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**Innovative supplier management processes for sustainability – Explorative findings
from German stock corporations**

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Abstract

Companies which have to manage global supply chains face a high level of complexity in that there is a large number of suppliers in diverse socio-economic contexts as well as a growing demand for control of social and environmental criteria in these supply chains. Sustainable supply chain management (SSCM) therefore argues for the need to consider social and environmental next to economic aspects in the management of supply chains. This integration can only be achieved by process innovations, in the way that sustainability criteria are integrated into the key processes of supplier management (evaluation, selection, and development). The presented survey-based exploratory study focuses on these processes in large German stock corporations. The results show that some companies are already considering sustainability aspects in their supplier management processes. Moreover, processes which are easier to implement, such as written requirements and standards, are more often implemented than resource-intensive processes of evaluation and audits. At the same time, the increasing importance of supplier development and related innovative approaches become apparent, as supplier development can lead to long term partnerships with suppliers and can cause a reduction of transaction costs.

Keywords

Supplier management, Process innovation, Sustainable supply chain management

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1 Introduction

Due to high cost pressure, many companies transfer large parts of their value-added processes to suppliers in countries with lower cost levels. Hence, these firms are active in various countries and cultures and deal with a large number of suppliers (Jahns et al., 2007; Reuter et al., 2010). The spatial distribution of suppliers, the global spread of supply chains, and the insufficient information regarding the actions of suppliers thereof, can result in a lack of control by the focal company (the company that controls the supply chain) (Seuring & Müller, 2008). Therefore, it seems relevant for corporate success how these global challenges in supply chains are managed (Kotzab, Friis & Busk, 2006).

However, supply chain management (SCM) is not only complex because of the international distribution of goods and services, or the large distances between the business partners. The diverse political and socio-economic conditions, particularly with regard to suppliers from developing and emerging countries (Teuscher et al., 2006; Beske, Koplin & Seuring, 2008), has – beyond conventional economic challenges – also led to social, environmental challenges across the supply chains (Lamming & Hampson, 1996; Handfield et al., 2002; Jahns et al., 2007). Companies face a high risk of product liability or loss of reputation due to poor working or environmental conditions at suppliers' sites, which cannot be monitored easily (Roberts 2004, 3; Piplani, Pujawan & Ray, 2008). Examples such as the consumer boycotts against Nike demonstrate this (e.g. textile and automotive industry; cf. e.g. Locke, 2003; Beske, Koplin & Seuring, 2008).

Against this background, it is not surprising that there is a growing interest in research on sustainable supply chain management (SSCM) where environmental and social issues are dealt with in the development of the global supply chain management in an integrated way

(Seuring & Müller, 2008; Bai & Sarkis, 2010; Gold, Seuring & Beske, 2010; Teuteberg & Wittstruck, 2010).

Next to the risk-related aspects described earlier (e.g. loss of reputation due to worker abuses), SSCM can also be a source of opportunity and innovation. There is an increasing demand for environmental-friendly and socially responsible produced products and services (Geffen & Rothenberg, 2000; Kassinis & Soteriou, 2003; Carter & Jennings, 2004) and, hence, for sustainability-oriented innovation at the side of the companies (Hansen et al., 2009). As sustainability-oriented innovation aims at developing products (and services) with improved social and environmental impact across the whole physical life-cycle (primary resources, parts and module supplies, production, consumption, end-of-life, or recycling), beyond actual *product* innovation, sustainability-oriented innovation also heavily depends on *process* innovations (Schumpeter, 1934, 2007; Hansen et al., 2009).

Overall, process innovations in the area of SSCM are inevitable for both risk reduction and opportunity seeking in the context of sustainability. These process innovations can be rather incremental in the sense that environmental/social aspects are integrated into conventional SSCM practices or they can be more radical by re-conceptualizing the supply chain with regard to who is in the chain and what the chain does (Pagell & Wu, 2009). In the current paper, we look at the former incremental process innovations. More specific, we look at processes of supplier management (Holt, 2004; Pagell & Wu, 2009) including the processes of supplier evaluation, selection, and development (Schiele, 2007; Reuter et al., 2010).

Up to now, there are only few quantitative empirical studies which focus on supplier management and the implementation of SSCM in stock corporations. Existent research concentrates on conceptual contributions (Carter & Dresner, 2001; Zsidisin & Siferd, 2001) or case study designs (Mamic, 2005; Pagell & Wu 2009; Reuter et al., 2010). Only a few quantitative studies deal with the particular aspect of the implementation of SSCM (Min &

Galle, 2001; Vachon, 2007; Beske, Koplin & Seuring, 2008) or analyze only selected dimensions of sustainability (e.g. Holt, 2004, who examines the ecological dimension of SSCM). Other quantitative econometric studies analyze the link of SSCM measures and financial performance (Chien & Shih, 2007). Furthermore, some studies have partly lost its topicality due to dynamic changes in recent years (e.g. Beske, Koplin & Seuring, 2008 who use survey data collected in 2003 or Holt, 2004). Regarding the theoretical underpinning, there are just a few empirical papers which focus on sustainable supplier management using the principal agent theory (e.g. Rossetti & Choi, 2008; Müller & Gaudig, 2011) or transaction cost theory (e.g. Hall & Matos, 2010; Carter & Easton, 2011).

In order to narrow this gap, this paper adopts the theoretical perspective of the principal agent theory and pursues the following research question: *Which innovative supplier management processes do large companies use in order to manage social and environmental issues in the supply chain?*

The research will address this question by means of an exploratory survey conducted among large and mid cap German companies listed on the German stock exchange. The perspective of the principal agent theory is used to explain challenges of uncertainty and information asymmetry between the focal company (principal) and its suppliers (agents) (Williamson, 1975; Simpson, Power & Samson, 2007).

The paper is divided into five parts. After the introduction, part two gives an overview on literature regarding SSCM in general and sustainable supplier management processes in particular. The third part presents the methodology and the core results of our survey. Part four discusses the results and considers implications for future research. Part five gives a brief conclusion and outlook.

2 Background on SSCM and innovative supplier management processes

2.1 Supply chain management and sustainability

Conventional SCM refers mainly to the management of flows of material, goods, information, and capital and involves the upstream and downstream linkages between different actors throughout their entire supply chain (Handfield & Nichols, 1999, 2; Pagell & Wu, 2009). Furthermore, SCM covers the distribution, disposal, and recycling of material and goods across partial or whole supply chains (Carter & Dresner, 2001; Zsidisin & Siferd, 2001; Haake & Seuring, 2009). In order to match requirements such as the right supply and storage conditions, quantity, and quality, costs and time have to be considered. The management of information flows as well as the effective coordination between the partners across the supply chain are also considered to be major challenges (Cooper, Lambert & Pagh, 1997).

In the supply chain, companies have to deal with suppliers which are spread broadly across the globe with significant complexity, for instance, due to cultural differences. Further, from the perspective of agency theory, a significant risk of uncertainty exists due to the information asymmetry between the focal company and its suppliers. This asymmetry increases with the distance of the (preceding) supplier to the focal company, which in turn can be opportunistically exploited by the supplier (Coase, 1937; Williamson, 1975; Drumwright, 1994). This is why a focal company is usually not well informed about all local environmental and social conditions at the suppliers' sites (De Nardo et al., 2010). These conditions can refer, for instance, to the use of hazardous substances or violations of human rights (Koplin, Seuring & Mesterharm, 2007).

When the conventional scope of SCM is extended to such environmental and social issues the notion sustainable supply chain management is used. Following the triple bottom line approach (Elkington, 1999), in SSCM all three dimensions of sustainability are explicitly

considered in the design and optimization of the supply chain (Seuring & Müller, 2008; Bai & Sarkis, 2010; Gold, Seuring & Beske, 2010). Based on this understanding, two aspects require further explanation: first, what are the drivers for SSCM and what are the specific environment and social issues addressed.

Objectives and drivers of SSCM

Important objectives of SSCM are the reduction of social and environmental risks across the supply chain. Moreover, as sustainability-oriented product innovation requires to think in the overall life cycle (from sourcing to consumption and recycling), SSCM (understood as implementing more sustainable processes in the supply chain) is also directly linked to the development of more sustainable products or services (Halldórsson, Kotzab & Skjoett-Larsen, 2009; Håkansson & Snehota, 1995, 144; Preuss, 2007).

When looking at the motivation for SSCM, several external and internal stakeholders can be identified which put pressure on companies to engage in SSCM. Externally there are mainly governments and regulators (Hall, 2000; Carter & Dresner, 2001; Min & Galle, 2001; Walker, Di Sisto & McBain, 2008), customers and competitors (on the market level) (Lamming & Hampson, 1996; Klassen & Vachon, 2003; Zhu & Sarkis, 2006), and NGOs as well as the general public (on the societal level) (Sharma & Vredenburg, 1998; Wycherly, 1999; Koplin, Seuring & Mesterharm, 2007). Internally the top management and the sustainability (or corporate responsibility) department are very important. They either forward the external pressure mentioned above or they act according to the company's own attitude towards social responsibility (Wycherly, 1999; New, Green & Morton, 2000).

Issues and standards of SSCM

SSCM deals with a broad diversity of social and environmental issues, for instance, the avoidance of child and forced labour, energy and material consumption, or biodiversity

(Mamic, 2005; Halldórsson, Kotzab & Skjoett-Larsen, 2009). Instead of managing each issue in isolated form, companies conform to norms or apply common standards (Beske, Koplin & Seuring, 2008; Seuring & Müller, 2008). In the following some examples of norms and standards are quoted categorized by economic, environmental, and social aspects:

- Economic criteria: e.g. OECD guidelines or in the sense of quality aspects DIN ISO 9000)
- Environmental criteria: e.g. Eco-Management and Audit Scheme (EMAS) and DIN ISO 14001
- Social criteria: e.g. conventions of the International Labour Organization (ILO) and the Global Compact

Moreover, companies use codes of conduct to control the social or environmental impact of supplier activities across their global supply chains. Such codes are often more specific than international standards in that they can consider characteristics of a sector or the specific company (Kolk, Van Tulder & Welters, 1999, 152; Handfield et al. 2002, Mamic, 2005). Codes of conduct as well as norms and standards can serve as criteria for evaluation and selection of suppliers, which will be elaborated in the context of *supplier management processes*.

2.2 Innovative supplier management processes

A central challenge when considering sustainability aspects in the relationships between the focal company and its suppliers (Bowen et al., 2001) is the integration of sustainability into supplier management processes. Both incremental and radical process innovations can improve SSCM (Pagell and Wu). In the present paper, two major types of processes are distinguished and are further described in the following subsections: *evaluation* and *selection*, *on the one hand*, and *development* of suppliers, *on the other* (Carter & Jennings, 2004;

Koplin, Seuring & Mesterharm, 2007; Simpson, Power & Samson, 2007; Müller, Gomes dos Santos & Seuring 2009; Reuter et al., 2010).

Supplier evaluation and selection

One main aspect discussed in the principal agent theory is the problem of disadvantageous selection of suppliers before contracting (adverse selection). Furthermore, there is the problem that companies are not able to control the suppliers' behaviour after a contract has been signed (moral hazard) (Eisenhardt, 1989; Zsidisin & Ellram, 2003). To evaluate the suppliers' performance, the suppliers themselves can offer to conduct internal audits or to use internal monitoring approaches (Mamic, 2005). Furthermore, external audits and certification by third party auditors are options to countervail the aspects mentioned with regard to principal agent problems (Mamic, 2005; Vachon, 2007). As noted above, codes of conduct, norms and standards can also serve as a basis for supplier evaluation and associated certification (Walton, Handfield & Melnyk, 1998; Holt, 2004). However, with regard to the principal agent theory, it also has to be considered that these different forms of mechanism can be parts of contracts. This means possible additional transaction costs such as costs for bargaining and enforcing the requirements (Mamic, 2005; Simpson, Power & Samson, 2007).

In addition, the labels and certificates which authenticate the compliance with environmental and social requirements and standards (signalling) can be used for *supplier evaluation and selection*, since they can serve as criteria for decision-making. Supplier evaluation might be part of continuous monitoring processes (Walton, Handfield & Melnyk, 1998; Holt, 2004). This option can be accompanied by incentives or sanctions. In the most extreme case, a negative evaluation result may lead to the termination of the business relationships (Darnall & Carmin, 2005; Delmas & Montiel, 2009). However, such a termination always entails a new search and selection of suppliers – which means additional transaction costs – whilst there is

no guarantee that the new supplier will actually fulfil the social and environmental requirements. An alternative to this termination is to develop suppliers.

Supplier development

Though still less important than evaluation and monitoring (Holt, 2004), supplier development becomes more essential for SSCM (Seuring & Müller, 2008; Vachon, Halley & Beaulieu, 2009; Reuter et al., 2010). When a focal company develops its suppliers it invests time and money to improve the supplier's performance. Pagell and Wu (2009) see that by collaborating with suppliers companies strive toward acquiring new knowledge themselves. Thus, supplier development can lead to product and process innovations on both, the buyer's and supplier's side (Geffen & Rothenberg, 2000; Rao, 2002; Hsu & Hu, 2008).

Based on a multiple case study research, Pagell and Wu (2009) identified supplier development as one of the important elements to ensure supplier continuity. When there is a stable supplier buyer relationship, information asymmetry can be reduced (and thus moral hazards can be avoided).

Possible instruments of supplier development are, for instance, dialogues with suppliers, to raise the awareness for sustainability aspects or to agree on measures to improve social and environmental conditions (Mamic, 2005; Delmas & Montiel, 2009). The focal company can invest in education and trainings of its suppliers or can also, together with the suppliers, take specific practical measures (e.g. to reduce the CO₂ emission) (Mamic, 2005; Reuter et al., 2010). Though these joint projects may cause costs of implementation, the information costs and uncertainty can be reduced.

Some risks associated to supplier development should also be mentioned. The development of suppliers means that other buying companies can also benefit from this effort. Hence, this could imply sunk costs for the investing company and cause the problem of free riding

(Mamic, 2005; Pagell & Wu, 2009). Monitoring the behaviour of other buying companies might be one option, but it is not easy to control this possible free riding behaviour by others, since the improved conditions at the supplier's site can be understood as common resources (Dyer & Nobeoka, 2000).

3 Empirical research

3.1 Research methodology

The research findings presented in this paper were obtained by means of an exploratory quantitative survey among large and mid cap companies listed on the German stock exchange. An exploratory approach was taken in order to map the state of SSCM in large enterprises in Germany. The analysis is based on a survey which was conducted from September 2008 until January 2009. For the survey we used a standardized questionnaire which consisted of five parts:

- Information about the company
- Supply Chain Management within the firm
- Supply Chain Management, focusing on the upstream side
- Supply Chain Management, focusing on the downstream side
- Sustainable supply chain management.

The questionnaire contained 38 questions (partly open, partly closed ones). The questionnaire was designed on the basis of the literature on SSCM as introduced in the previous chapter. In order to depict the state of SSCM in enterprises as comprehensively as possible, the questions addressed very different SSCM aspects such as drivers and barriers as well as standards. For validation of the questionnaire, we conducted a pre-test with four persons who work in different companies in the field of purchasing or corporate sustainability.

For the main survey, we contacted the 80 largest companies listed on the German stock exchange (the 30 large cap and 50 mid cap companies) via an initial telephone call to identify the responsible manager and to confirm the contact information. Since 8 companies denied participating in this survey, the questionnaire had been mailed to the remaining 72 companies via post or e-mail. The contacted persons were predominately from the purchasing/SCM/logistic department (57 %). 25 % worked in the sustainability or related (quality/health/safety/environment) department, and 9 % in other departments (e.g. external relations). The remaining respondents (9 %) did not reveal information about the department in which they worked. *Table 1* illustrates the sample characteristics. The survey yielded 32 usable questionnaires, equalling a response rate of 44%.

Insert Table 1 about here

The results of the returned questionnaires will be discussed in the following. First, the characteristics of the supply chains of the companies surveyed are described. Afterwards, the main drivers for SSCM, the relevance of social and environmental issues, and innovative aspects in SSCM are outlined. Finally, the innovative processes for integrating sustainability into supplier management are investigated.

3.2 Characteristics of the management of global supply chains regarding sustainability

Complexity in international supply chains

Looking at the sheer number of suppliers, more than the half of the companies surveyed state they have more than 5,000 suppliers (53 %) and 25 % affirm they have 1,000 to-5,000 suppliers. Furthermore, they source from a great number of different countries (47 % of the companies source from 50 and more countries) and partly from emerging and developing

countries. 44 % and more of the companies surveyed state they source from emerging countries from Asia, Latin America, or Africa; 28 % and more companies claim they source from developing countries from Asia, Latin America, or Africa. Furthermore, three quarters of the companies affirm that their production and service sites have become more international within the last five years. All these aspects of international sourcing and production indicate a high potential of *complexity* and a manifoldness of sustainability challenges.

Overall, companies mention various reasons for complexity (*Figure 1*). The majority of the reasons are decisive or very decisive for complexity in supplier relationships – in particular the number of suppliers.

Insert Figure 1 about here

Most of the companies surveyed evaluate their international supplier relationships as complex (50 %) or very complex (31 %). Other empirical studies confirm the growing importance of the globalization of the supply chains and associated challenges which apply, in particular, to emerging and developing countries (Reuter et al., 2010).

Besides the wide range of countries and the large number of suppliers, companies also face a variety of sustainability issues. The importance of several issues is emphasized by the companies surveyed (*Table 2*).

Insert Table 2 about here

As the *Table 2* shows, next to conventional economic issues, a broad range of social and environmental issues also plays an important role. As to be expected, issues such as climate change and health protection score highest in the perception of practitioners. The companies attach only little importance to the issue of biodiversity although this is recently high on the international agenda (e.g. the United Nations had declared 2010 to be the International Year of Biodiversity). Other studies investigating sustainability issues prove that biodiversity has so far received little commitment from companies (Bishop et al., 2008).

When looking at the results shown in *Table 2*, it is surprising that there are no distinct differences between environmental and social issues. This is in contrast to findings suggested that research in SSCM was dominated by environmental issues, whereas social aspects were still rare (Seuring & Müller, 2008). The wide range of relevant sustainability issues underlines that companies have to deal with a high level of complexity due to the fact that all three dimensions of sustainability have to be considered (Seuring, Goldbach & Koplin, 2004; Kumar & Malegeant, 2006).

Drivers

SSCM is driven by different internal and external stakeholders. According to practitioners, the most important *external* drivers in the future are customers/end consumers (72 %), the regulators (national/international) (69 %), shareholders (56 %), and press/media (50 %). The relevance of these stakeholders can already be seen in previous studies (e.g. Carter & Dresner, 2001; Walker, Di Sisto & McBain, 2008).

With regard to *internal* drivers, the respondents consider the following ones as most important: the sustainability/environmental department (78 %), the top management (75 %), the purchasing department (59 %), and owners/shareholders (50 %). Other departments

(production, marketing and R&D, each 19 %), strategy (16 %), and accounting and controlling (each 3 %) play only a subordinate role for SSCM.

The respondents claim that marketing and R&D are less involved in SSCM issues. This is a surprise, since these are the departments which deal with demand from customers and related innovation activities. As mentioned above (cf. external drivers), customers are seen as one of the main drivers for SSCM, thus SSCM should not be understood as an issue limited to the purchasing department. For instance, if the marketing department wants to utilize sustainability efforts in external reporting or product labelling, information about the companies' purchasing and other supply chain activities are required.

Goals

The most important goals for considering social and environmental aspects in procurement are risk-oriented, such as the reduction of supply risks or the fulfilment of legal requirements. The potential of R&D is only the second last important goal.

Nevertheless, 88 % of the companies surveyed state they consider environmental and social aspects in their procurement. Moreover, the companies were asked which goals they strive for to integrate environmental and social aspects in purchasing activities (*Figure 2*).

Insert Figure 2 about here

Reputation improvement (81 %) and risk reduction (66 %) are pursued most often as a “permanent” goal. Cost optimization is also an important goal, although it is a less systematically formulated one (permanent 56 % and temporarily 28 %). Fostering R&D is a goal which is more important than becoming a market leader; however, it is often only a

“temporary” goal. In sum, the most common answers reflect a reactive attitude of the companies characterized by risk reduction and reputation improvement.

In total, 66 % of the companies surveyed claim they use R&D partnerships. 47 % cooperate with their suppliers in terms of supplier integration, 28 % use a consortium or working group (without R&D partnership) and 16 % have a joint venture with their suppliers. Overall, 84 % of the companies claim they cooperate with their suppliers beyond the mere purchasing process.

Cooperation is an option for a company to achieve a more sustainable supply chain (Bowen et al., 2001) and to facilitate knowledge transfer (Dyer & Nobeoka, 2000). Collaborative work means that information and knowledge is transferred between the focal company and its supplier. Here, not only the focal company can provide information to the supplier, it also could be the other way round, so that the supplier transfers its knowledge to the focal company (Klassen & Vachon, 2003). Hence, in the medium and long-term, a buyer company can reduce transaction costs by encouraging cooperation with its suppliers, because the company does not have to search for new information. In the short time, though, there might be additional costs due to the fact that collaboration requires more coordination. Together the partners can develop new processes so that they will need fewer resources or they will be able to better cope with sustainability challenges in the supply chain.

3.3 Supplier management processes for sustainability

Requirements, evaluation, and selection

Within supplier management, companies apply standards to *formulate requirements* for suppliers in order to, for instance, prevent adverse selection (cf. 2.2). *Table 3* shows how often companies make environmental or social requirements an explicit part of formal supplier agreements. It can be seen that, in contrast to social requirements, environmental

ones are more often addressed. Moreover, there is a difference regarding the fixing of requirements in evaluation and audits by own staff in comparison to evaluation and audits by external service providers.

Insert Table 3 about here

Companies partly place more emphasis on environmental requirements. This is in particular true for minimum standards, codes of conduct, and own evaluation of suppliers and audits by own staff. Interestingly these results contradict the findings regarding the relevance of sustainability issues – in that the environmental and social issues are more or less equally important (cf. 3.2). An explanation might be that even though environmental and social issues are similar regarding their perceived relevance, however, environmental aspects can better be quantified and controlled and thus, implemented more easily. As a consequence, they better serve as requirements in supplier evaluation (Richards & Gladwin, 1999).

Assuming that environmental and social standards are similarly applied for internal and external supplier evaluation, still there is a difference regarding the implementation of this evaluation. It is noticeable that supplier evaluation and audits by own staff are nearly twice as often implemented than evaluation by external service providers – although there is a great number of external service providers available (Mamic, 2005). The internal solution gives the company the opportunity for capacity development and allows more degrees of freedom. However, a (subsequent) evaluation and audit by a third party might be necessary since companies are urged to do so by external stakeholders in order to assure credibility and legitimacy (Zadek, 2004). Still, it has to be mentioned that external auditors might not always act entirely independent (Mamic, 2005; Müller, Gomes dos Santos & Seuring, 2009).

Compliance with standards

The respondents state that they require most often proof of codes of conduct (63 %), and of the global known standards ISO 9000 (44 %) and ISO 14001 (41 %) from all or a lot of their first-tier suppliers. A proof of some other norms and standards is considerably rare required; for instance, ILO core labour standards (25 %), Global Compact (13 %), OECD guidelines for multinational companies (9 %), EMAS, AA 1000 and SA 8000 (each 3 %). Compared to other studies, on the one hand, the results confirm that some standards such as SA 8000 are less required because of the sector specificity. On the other hand, the findings do not reflect the acknowledged wide-spread use of EMAS (Koplin, Seuring & Mesterharm, 2007).

Beyond this, the companies seldom require proof of norms and standards from their second or third-tier suppliers. This might be explained with a fairly difficult access to information accessibility regarding the action of the lower tier suppliers. Also, companies may think that “trickle down” and “green multiplier effects” (Preuss, 2001; Holt, 2004) automatically push environmental and social requirements further upstream into the supply chain.

Supplier development

Beyond selection and evaluation processes, supplier development is another target for process innovations in the context of SSCM. For supplier development, companies can use a wide range of measures and corrective actions to change and improve environmental and social conditions at the site of suppliers (*Table 4*).

Insert Table 4 about here

Nearly half of the companies surveyed (47 %) state that they “always” use warnings in case of non-compliance, while talks to define potentials for improvement are only frequently used by

about one third of the companies (31 %). The termination of a supplier relationship is still for one quarter of the companies a possible option. Trainings for improvement (9 %) are the least usual action. Furthermore, the companies take different measures “sometimes”. Here, the own control of local conditions (69 %), trainings for improvement (56 %), and talks to define improvement potential (53 %) as well as the termination of supplier relationship (50 %) are the most common ones.

As a result, the companies surveyed seem to be still reactive with regard to their measures to claim SSCM engagement from their suppliers. The measures which have a proactive character (e.g. trainings), but they are yet not as common as reactive measures such as admonishment in case of non-compliance. In general, this is not surprising because significant investments are necessary to change the environmental and social conditions at suppliers’ sites.

Still, the termination of supplier relationships is not the first choice either. In some sectors, non-compliance with sustainability standards is more common than an exception (Peters 2010, 50-51; PwC & Oekom Research 2009) so that the consequent termination of supplier relationships is not practicable. In support of this, Holt (2004) shows that suppliers are seldom affected by contract termination. Thus, requirements with regard to standards and codes of conduct sometimes only serve as a starting point for collaborative supplier development (Mamic, 2005; Bernstein & Greenwald, 2009). Contract termination may also be disadvantageous because it is related to additional cost of searching and building up a new supplier relationship. Moreover, it does not necessarily lead to an improvement of information and reduced uncertainty regarding environmental and social local conditions of the suppliers. Moreover, supplier development can even be economically advantageous. Even though, the investment in trainings is associated with costs, the focal company can gain from improved supplier know-how through reduced risks and improved quality.

4 Discussion and further research

4.1 Supply chain characteristics

The exploratory study shows that the companies surveyed have often a large number of suppliers and source from a large number of different countries (industrial, emerging, and developing countries). Furthermore, they state that their service and production sites have become more international within the last five years. Hence, the companies have to cope with a high level of complexity. Besides this, the complexity also raises due to additional sustainability issues that they have to consider. Although economic aspects are still of the most relevance for supply chain management, meanwhile, various social and environmental issues also play an important role. It is surprising that there are no distinct differences between environmental and social aspects found as other studies indicate that SSCM was dominated by environmental issues (Seuring & Müller, 2008).

4.2 Supplier management

The companies surveyed base their environmental and social requirements most strongly on the compliance with standards in terms of signalling from the suppliers' side (*Table 3*). Second, the environmental and social aspects are fixed in supply contracts. This can be based on a balance of interests between the focal company and its suppliers whereas possible corrective actions and sanction measures can be part of the contracts. Third, evaluation and audit mechanism by the own staff is one possibility to integrate sustainability issues in supplier relationships. Evaluation and audits can help to avoid adverse selection before contracting and can help to reduce the risk of a moral hazard after the closing of the contract. Control mechanisms carried out by third party auditors only play a subordinate role in the companies surveyed. An external evaluation or audit can be useful in case of rare resources within a company, but then the company cannot extend its knowledge and it is dependent on

the conditions of an external service provider. Nevertheless, external audits are sometimes inevitable since they are used for external legitimacy reasons (Zadek, 2004; Peters; 2010, 40). In general, the companies surveyed use measures to integrate sustainability aspects in their purchasing which can quite easily be implemented (minimum standards, contracts) instead of focusing on more resource intensive mechanism such as screening and monitoring. Furthermore, sustainability criteria are not always based on (more reliable) control and auditing mechanism. This can be an indication that companies still act more reactive with regards to SSCM and that their related activities are rather reputation-oriented.

4.3 Supplier development

The findings show that the companies use a spectrum of measures and corrective actions to change and improve environmental and social conditions at the site of their suppliers (*Table 4*). Admonishing suppliers in case of non-compliance is the measure which is most often used as a standard practice, followed by talks to define potentials for improvement, and the termination of the supplier relations. Own audits and trainings are only less important with respect of permanent measures, but these measures are often taken “sometimes”. Although the termination of a supplier relationship caused by non-compliance with environmental and social requirements does exist in practice, it bears the risk of additional transactions costs (costs for information and contracting) since there will be a need for searching and selecting a new supplier. Moreover, the focal company cannot be sure that a new supplier would definitely perform better in terms environmental and social requirements, as the risk of adverse selection and moral hazard also relates to the new supplier.

More important than the termination of supplier contracts appears the possibility of supplier development. In contrast to earlier studies (e.g. Holt, 2004), but in accordance with more recent research (Mamic, 2005; Pagell & Wu, 2009; Reuter et al., 2010) a high relevance of supplier development can be noticed. The increased interest should be seen in the context of

increasingly international supply chains, a growing role of sourcing from emerging and developing countries, and the rising importance of sustainability issues. Hence, capacity building and knowledge transfer through innovative supplier development processes become more important.

The growing importance of sustainability-oriented supplier development is also desirable for overall sustainability, at least for two reasons: first, if suppliers are developed instead of being listed out the local economic, social, and environmental conditions at the suppliers' sites can be improved. In case of the termination of a supplier relationship these conditions might remain unchanged, due to the fact that the suppliers do not have financial resources to change the conditions. Second, trickle-down effects can be provoked since the first tier supplier itself may formulate environmental and social requirements for lower tier suppliers, too. Furthermore, spill over effects can be realized in terms of developments of the supplier's region or sector.

Supplier development can be beneficial for the above mentioned reasons, however, it can also be accompanied by own difficulties. In contrast to the problems of adverse selection und moral hazard, companies might have to deal with the holdup problem. In this case, a focal company runs the risk of resource dependency because of its investments in supplier development (e.g. trainings). If a supplier acts in an opportunistic manner, in the way that affects the company-supplier relationships, the focal company will have sunk costs (Holt, 2004). Therefore, companies can protect their investments with specific contractual and structural arrangements (e.g. long lasting contracts, strategic partnerships, supplier integration). Monitoring the behaviour of other buying companies might be another option. However, it is not easy to control this possible free riding behaviour by others, since the improved conditions at the supplier's site can be seen as common resources (Dyer & Nobeoka, 2000). Nevertheless, from the sustainability and ethical perspective, free riding

behaviour of others should not weaken the point to invest in better supplier's social, environmental, and economic conditions (Rawls, 1971; Shankman, 1999).

Additionally, supplier development can then be a foundation for a long lasting collaboration between the focal company and its supplier. This in turn will probably be accompanied by an establishment of trust between the supply chain partners, which may in turn reduce transaction costs (since a change of suppliers will be less probable).

4.4 Limitations and further research

SSCM and the cooperation between a focal company and its suppliers gain in importance so that further research interest can focus on these linkages. Therefore, different strategies are conceivable:

- To better understand the interorganizational horizontal relationships and networks (e.g. Holt, 2004) between a focal company and its suppliers, the reasons for the different measures in supplier management (admonishments, terminations of supplier relationships, trainings, etc.) can be investigated. Furthermore, possible trickle-down effects with regards to environmental and social issues have been identified. Therefore, the possible consequences for first and lower tier suppliers as well as for the focal company can be analyzed.
- The empirical study confirms the high strategic relevance of the purchasing department with respect to sustainability issues within the supply chain and the focal company (Preuss, 2007). The purchasing department's challenge will be how to develop the expertise and how to collaborate with the other departments within the company to manage the various sustainability issues. There are already some attempts to cope with these cross-functional challenges.

- Within supplier development, a tight collaboration between a focal company and its suppliers can focus on sustainability-oriented product innovations (Preuss 2007; Seuring & Müller 2008; Hansen, Große-Dunker & Reichwald, 2009). Since these development processes are not limited to intercompany collaboration, intermediaries (understood as third party organizations; Miller & Choi, 2003) can also play an important role to sustainability-related innovations. A multi-layer cooperation and can be a stable foundation for such product innovations within R&D activities.

Within this study we have adopted the theoretical perspective of the principal agent theory to discuss the empirical data regarding supplier management processes as an important part of SSCM. Using the principal agent theory is a classical approach to analyze supplier buyer relationships, because the supplier (agent) and the focal company (principal) are connected by contractual agreements. This perspective could be broadened with regard to the stakeholder approach. Hill and Jones (1992) suggest the stakeholder agency theory, which captures the fact that companies have to deal with various stakeholders and their requirements. These stakeholders are suppliers as well as other ones such as customer, media, or the general public. Regarding SSCM, there could be a huge pressure on the focal company to be responsible for the whole supply chain (Halldórsson, Kotzab & Skjoett-Larsen, 2009). As a consequence, suppliers are not always dependent on the focal company, so that there might be a reversal of the balance of power. Further research in SSCM can address this issue by taking the perspective of the stakeholder agency theory.

The results of this study are based only on basic statistical analyses with the aim to map the state of SSCM practices in larger German companies and thus should be considered exploratory. Further research could use the results to build and test hypothesis. As this study focus on environmental and social aspects the research might be plagued by a social desirable bias (Fernandes & Randall, 1992), though we tried to control it through questions for

verification in the questionnaire. Furthermore, the respondents were informed that the data would be used only anonymously.

5 Conclusion and outlook

SSCM deals with the design and optimization of supply chains while considering economic, environmental, and social aspects. The linkage of sustainability issues and management of global supply chains gains increasing interest in research and practice. Thereby, supplier management processes play an important role in facilitating more sustainable practices at the side of suppliers. The majority of the companies surveyed are – to some extent – already integrating environmental and social aspects in their supplier management processes.

Supplier management processes are rather reactive and focus on control activities and compliance with set requirements. Nevertheless, there exists a tendency toward more intense collaboration in the company-supplier relationship. Sometimes measures are already used to improve environmental and social conditions at the suppliers' location through trainings or joint improvement projects, amongst others. Activities to develop suppliers are useful for at least two reasons: first, costs for the control of suppliers can be reduced and second, long lasting supplier partnerships can be established. However, supplier development investments should be protected using contractual mechanisms or establishing long-term cooperation in order to avoid the problems of sunk costs.

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Tables and Figures

Sample characteristics	Data
Number of companies	32
Ø Number of employees	90,158
Ø Annual turnover in Mio. Euro (number of companies) ¹	27,294 (25)
Sectors (sectors according to German stock exchange)	
- Automobile	3 (9 %)
- Banks/Insurances	7 (22 %)
- Chemicals/Pharmaceuticals	6 (19 %)
- Consumer	3 (9 %)
- Industrial	6 (19 %)
- Transport & Logistics, Retail	3 (9 %)
- Others	4 (13 %)
<i>Total</i>	<i>32 (100 %)</i>

Table 1: Sample characteristics (Data from business reports 2007/2008)

¹ 25 of the 32 companies disclose the turnover in their annual reports. The 7 remaining companies belong to the financial or insurance sector and disclose their total assets or gross premiums. Thus, here, these latter figures are not used for the averaging.

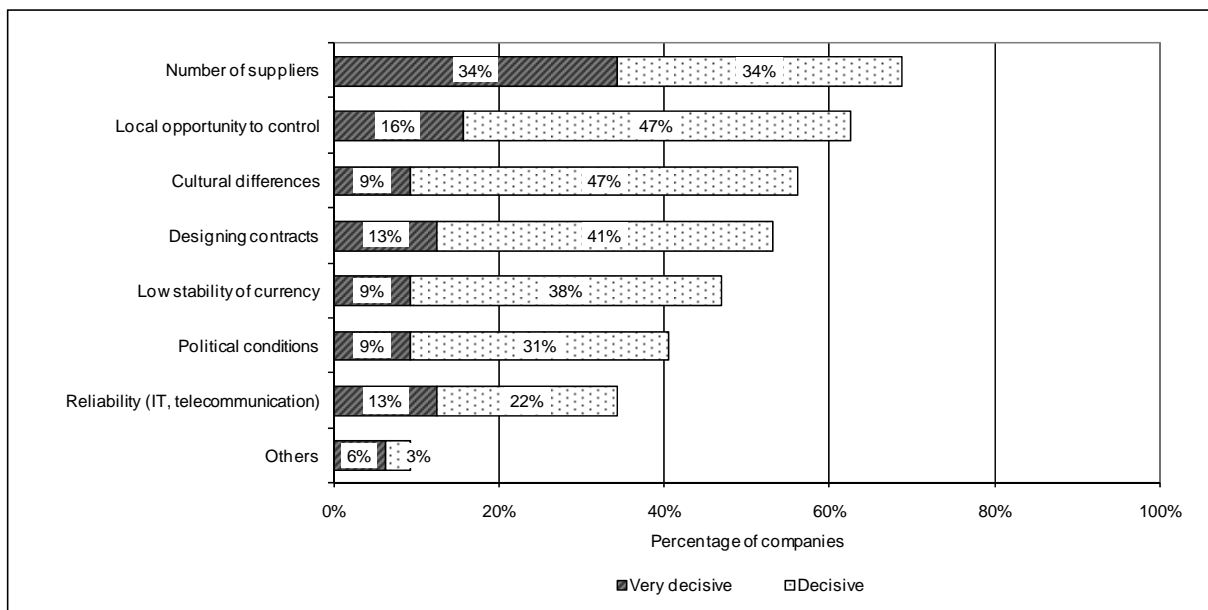


Figure 1: Reasons for complexity in supplier relationships

Sustainability issues	Relevance
<i>Economic aspects</i>	
Supplier reliability	97 %
Quality assurance	97 %
Cost reduction	94 %
Competitive pressure	91 %
Innovation potential	81 %
<i>Environmental aspects</i>	
Waste reduction	91 %
Reduction of greenhouse gas emissions	84 %
Reduction of negative impacts on the environment	84 %
Use of materials and resources	81 %
Renewable energy	63 %
Biodiversity	25 %
<i>Social aspects</i>	
Health protection	88 %
Human rights	88 %
Child and forced labour avoidance	84 %
Equal rights	81 %
Freedom of association	75 %
Job security	69 %

Table 2: Sustainability issues relevant in the supply chain (percentage of companies; multiple selection possible)

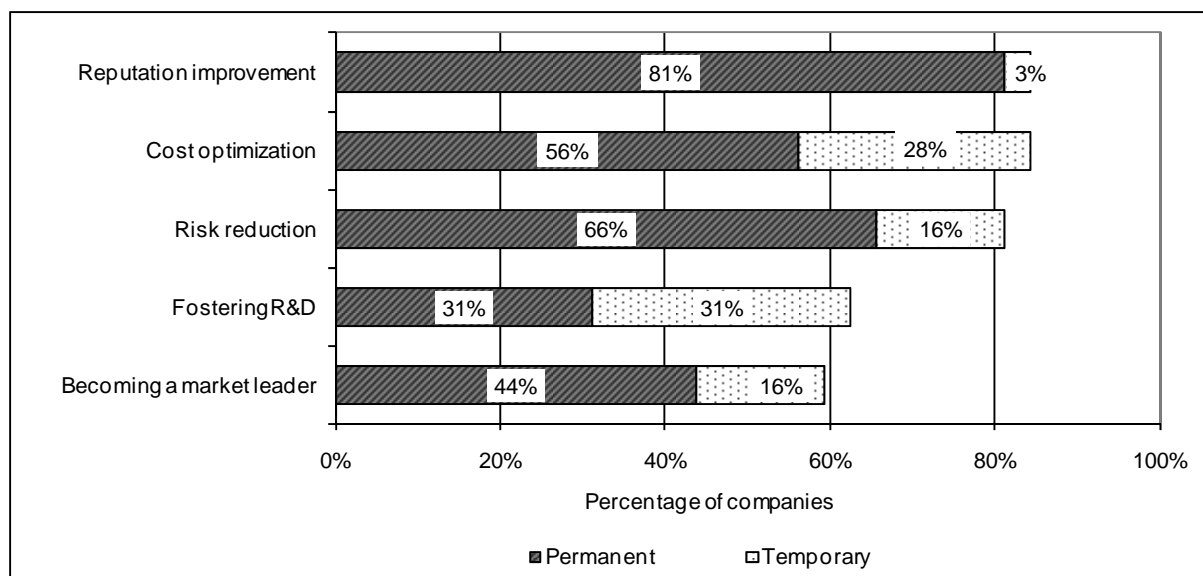


Figure2: Goals (permanent/temporary) for the integration of environmental and social aspects in procurement

Mechanisms addressing sustainability in written form	Issues addressed	
	Environmental	Social
Minimum standards	84 %	75 %
Supply agreement, general terms and conditions	78 %	72 %
Code of Conduct	66 %	56 %
Own supplier evaluation	66 %	53 %
Audits by own staff	66 %	56 %
Audits by external service providers	28 %	28 %
External supplier evaluation	25 %	25 %

Table 3: Environmental/social requirements are set in supplier agreements explicitly in a written form (percentage of companies)

Type of measure	Rule of application		
	Always	Sometimes	Never/do not know/ no answer
Admonishment in case of non-compliance	47 %	34 %	19 %
Talks to define potentials for improvement	31 %	53 %	16 %
Termination of the supplier relation	25 %	50 %	25 %
Own control in situ	19 %	69 %	12 %
Trainings for improving social and environmental conditions	9 %	56 %	35 %

Table 4: Measures and corrective actions in SSCM (percentage of companies)