence, the supply base. It is a result of previous paths of decisions and actions; (2) the functional capability relates to the ability to implement corporate strategy into organizational processes of the PSM function. Such corporate know-how is the result of employee skills and internal process structures. It is tacit and socially complex in nature, providing firms with difficult-to-imitate capabilities (Hart, 1995; Russo and Fouts, 1997; Wagner, 2007). As a result of the literature review, we have adapted our research framework as presented in Fig. 2.

3. Research methodology

3.1. Research design

An inductive multiple case study approach was selected in order to explore how companies manage sustainability-related supplier risks. This approach appeared to be adequate for the following four reasons: (1) research on how firms account for sustainability-related supplier risks in their purchasing organization is still in an exploratory stage (Basu and Palazzo, 2008); (2) case study research is well-suited for investigating complex phenomena, which cannot be illuminated by, for example, surveys alone, since it allows the researcher to interact with the informant and to draw on multiple sources of information, leading to information-rich cases (Crane, 1999; Yin, 2009); (3) the definitions of ecological, social, and environmental sustainability diverge in literature and practice. Hence, clarification is required in order to account for content validity, which could be addressed best in the course of interviews; (4) the triangulation of data from multiple sources allows for a better mitigation of the social desirability bias which is inherent in the topic at stake (Crane, 1999). An overview of measures to address the concerns regarding validity and reliability throughout the course of our research is provided in Table 1.

3.2. Case selection

The sampling frame was developed based on the extant literature and preliminary expert interviews. For the purpose of gaining in-depth insights into advanced practices which would lay ground for the generation of hypotheses, the notion of Gerring (2007) was followed and the extreme case selection technique was employed with the PSM function as the unit of analysis. The study was conducted in the chemical industry (Standard Industrial Classification [SIC] code 28) for the following reasons: first, environmental protection has high strategic relevance in the chemical industry since its costs are among the highest of all industries. Second, the industry’s high profitability and a long history of incidents have led to close scrutiny by its stakeholders, emphasizing the relevance of responsible environmental and social behaviour (Cheah et al., 2007; Christmann, 2000).

The list of potential case companies was further shortened by making the listing in either the Dow Jones Sustainability Group Index (DJSI) or the FTSE4Good (López et al., 2007), a selection criterion. In order to yield a sample with homogenous antecedents for the development of CSR initiatives, we only included firms from Central Europe, which had previously experienced serious environmental or social incidents in the 1980s or 1990s. Ultimately, the purchasing executives of the top ten European chemical companies, in terms of annual sales revenue, were approached via email and follow-up telephone calls (Howard et al., 1999; Dul and Hak, 2008). Out of these ten, five firms agreed to participate in our study and provided access to purchasing executives and archival data under the condition of anonymity. The profile of the case companies and their sustainability practice is provided in the Appendix.

<table>
<thead>
<tr>
<th>Reliability/validity criterion</th>
<th>Research phase</th>
<th>Design</th>
<th>Case selection</th>
<th>Data gathering</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td></td>
<td>● Develop case study protocol</td>
<td>● Selection based on notation in DJSI and FTSE4Good indices</td>
<td>● Shared questionnaire for all interviewers</td>
<td>● Involvement of authors who did not gather data</td>
</tr>
<tr>
<td>Internal validity</td>
<td></td>
<td>● Theoretical framework</td>
<td>● Sampling criteria recorded in case study protocol</td>
<td>● Record factors that might be alternative explanations</td>
<td>● Pattern matching</td>
</tr>
<tr>
<td>Construct validity</td>
<td></td>
<td>● Adoption of constructs from previous empirical works in the field of sustainability and supply risk management</td>
<td>● NA</td>
<td>● Multiple sources of information</td>
<td>● Triangulation of multiple data sources</td>
</tr>
<tr>
<td>External validity</td>
<td></td>
<td>● Sampling within SIC 28</td>
<td>● Description of sampling criteria</td>
<td>● Multiple interviewers</td>
<td>● Logic models</td>
</tr>
</tbody>
</table>

Table 1 Measures for ensuring validity and reliability throughout the course of research (based on Gibbert et al., 2008; Yin, 2009).
3.3. Data collection

The collection of primary data proceeded in two phases between August and November 2008. In the first phase, the informants completed a questionnaire inquiring about the staff, the purchasing function and the degree of sustainability implementation in purchasing processes. At the same time, publicly available data on the case companies was gathered, e.g. from company websites, annual reports, but also from third parties, such as DJSI, FTSE4Good and NGOs in order to lay ground for later data triangulation (Gibbert et al., 2008). Based on this data and the completed questionnaires, the interview guide was developed (Perry, 1998). This sequential process allowed us to challenge statements found in the companies’ reports, such as “above all, sustainability is most important” or “sustainability is controlled for along the whole supply chain”, by asking how these statements are reflected in practice. The interviews with at least one high level purchasing executive and one purchasing manager responsible for SSM lasted between 1.5 and 2 h and were jointly conducted by the same two authors. Notes of answers and on presented documents, such as supplier self-assessment questionnaires and prepared action-plans for subsequent supplier development, were taken during the interviews. Immediately after the interviews, notes about the spoken dialogue were written by each author independently. These observations were compared by the team of authors and supplemented or corrected if necessary. In order to account for reliability, the interview procedure and situation was recorded in a protocol, for example, quoting dates of the interviews and information about interviewees, individual settings of each interview, and where and how archival data was collected. Furthermore, a case database stored individual notes, transcripts from the interviews, the questionnaires, content from the companies’ websites, sustainability and annual reports, as well as data retrieved from third parties (Gibbert et al., 2008; Yin, 2009).

4. Data analysis

The data analysis started with open coding of the collected information from the various sources in order to structure the data. Subsequently, key categories were identified and further refined in an incremental and iterative process. First, we conducted within-case analyses to develop individual profiles in order to become acquainted with each case. After each author individually coded each case, we met to compare the classification of the case. In areas of discrepancy, we analyzed whether the problem was the coding scheme or the individual interpretation. This led to an iterative process to improve the coding scheme and to reach inter-rater reliability (Pagell and Krause, 2005). Having established consistent coding and classification of individual cases, we proceeded with cross-case analyses to detect commonalities and differences in patterns of supply sustainability risk management across the studied cases (Eisenhardt and Graebner, 2007; Yin, 2009). We present the findings from the cases accord-
Table 2
Sustainable supplier risk assessment and management characteristics

<table>
<thead>
<tr>
<th>Firm</th>
<th>Black</th>
<th>Blue</th>
<th>Red</th>
<th>Orange</th>
<th>Yellow</th>
</tr>
</thead>
</table>
| **External pressure** | - Customers and shareholders  
  - ILO a  
  - Other NGOs | - Shareholders  
  - UN Global Compact  
  - PSCI b  
  - Other NGOs | - Customers  
  - Shareholders  
  - NGOs  
  - UN Global Compact | - Customers  
  - Regulatory body  
  - UN Global Compact | - Regulatory bodies  
  - PSCI b |
| **Influence of external pressure on PSM** | - Via top-management  
  - Via compliance department | - Via top-management  
  - Direct PSM perception of external pressure | - Via top-management  
  - Direct PSM perception of external pressure | - Via top-management  
  - Direct PSM perception of external pressure | - Via top-management  
  - Direct PSM perception of external pressure |
| **Purchasing categories most affected by SSM** | - Specialty raw material  
  - Renewables  
  - Precious metals  
  - Mining products  
  - Packaging  
  - Life sciences | - Contract manufacturing  
  - Raw material  
  - Packaging  
  - Life sciences  
  - Logistics services  
  - Car fleet | - Raw material  
  - Packaging  
  - Life sciences  
  - Logistics services  
  - Car fleet | - Raw material  
  - Contract manufacturing  
  - IT equipment  
  - Textiles  
  - Office supplies | - Raw material  
  - Contract manufacturing  
  - IT equipment  
  - Textiles  
  - Office supplies |
| **Assessment of the probability of non-compliance** | - Properties of goods (physical/chemical)  
  - Geographical location  
  - Self-assessment of suppliers  
  - Consolidation of scores on a scale ranging from 0–100 | 1st level  
  - Geographic location  
  - Industry sector  
  - Judgment of supply managers | 1st level  
  - Supplier self-declaration to comply with red’s standards | 1st level  
  - Supplier reputation  
  - Purchasing category  
  - Production process  
  - Geographical location | 1st level  
  - Geographic location (key driver of further actions)  
  - Past records |
| **Assessment of the impact of non-compliance** | 2nd level  
  - Supplier self-assessment | 2nd level  
  - Geographic location  
  - Purchasing category  
  - Suppliers regular performance | 2nd level  
  - Supplier self-assessment  
  - Strategic status of supplier  
  - Purchasing volume | 2nd level  
  - Supplier self-assessment  
  - Absolute revenue affected  
  - Purchasing volume | 2nd level  
  - Supplier self-assessment  
  - Supplier reputation  
  - Purchasing volume  
  - Public disclosure of non-compliance fines  
  - Loss of customer credibility |
| **Perceived damage potential** | 2nd level  
  - Pressure group threats  
  - Corporate reputation  
  - Swales revenues | 2nd level  
  - Corporate reputation  
  - Increasing total costs  
  - Sales revenues | 2nd level  
  - Corporate reputation  
  - Negative media exposure | 2nd level  
  - Corporate reputation  
  - Negative media exposure  
  - Loss of customer credibility | 2nd level  
  - Corporate reputation  
  - Negative media exposure  
  - Loss of customer credibility |
| **Sustainability related auditing** | - Purchasing experts in cooperation with internal SHEc, production labour, and human rights experts  
  - Quality of supplied products  
  - Security of supply  
  - Total costs | - External audits focusing on labour standards and human rights | - Standard process is under configuration, currently reliance on external auditors if required | - Internal SHE experts in cooperation with external audit firm | - Internal SHE experts in cooperation with external audit firm |
| **Perceived operational performance implications** | - Process innovations  
  - Direct costs  
  - Quality of supplier products | - Total costs  
  - Internal customer satisfaction | - Security of supply  
  - Quality of supplied products | - Total costs  
  - Quality of supplied products | - Total costs  
  - Quality of supplied products |

a International labour organization.  
b Pharmaceutical supply chain initiative.  
c Safety, health, and environment.
are assigned different weights in the process of indicator consolidation (cf. Zsidisin et al., 2004). At Orange and Blue this assessment is conducted in cross-functional teams, consisting of buyers, internal clients, and sustainability experts. The potential business impact of non-compliance is estimated by indicators such as the spend volume with the respective supplier or the revenues affected by the procured product. These indicators are also translated into four- or five-point scores and reflect the impact (potential loss) axis for each supplier relationship.

For established suppliers, the exigency for subsequent action is derived from their position in the matrix. Non-critical suppliers receive a self-declaration to be signed to signify compliance with the required standards. Critical suppliers receive a questionnaire on sustainability-related practices and how exactly they deal with issues such as waste levels, handling of hazardous material, and labour standards. The further treatment of critical suppliers depends on their self-assessment; for example, if there is doubt about the sustainability of the supplier, an audit is triggered. Very critical suppliers immediately receive a sustainability audit, concluded by a follow-up action plan.

New suppliers entering the selection process are confronted with the supplier self-assessment questionnaire before they are short-listed. In the early stage of the supplier selection process, sustainability standards act as a gate-keeper; if violations occur, further cooperation is terminated. Once a new supplier has progressed to the shortlist, the company will be audited on-site by either internal or external experts in order to ensure that only compliant suppliers enter the supply base. An executive at Blue stated:

“Sustainability criteria, in particular social concerns, are accorded the same weight as price and quality in the selection phase.”

As opposed to the two-dimensional and sequential sustainability risk assessment method pursued by Orange, Red, Blue, and Yellow, Black follows an approach that is described best as being parallel and multidimensional. Sustainability risk assessment and supplier ratings are seamlessly interlocked. Risk indicators from the supplier database are simultaneously analyzed with data gathered from the supplier self-assessment and externally acquired data yielding a weighted average risk-score ranging from 0% to 100% compliance. Based on this method, one score for ecological risk and one for social risk is calculated. The supplier self-assessment is compulsory for all established and new direct material suppliers. If suppliers refuse to assess themselves, their score will be discounted. The minimum compliance threshold for established and new suppliers is 65%. New suppliers must reach this threshold in order to be considered for a business relationship. If established suppliers score below this threshold, a supplier audit is triggered, and an action plan must be adhered to over a 3–6 month timeframe.

The probability-impact classification, as pursued by Orange, Red, Blue, and Yellow, has limited applicability for continuous monitoring of supplier sustainability risk because of its discrete nature. However, it provides a supplier risk assessment which determines subsequent sustainability risk mitigation strategies as well as supplier development needs. While Black’s sustainability risk assessment capability is more complex and resource-consuming, it provides detailed information about the sustainability status of individual suppliers and the supply base as a whole. Furthermore, it provides a baseline measure for continuous development of a supplier on the percentage scale and allows detecting paths for further development necessities of the supply base. In line with prior literature (e.g., Krause et al., 2007), the following proposition is formulated:

**Proposition 2a. Supplier sustainability risk assessment enables an effective sustainability risk mitigation response.**

Orange, Blue, Red, and Yellow acknowledged deficiencies in the initial identification of sustainability risks. These companies recently continued to broaden their sustainability risk assessment to actively address stakeholder pressure for the initially neglected sustainability risks in supplier management processes. Black’s pioneering role in SSM enabled the company to be ahead of competitors in terms of the breadth of supplier sustainability risk management. Recently, Black anticipated increased stakeholder pressure for transparency of the social dimension of sustainability. As a consequence, Black developed the social risk score based on the process and knowledge already existing from the ecologically focussed risk assessment method.

As suggested by DCV literature, Black was able to leverage its ecological supplier risk management capabilities to the context of social supplier risk management due to the build-up of excess capacity (Pralahad and Hamel, 1990; Eisenhardt and Martin, 2000; Zollo and Winter, 2002). Thus, we conclude that the necessary sustainable supplier risk management processes are built on limited content breadth, before broadening the content scope towards a more holistic embracement of the sustainability concept. Thus, we propose:

**Proposition 2b. The initial configuration and deployment of supplier sustainability risk management capabilities is valuable in building excess capacity, which enables firms to broaden the scope of their sustainability risk management processes.**

4.3. Supplier sustainability risk management response

As firms become able to assess and manage a broader scope of supplier sustainability risks, resulting from more mature and stable SSM processes, they reduce the firms’ risk of exposure to adverse publicity and reputational damage. In the following passage, we will elaborate on the commonalities and differences among the sustainability risk mitigation processes executed by the case companies. Furthermore, we will highlight those SSM processes which enhance a firm’s ability to acquire products and services from compliant suppliers.

In all of the five case companies, risk mitigation processes were initially configured when sustainability risks were identified and assessed. In cases of remediable non-compliance with sustainability criteria, the case companies emphasized their preference for retaining rather than terminating relationships with established suppliers. Unless the violations were grave, existing suppliers were given the opportunity to improve their status within a pre-defined time frame. Once this period had expired, suppliers were re-audited, and the outcome ultimately determined further proceedings. Any further breach of regulations was normally considered reason to discontinue the business relationship. An executive at Yellow aptly expressed this position:

“Since supplier phase-out is often not an option, responsive and resource-effective supplier development is a key success factor to minimize our exposure to sustainability-related risks.”

At Black, the business relationship is temporarily put on hold until the minimum compliance threshold of 65% is met. This limit exerts pressure on the supplier to take the prescribed actions which have been derived from the audit. The blacklist status is set by the internal purchasing sustainability experts in the enterprise resource planning system in order to (1) avoid maverick buying from non-compliant suppliers and (2) to avoid potential conflict of interest of category managers to achieve price reductions at the
expenses of sustainable purchases. The sustainability experts are responsible for assessing and developing suppliers around the world to assure that the supply of raw materials and other production-related components are available at the desired quality and permissible price level. The sustainability experts evaluate bond key performance indicators such as 'percentage of suppliers compliant with sustainability standards' and 'average sustainability score of the supply base'. Re-auditing allows for incremental improvement, and the ability to adapt to and incorporate the constantly changing expectations of various stakeholders in the sustainability risk assessment and supplier development processes.

In unison, informants at Orange, Blue, and Black emphasize that in highly competitive supply situations they desist from supplier development for green and ethical production. Hereby, the term 'competitive' refers to a sufficient number of suppliers capable of delivering the requested product at comparable prices, quality, as well as environmental and social performance. For new suppliers, an early indication of unsatisfactory compliance with the buying firm's sustainability expectations results in their immediate elimination during the supplier qualification process. On the one hand, sustainable supplier development is the preferred option by all cases companies for established suppliers. We conclude that established suppliers' sustainability criteria are dependent assessment criteria which are subject to further resource commitment of the buying firm to improve suppliers' capability to meet short- and medium-term needs of the buying firm (Krause et al., 2007). On the other hand, for potential new suppliers, sustainability criteria are independent selection criteria. They are important for screening potential new suppliers and preventing non-compliant suppliers to enter the supply base, thereby reducing the firm's risk exposure (Tang, 2006). In line with arguments from DCV, we conclude that the value-creating (damage preventing) strategies necessary to counteract external pressure must be executed more rigorously than competitors in order to stay ahead of the competition (Eisenhardt and Martin 2000; Teece et al., 1997). In the context of supplier selection, development and phase-out as risk mitigation strategies, we propose:

**Proposition 3a.** The ability of sustainable supplier selection, development and phase-out strategies to mitigate sustainability risks depends on the rigor with which they are applied.

The case companies appeared to follow similar procedures in screening and handling existing and potential new suppliers. In the following discussion, we will elaborate on the deviations that could be observed at a more detailed level of process analysis. While Orange, Blue, Red, and Yellow assign a status to the supplier (non-critical, critical, very critical), Black rates its suppliers on a percentage scale. This percentage scoring model allowed the initial risk assessment criteria to be transferred into a periodical, recurring supplier monitoring scheme (Vachon and Klassen, 2006). As opposed to discrete supplier evaluation, the continuous approach allows for a more detailed and continuous monitoring of the supply base over time. At Black, supplier development efforts continue even if the compliance threshold is attained. Initially, compliant suppliers (above 65%) are confronted with development targets in order to raise their sustainability level. They are inspected at regular intervals thereafter. Periodical evaluation allows for differentiation of suppliers into two groups. The first group requires the buying firm's active involvement in developing sustainability standards, for example via audits and action plans. The second group, encompassing suppliers which are already compliant with minimum standards, requires passive development via target setting and monitoring (Hartley and Jones, 2006).

In harmony with Proposition 3a, we ground our proposition in the DCV of the firm, according to which the decisive factor about the value and idiosyncrasy of a capability stems from the astuteness in how they are combined and applied (Eisenhardt and Martin, 2000; Peteraf, 1993). Thus, we formulate:

**Proposition 3b.** The ability of sustainable supplier assessment and development capabilities to mitigate sustainability risks depends on the astuteness with which they are created and applied.

### 4.4. Sustainability risk performance outcomes

Informants at Blue and Black highlighted medium-term competitive thinking as a driving force behind their supplier sustainability risk management strategies. This standpoint is exemplified in a statement made by Blue's CPO:

"Together with our suppliers, we seek to ensure that applicable laws are complied with and working conditions and environmental protection measures are improved throughout our supply chain. In doing so, we are not only reducing our own financial and reputational risk exposure, but nurturing relations with our suppliers and increasing our attractiveness for increasingly ethically aware customers and financial markets."

Supplier assessment of sustainability standards at established suppliers sets apart risky suppliers from less critical and non-critical suppliers. This enables firms to reduce their risk exposure and to take corrective action along three paths: (1) non-consideration of critical suppliers for selection, (2) development of established suppliers towards minimum standards and above, and (3) phase-out of non-compliant established suppliers (most disliked option across cases). Pursuing the first path allows organizations to avoid risky or non-compliant suppliers from entering the supply base. Thus, a more profound supplier sustainability risk assessment capability provides firms with superior resource-picking capabilities (Makadok, 2001; Peteraf, 1993) and prevents reputational damage to the buying firm caused by non-compliant suppliers entering the supply base. Hence, we postulate:

**Proposition 4a.** Sustainability risk assessment capabilities allow for effective supplier selection, leading to risk reduction, which constitutes a source of competitive advantage.

The second option not only leads to a decrease in the number of critical suppliers, thus reduced risk exposure, it also provides further competitive benefits to the buying firm. One of these medium-term competitive benefits is illustrated by the statement of an executive at Orange:

"In most procurement situations, a supplier phase-out, resulting from deficient standards, is not an option, as this would further enhance dependency on the remaining suppliers in that market. By sustainable supplier development, we foster competition among our suppliers."

In line with prior research in the field of supplier development, this effect was also observable at Blue and Black. Additionally, they acknowledged that supplier development enhances the relationship with their suppliers (Carr and Pearson, 1999; Krause et al., 2007). Moreover, sustainability audits are valuable to detect further improvement potentials, mostly related to the quality of supplied products, the security of supply and process innovativeness. The case firms combined the sustainability audit with quality and process ensuring audits. In order to do so, the PSM function collaborated with internal and external experts for production, operations, and quality. As a result, we found SSD to
have a direct operational performance effect. The collaboration with production and quality experts in sustainability-assuring supplier audits leads to spill-over effects on operational performance, namely enhanced quality of supplied products and security of supply (see Table 2). Furthermore, SSD has an indirect medium-term effect on firms’ bargaining power, and hence total costs due to the retention of competitive pressure in the supply market. We conclude that SSD has positive performance implications beyond risk reduction, thus supplier development rather than supplier phase-out, should be pursued. Thus, we formulate the following proposition:

**Proposition 4b.** Beyond the reduction of supplier sustainability risks, sustainable supplier development has a positive effect on operational performance and hence competitive advantage.

The third option is a comparably unpopular choice among the case companies since the detection of misconduct at the supplier leaves the buying firm with a moral obligation to engage in timely corrective action whenever harm or damage is discovered. This finding is in line with Campbell’s (2007) definition of CSR underlying this paper. Intentionally ignoring the misconduct at supplier premises will not mitigate the buying firm’s risk of the issue being brought to stakeholder or public attention, causing damage to company reputation.

4.5. **External responsiveness**

In the course of the case analysis, some findings evolved which were not classifiable according to our research model. Blue, Orange, and Black stressed that the perception of external stimuli is not a unique but a recurring event with frequently alternating characteristics. In the PSM environment, stimuli are less rigid but not less frequent. The firm’s timely response to a situation, which might conflict with stakeholders’ interests, is necessary so that the firm’s business practices are considered as responsible, thereby limiting its exposure to reputational damage (Campbell, 2007).

While profound and congruent sustainability risk assessment and mitigation processes are valuable in addressing external stimuli, they are not sufficient to spot their dynamics and bring it to PSMs attention. Once a new (quasi-) standard evolves, a short response time to ensure compliance across the supply base is crucial in order to maintain the buying firm’s reputation. In dealing with uncertainty variables, such as regulation and quasi-regulations, it is important to possess the capability to promptly react to the universe of probable outcomes (Teece et al., 1997).

NGOs have continuously gained importance and become a major source of information on firms’ sustainability performance of suppliers. As opposed to regarding NGOs as pressure groups, Blue and Black began to actively approach and cooperate with critical NGOs in order to be at the forefront of external developments. Thus, they devised a way to integrate these groups into their sustainability risk management processes, illustrated by the quote of a Black executive:

“The timely response to information on new regulations or a supplier’s misconduct is vital. As soon as we get knowledge of sustainability-related issues, we need to respond to the situation. Nowadays, NGOs are too powerful to be ignored, thus we chose to cooperate with them.”

This strategy increases predictability and responsiveness. A cooperative and structured relationship with NGOs leads to mutual exchange and progression of the buying firm’s knowledge. This cooperative approach with pressure groups enables the PSM function to respond more effectively to new requirements and supplier misconduct (Eisenhardt and Martin, 2000). Specific examples are the adaptation of supplier risk assessment criteria, audit cycles, and audit contents. In terms of DCV, cooperation with NGOs allows the adaptation of sustainability risk management processes to take place sooner, more rigorously and more astutely than competitors. Hence, external responsiveness is a major ingredient of dynamic SSM capabilities and will be rewarded with competitive advantage. This leads to our final proposition:

**Proposition 5.** Under the presence of dynamic stakeholder stimulus, external responsiveness has a positive effect on sustainability risk identification, assessment and mitigation processes, which in turn affect sustainability risk performance outcomes.
Based on our case analysis and reflections on extant literature, mainly DCV, we adapted our initial research framework to reflect our research propositions and to summarize our findings in Fig. 3. The implications of our findings are discussed in the following section.

5. Summary and conclusion

In this paper, we have studied how firms address the challenge of meeting their stakeholders’ sustainability demands across their supply base in a resource-effective manner, while effectively managing the risk of corporate reputational damage, which could potentially be caused by supplier non-adherence to sustainability standards. The contribution of this paper is threefold. First, we analyze how PSM functions configure their supplier sustainability risk assessment processes in order to effectively prioritize resources and knowledge for effective management and development of a sustainable supply base. Secondly, we provide insights on the performance outcomes of these undertakings. Thirdly, we elaborate on how firms organize supplier sustainability risk management processes in order to respond to dynamic changes in external pressure for sustainability.

Based on five in-depth case studies, we conclude that the earlier firms begin to assess their suppliers for sustainability, the greater the accumulation of sustainability-related risk management capabilities relative to their competitors will be. Hence, there are first-mover advantages available from the deployment of established processes. The deployment provides the firm with learning economies over time, which are tacit and socially complex due to their functional and firm boundary-spanning nature, leading to competitive advantage (Peteraf, 1993). Firms and their PSM functions should take a step forward and implement a structured sustainability risk assessment and subsequent supplier selection and development to effectively manage a sustainable portfolio of suppliers. Without structured supplier assessment, effective management of supplier sustainability can only be achieved randomly, which might lead to potentially detrimental negative effects on corporate reputation.

Moreover, we provide additional rationale to engage in sustainable supplier assessment and development since there are two kinds of positive performance outcomes available to the buying firm: (1) more profound mitigation of corporate reputational risk and (2) enhanced operational performance. In the context of RBV, sustainability risk assessment methods provide firms with supplier selection (resource picking) capabilities since they prevent potentially high risk suppliers entering the supply base. Moreover, risk assessment enables PSM to classify established suppliers according to their sustainability capabilities. Thus, it enables the allocation of supply risk mitigation processes where they are most effective. In the context of DCV, the risk mitigation process, and predominantly the SSD capability, enables the buying firm to effectively manage the qualified suppliers of the supply base and to further enhance their performance in terms of ecologic, social, and operational performance improvements. Thus, SSD provides performance implications beyond sustainability risk reduction.

Thirdly, the supplier risk assessment and classification presented in the literature review and applied by four out of five case companies is a static model (Gelderman and Van Weele, 2003). The assessment does not provide guidance to purchasing managers how to move from one position in the probability-impact matrix to a more favourable position. Thus, supplier assessment, selection, and development must be tightly interlocked to effectively manage the sustainability risk exposure caused by individual suppliers or the supply base as a whole (see Fig. 3).

In a dynamic environment, not only the weights assigned to sustainability indicators might have to be adjusted, but also new indicators might have to be added to the assessment scheme. As a consequence of the supplier code of conduct, the supplier self-assessment and the supplier development program will have to be adjusted in order to effectively manage risks in line with the most recent stakeholder pressure. We established that external responsiveness is inalienable for effective sustainability risk management. While mature and congruent sustainability risk assessment and mitigation processes are valuable in addressing external stimuli, they are not sufficient to detect their dynamics. Thus, firms must integrate external responsiveness with supply risk management and supplier management to create a truly dynamic capability.

Such a dynamic capability allows for a rigorous and astute extension of the content and the execution of supplier risk assessment, sustainability audits, and continuous supplier monitoring. Cooperation with and responsiveness to external resources, such as third-party auditors and NGOs, allows the PSM function to respond more effectively to new requirements and to detect and rectify supplier non-compliance (Eisenhardt and Martin, 2000). Thus, such cooperation provides firms with the ability to secure the buying firm’s reputation in the long term (Campbell, 2007; Teece et al., 1997). We conclude that external responsiveness positively affects sustainability risk identification, assessment, and mitigation strategies, which in turn positively affect risk and operational performance.

To conclude, we would like to point to potential areas for further research. In the context of the cases presented here, the probability of supplier non-adherence to sustainability standards is measured in terms of item specification, resulting production process, geographic location and the supplier self-assessment. These findings may be specific to the chemical industry. Hence, further research is needed to elaborate and test whether the sustainability risk assessment method presented here is valuable in different industry settings.

In addition, one may doubt whether the purchasing volume is a reliable indicator to approximate corporate reputational damage caused if suppliers do not adhere to sustainability standards. It is not yet resolved whether the indicators that measure supplier sustainability risks are the most predictive and reliable proxies of the empirically observable sustainability risks across industries. Nellore and Söderquist (2000) indicate that the “Achilles heel” of all supplier assessment models is measurement. Therefore, it is important to examine which indicators provide the most meaningful proxies of the probability of supplier misconduct and the resulting impact on the buying firm in terms of performance and corporate reputation. Further research in this area is necessary to assure that PSM professionals derive correct SSM decisions from the supplier sustainability risk assessment processes presented in this research.

Appendix

Black

Black is a leading, Germany based company in the chemical industry with almost 100,000 employees worldwide. The portfolio consists of chemicals, oil, gas, plastics, and crop protection products. Major customers can be found in the automotive industry, the construction industry, the pharmaceutical industry, and among producers of fast moving consumer goods, especially in the personal care industry. Production facilities are allotted on
every continent. The procurement function managed approximately 12 bn EUR worth of raw material purchases. Five regional experts are deployed around the world, in order to assess, audit, and develop suppliers regarding the compliance with sustainability standards on a fulltime bases. Those experts experience full empowerment and may halt relations with suppliers as soon as there is doubt concerning their compliance with Black’s minimum sustainability standards. They particularly emphasize workers health and safety, child and forced labour, and environmental pollution in their sustainability guidelines. Since sustainability is an integral part of the company’s vision and mission, top management and the compliance department are the major internal drivers for sustainability initiatives at PSM. The company has ten years of experience with sustainable supplier management. Less than five years ago, Black went to great lengths in order to integrate sustainability measures into PSM operations, including the integration in the ERP system. A recently started sustainability agenda brings confidence to be very well prepared for the upcoming challenges in the respective field. Black is listed in the FTSE4Good and the DJSI.

Blue

Blue is major Swiss chemical company offering a wide range of healthcare products with more than 50,000 employees presented in over 100 countries worldwide. The supply base consists of approx. 230,000 suppliers around the globe. The annual spend managed by PSM is approx. 11 bn EUR. Approximately 45% of suppliers have been formally assessed for sustainability. The firm has seven years experience with sustainable supplier management and employs two full-time equivalents fully responsible for sustainable procurement. In general, the governance structure for sustainable procurement initiatives is highly formalized, including guidelines, supplier assessment procedures, and monitoring activities. PSMs sustainability initiatives are currently focused on China, India, and South East Asia. However, all worldwide suppliers are required to comply with the company’s sustainability standards. In their code of conduct for suppliers they particularly emphasize the social dimension of sustainability (child and forced labour, any kind of discrimination and workers health and safety). They recently enhanced their focus on environmental pollution. Blue is listed in the FTSE4Good and the DJSI. Furthermore, it is a founding member of the United Nations Global Compact (UNGC). Hence, top management is considered the key (internal) driver of sustainability initiatives.

Red

Red is a German chemical company offering a wide portfolio of pharmaceutical and chemical products. For its chemical products major customers can be found in the consumer electronics, automotive and the packaged goods industry. The pharmaceutical product portfolio consists of cancer treatment products but also on regular consumer health care protection products available in pharmacies and retail chains (in some countries). The procurement function managed approximately 3 bn EUR in 2007 with 300 employees worldwide. The firm has three years experience with sustainable procurement and currently employ one full-time responsible to drive further developments within the purchasing function. The supplier assessment guidelines are formalized. All worldwide suppliers are required to comply with the company’s sustainability standards. The monitoring activities are currently set-up with enhanced focus on the Chinese and Indian supply markets. Red is listed in the FTSE4Good Index. Procurement management is committed to further develop its sustainable supplier management processes within a short period of time in order to be well prepared for future challenges. Part of the development program is the engagement in a Central-European sustainable procurement network and the cooperation with an external auditing firm to establish a standard supplier auditing procedure.

Orange

Orange is the pharmaceutical division of a large chemical company from Switzerland offering a wide range of healthcare products and employs over 50,000 people in more than 150 countries around the globe. For the last six years, Orange has been going through major restructuring activities, acquiring and divesting companies to finally concentrate on two main businesses. Orange spends roughly 5 bn EUR on products and services from suppliers. Its sustainability-related activities, which are driven predominantly by top-management, are currently focused on Asia. In general, the governance structure for sustainable procurement initiatives is highly formalized, including guidelines, supplier assessment procedures. The company particularly seeks to reduce the environmental impact of supplier production in terms of air emissions, waste levels, and water and energy efficiency. However, monitoring of activities is not yet as strict as desired, which is considered due to the fact that they only practice sustainability in PSM in a genuine manner for five years. In addition to the one full time equivalent they seek to hire additional personnel responsible for sustainability. Orange is listed in the FTSE4Good and the DJSI and is a Super Sector Leader in the latter.

Yellow

Yellow is a leading French chemical company with a broad portfolio of pharmaceutical products and vaccines. Almost 100,000 employees are located in more than 100 countries. The purchasing volume managed by purchasing is close to 10 bn EUR. While the company’s supply base is distributed around the globe, PSMs sustainability-related activities focus on China and India. Over the last two years 25% of the value of group purchases has been formally evaluated for sustainability. They have started the sustainability initiative in PSM six years ago and currently employ three corporate purchasing managers responsible for sustainable procurement. In general, the governance structure for sustainable procurement initiatives is highly formalized, including guidelines, supplier assessment procedures, and monitoring activities. Since the sustainable procurement mission/vision has been recently updated to equally reflect the ecological and social dimension of sustainability. The company particularly seeks to reduce air emissions, enhance workers health and safety and control for child and forced labour at supplier premises. Orange considers itself to be very well prepared for the challenges of the next five to ten years.

References