

## Note on the Development of Sustainable Supply Chain Strategy

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When sustainability issues are discussed, the scientific focus is usually on companies. However, value creation, industrial ecology, life-cycle management and the proactive corporate behaviour exceed corporate limits, extending the environmental responsibility of companies between each other and through their relationship with community organizations. It is not surprising therefore that there is an increasing attention on the analysis of supply chain strategies and their sustainable nature both in theoretical research and practice. The goal of this article is to analyze the principles of sustainability in the supply chain strategy. The authors attempt to show the characteristics of sustainable corporate and business strategies and to review the supply chain strategy concepts and its basic types. Finally the loan relationship between sustainable business strategies and supply chain strategies will be explored with the help of a case study about the architectural company Skanska SA.

### 1. Introduction

The supply chain concept became generally used in the 1990s, thanks to the outsourcing of value chain components, the escalating changes in the business environment, the expansion of the purchasing and selling markets, the growing complexity of the demand, the increasing expectations, the shortening of product life cycles, and the increasing role of knowledge-intensive activities, ICT technologies. Companies realized that however mighty they are, they cannot possess alone all the essential capabilities and resources needed for market success. Therefore the approach of companies is changing: they pay attention to build relationships and enhance the external integration along the supply chain. This integration no longer occurs on the basis of hierarchical position or role, but on the basis of the knowledge and competences of the participants, which together are able to meet customer needs efficiently and effectively (LaLonde and Masters, 1993). Producers, suppliers and their intermediaries must be able to act fast, flexible, agile and adaptable; otherwise they lose their previously earned market position. Only those supply chains can be successful in the competition, which have their strategies and processes fitted to corporate strategy, to the characteristics of the provided products and services, to the requirements of the consumer markets they serve. Furthermore, the activities of individual members should be in accordance with each other well. This means that the degree of both internal and external integrity should be appropriate, suitable supply chain strategy (SCS) and proper supply chain management (SCM) should be utilised. The role of companies in sustainability, the corporate greening and the determinants of environmentally conscious corporate behaviour are also highly analyzed in the relevant literature. While one investigates the role of multinational companies (e.g. Prahalad and Hammond, 2002) and SMEs (e.g. Vickers et al., 2009), others examine the nature of competitive advantage due to environmentally conscious operation (e.g. Porter and van der Linde, 1995), or concentrates on the examination of environmental management systems and environmental performance assessment (e.g. Berényi, 2007). These studies assume that the activities, behaviour and greening strategies of companies may be the key to the objectives of sustainability. Similar trends can be seen in the field of supply chain literature. Green

design, green operation, green manufacturing, reverse logistics - just to mention a few - are the key concepts in exploring and explaining the linkage between sustainability and supply chain management. While these concepts highlight the main opportunities, tasks and methods in the greening process of SCM, one should realize that sustainable supply chain operation needs sustainable supply chain strategy embedded in sustainable corporate and business strategy.

## 2. Exploring the linkage between sustainable business and supply chain strategy

The appearance and the increasing importance of sustainable development can be explained mainly by climate change caused by human activities, global warming, population growth and urbanization induced increase in demand, inter- and intragenerational differences and other factors in connection with social and environmental impacts. In the cause-effect relation are serious consequences for example soil, water and air pollution, adverse impact on human health and biodiversity (e.g. mortality, morbidity), decrease of scarce natural resources and raw materials. In addition, non-renewable resources and raw materials cause import dependence and supply security problems in national production. All these factors influence the competitive position of companies, strategy and operation; therefore they represent risks that could mean adjustment pressure or strategic opportunities.

Companies have to adapt to the complex system of needs and conditions: the social rules, the change of consumer claims, the expectations linked to the environment consciousness, the national and the international legislative environment, the politics and the economic policy, the market tendencies (e.g. import dependence, the change in price of energy sources, competition intensity) expound adjustment pressure. Figure 1 exemplifies all this.

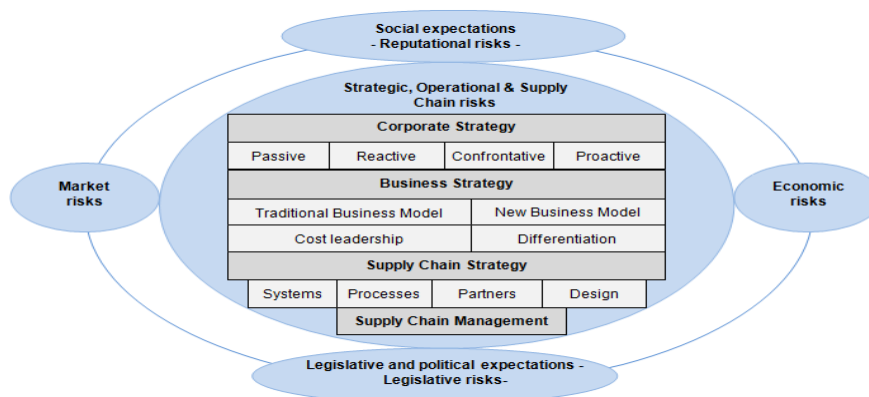


Figure 1: Risks and opportunities – Corporate, business and supply chain strategy

External challenges and internal efficiency problems cause the emergence of strategic, operational and supply chain risks that should be treated with high priority. In addition companies with environmentally conscious operating practice expect from their suppliers and distribution partners to involve in strategic and operational decision-making social, economic and environmental aspects, to synchronize actions and to acquire various certificates (e.g. ISO 14001, EMAS). Consequently, companies with internal inefficiency problems and with inability to match changes in the economic environment will have significant disadvantage in the long term, such as companies without active risk management practice (Pintér, 2007). Many times companies define such sustainability ethics, technical standards, which are far beyond the legal obligations and the general sectoral practices. The goal is to achieve higher market share by differentiating the characteristics of products and services alongside the environmental benefits. On the other hand, companies that are capable of enhancing the organizational, technological, manufacturing efficiency and mitigating environmental impacts might be able to design a favourable cost structure that means for the competitors with passive adaptation activity and with higher operational costs a significant competitive disadvantage. Also can be mentioned the emergence of entirely new lines of business, and the strengthening of the previously not or barely profitable sectors. Based on the above findings it can be stated that whether sustainability-related risks mean for companies compulsion or possibility - a strategic response should always be given. Integration of the appropriate answer into practice can be solved by redefining all corporate, business and supply chain strategies.

On the basis of the corporate strategy that tells where the company competes, the strategic behaviour can be passive, reactive, proactive or confrontative (Walton et al., 1998). If we examine these well-known

strategic guidelines of corporate sustainability in the light of the presented risks, it is verifiable that while the reactive strategy may help in the reduction of regulatory and economic risks and in addition the confrontative strategy supports the alleviation of market risks, the proactive strategy is the one to ensure the appropriate handling of all risk dimensions simultaneously. Companies continuing the proactive sustainability strategy aim for the reduction and for the prevention of the negative social and environmental effects considering their full value chain. Their innovations help in the more efficient use of the resources, their environment protection endeavours and their results are utilized in the development of the corporate image and of the market position, while they collaborate with their stakeholders (Szakály, 2001). It is obvious that the passive strategic behaviour, that is the strategy creation ignoring the exterior requirements, is suggestible for no organization.

From the business strategy side that tells how the company competes, we have to emphasize two important topics: the applicable competitive strategy and the desirable business model. The examination of these strategic business aspects is relevant in the case of all strategic alternatives presented above. According to Porter (1980), companies may obtain sustainable competitive advantage on the market fundamentally in two strategic ways. On one hand they may aspire for cost leadership that means they attempt to reduce the cost of production to a minimum. On the other hand they try for reaching differentiation by developing a valuable qualitative dimension of products and services into a customer recognized unique one. The basic strategies of Porter and the sustainable corporate behaviour can be interpreted in relation - namely the maintenance and the strengthening of the cost leadership can be reached through the results of the proactive and creative environmental responses. Significant cost saving can be reached in the production by investing substantial sums in development of the operations and the environmental management system, so the generation of waste and pollution is at minimum and the efficiency of production processes can be increased (Schmidheiny, 1992). Moreover it is frequent, that the available best practices, technologies are taken as a starting point while forming the measures and laws, so leading companies of the environmental developments and investments may create sectoral standards, entry barriers, so they acquire enormous competitive advantage (Preuss, 2001). If we look at the question of the energy and the natural resources, we may meet the reduction of the energy consumption at increasingly more companies by using programs that are encouraging energy and material awareness. While at some companies these are merely end of pipe solutions or incremental innovations, other companies introduce complex energy management systems which have the ability to control, manage and optimize energy utilization. All this may lead to the quintessential conclusion that their operations and value creation processes are reconfigured, inter alia by applying power generation technologies on the basis of renewable energy sources (Perry et al., 2008). The assessment of the environmental and social effects constitute ground for differentiation strategy, i.e. the excellence of environmental and social performance of products and services may be the key to maintaining and developing competitive advantages. It is important to notice that companies may be able to create new markets only if they manage to get a sufficient size group of solvent customers for the unique products and services (de Bakker et al., 2002). Competitive strategies based on the business models are another viewpoint to be considered for the companies. "Business model describes the rationale of how an organization creates, delivers, and captures value" (Ostervalder and Pigneur, 2010). In other words, the business model can be considered as the forming of configuration of the value chain that is matched with the strategic purposes of the company that leads to a coherent system of the value creation activities. Companies may choose from two opportunities for sustainable competitive advantage: they either implement an applied sectoral model with improved efficiency, or they work up a new business model without an example yet. From the side of sustainability, a good example of forming a new business model can be the one that was configured to display services for sale instead of products - the model of selling performance instead of goods. For example Carrier Co. worked out the refrigeration service instead of selling air conditioners and Interface Co. offered the office carpet service instead of selling wall-to-wall carpets (Hawken et al., 1999).

At this point one question arises: How and why one can think that sustainable corporate and business strategies link to the concept of supply chain management? Nowadays, the increase of the internal integration is not enough to satisfy customer claims or to exploit inner abilities. A company has vainly unique production abilities, production strategy vainly serves organizational disposals, expedient production philosophies (e.g. JIT, TQM) that are able to contribute to the maintenance and development of the market position of the company (Pagh and Cooper, 1998) are vainly used, if they ignore the importance of caring relationships and cooperation with suppliers, vendors and customers. On the other hand, the system of contacts built up with the external participants of the value creation in the context of the external integration may create the base of additional synergistic abilities, which can be copied or imitated just as inner abilities, but the task poses to the competitors much considerable difficulties. The majority of the authors dealing with the research of the supply chain think these days that the basis of the

competitive advantage are not the appropriate abilities of a single company, but rather the prominent abilities insured by the supply chain (Bovet and Sheffi, 1998). If we accept that the process of the corporate value creation exceeds the borders of single companies, then it is an obvious consequence that the view of examination of formation and operation of both the business strategic opportunities and the exploration of the business models' driving forces, should change from value chain basis to supply chain basis. We have to see that companies have impact on the environment and the society by the functioning of the relations system during the whole lifecycle of the products and services (Čuček et al., 2011). The supply chain observes material, informational and financial processes, indeed the supply chain activities may yield negative social and environmental effects. It can be declared that single companies alone are not able to meet sustainability expectations and are not able to exploit the provided opportunities. How could a company set itself as an example if its strategic approach, operations, products and services are qualified as sustainable, but the viewpoints of sustainability are not taken into consideration during the forming and development of the design of the supply chain, if sustainability does not deal with the attested behaviour of its suppliers and distributors, if it does not deal with social and environmental effects of the supply chain networks, processes and systems while all these should be formed in the strategy of the sustainable supply chain (Young et al., 2012).

### **3. Main types and elements of sustainable supply chain strategy**

Supply chain strategy determines the goals and the adequate development roadmaps of the supply chain in accordance with the corporate and business strategy of a firm. This creates the basis for strategic supply chain decisions about supply chain design, structure, systems and processes of supplier and customer relationships, and order fulfilment. Regarding sustainable supply chain strategy as Krajewski et al. (2010) highlight; companies must take into account the environmental and social impacts and risk associated with the entire supply chain (i.e. focal company, upstream and downstream processes, logistics), the opportunities of energy and resource utilization reduction offered by productivity enhancement, and innovations supporting the greening of products, processes or entire business models. As Seuring and Müller (2008, pp. 1703) conclude: “the focal company quite often has to take a longer part of the supply chain into account than needed for “pure” economic reasons”.

Supply chain experts share the view that SC design must fit the expectations of the market and the specific features of the products or services of the focal firm. According to Fisher (1997) companies can build efficient or flexible supply chains. He stresses that for functional products serving basic customer needs and having easily predictable demand, focal companies can build efficient supply chains focusing on the reduction of physical costs and the price sensitivity customers. In the case of innovative products with unpredictable, variable demand and market reactions, firms can easily face with excess or shortage inventories, and faster obsolescence - therefore innovative products need responsive supply chains. However in practice hybrid designs combining lean and agile paradigms also exist (Christopher and Towill, 2002). Hybrid supply chains can be used when the functions of the products or services are not entirely clear or innovative, when firms operate in rapidly changing and cost-sensitive markets, or there is a possibility to produce modular products and processes, activities and products can be uncoupled in spatial and temporal manner. Regarding SC design one can conclude that in general lean/efficient supply chain design inherently follows the principles of sustainability. While efficient supply chains are based on stock and waste mitigation, higher productivity and utilisation rates, sustainable process innovations are also needed for flexible re- or proactive actions to the external and internal changes. Characters of responsive/agile supply chain design – e.g. buffer capacity and inventories, small lot sizes, faster transportation, more assembly or distribution centres, etc. – at first sight contradict with sustainability, however if sustainable products can be seen as innovative products because of their unpredictable and diverse demand, the use of agile supply chain can be acceptable. In the case of hybrid supply chains, the use of postponement or “base-variable” methods can provide opportunities for mastering the controversial environmental and social effects.

The formulation of SC structures and SC processes determined by SC design is an important part of supply chain strategy. This includes the decisions about manufacturing and distribution centres – location, capacity, lead time, variety, lot size, demand and supply planning, - stocks, up- and downstream structures, outsourcing, vertical integration, negotiation, design collaboration, buying, pricing, customers services, material and information flows, transportation, etc. From the sustainable supply chain strategy point of view, sustainable planning (e.g. life-cycle engineering and related activities, design collaboration), procurement (e.g. supplier selection, sustainable sourcing), execution (e.g. sustainable production, packaging, marketing, and reverse logistics) practices must be considered.

Finally SC systems encompass the methods and processes of supply chain management, alignment, communication, and performance measurement activities. In the case of sustainable supply chain strategy

this means the creation and use of specific management and standards systems (e.g. ISO 14001, SA8000), supplier and distributor evaluation schemes, BSC-based or SCOR type performance measurement systems extended with sustainability aspect, and the platforms of inter-company communication and training. Accordingly, four types of supply chain strategy can be distinguished. Passive supply chain strategy means that the firm ignores the environmental and social aspects of the operation of its own and its partner. In the case of reactive supply chain strategy there is no deep intra- and inter-firm commitment, or collaboration about sustainability, the goal is to satisfy legislative and regulatory expectations regarding the operation of the supply chain. Confrontative supply chain strategy tries to connect sustainability aspects with cost efficiency. The goal is to transform the existent supply chain design, structures, processes and systems to be in a more efficient and sustainable form with the help of productivity enhancements and environmental stewardship. The strategy needs higher level of involvement from suppliers and customers as well. Proactive supply chain strategy incorporates the opportunity seeking and process views of the collaborative partners and the use of innovative solutions. Decisions related to supply chain design, structures, processes and systems follow this approach supporting the use of product, process and system innovations creating maintainable and long term competitive advantage for the companies.

Let us examine the case of Skanska SA - is one of the biggest players in the European building industry with 57 000 employees and 200 000 subcontractors. Nowadays European construction industry faces different challenges; one of them being the emergence of the concept of sustainable building. As it is well known, about 40% of energy consumption and about 25% of material moved by the European economy is due to the construction industry and its supply chains. Skanska SA has taken a major step towards sustainable construction by defining in its corporate strategy the goal to be the global market leader in this emerging market. However, as Figure 2 shows the company realised that in order to become the global leader, their corporate policies, structure, and culture has to change accordingly.

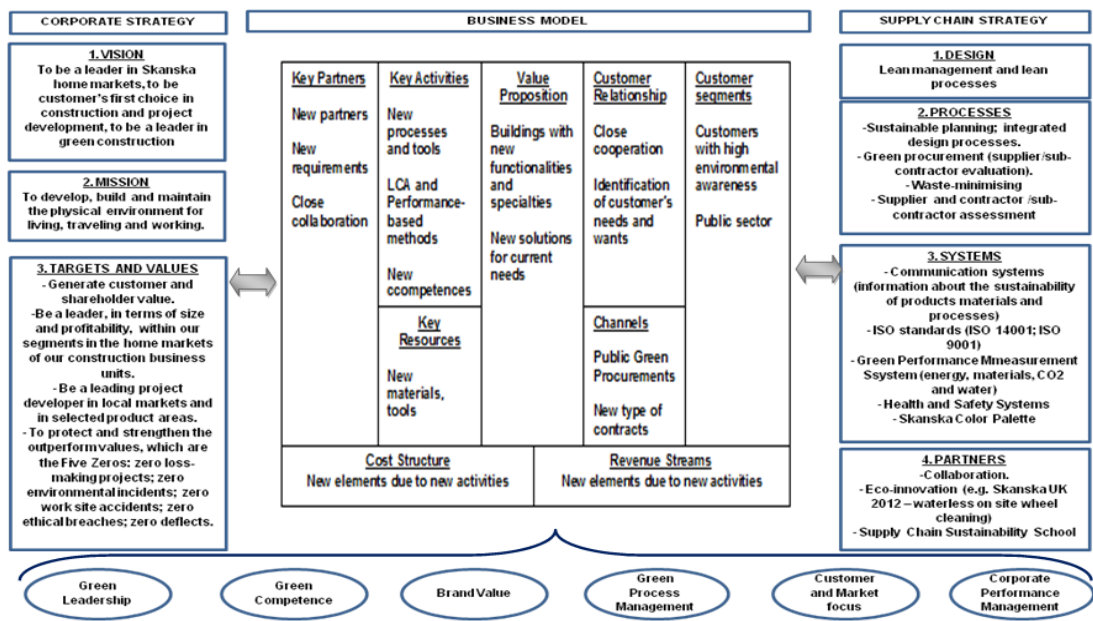


Figure 2: The interrelationship between the sustainable business strategy and the supply chain strategy in the practice of Skanska SA

The principle of Five Zeros not only directs the strategic and operational decisions made by the company, but affects its business model as well. New processes and tools (like LCA-methodology, performance-based planning), new competencies (integrated planning), new materials (with lower environmental impact and higher functionalities), new type of partners and stringent requirements, closer cooperation between contractors, subcontractors and customers have to be used, new types of customers need to be identified and satisfied. Business model changes spread to the company's supply chain strategy and management. Regarding supply chain design lean management has been privileged, new SC processes such as integrated design methodology, green procurement, sustainable partner assessment system (with environmental, social and economic aspects) has been developed. Skanska also created SC systems for better communication between supply chain elements for sustainable performance measurement

(regarding Environmental and Health & Safety issues), while ISO9001, ISO14000 and Skanska Color Palette systems have also been introduced. SC partners are not just obliged to correspond to the changed requirements, but they also participate in the company's eco-innovation processes and Supply Chain Sustainable School initiated by Skanska SA. Without these efforts made by the firm towards a proactive SC strategy, Skanska would not be able to justify its commitment for sustainability.

#### 4. Conclusions

Once the principles of sustainability become the norm in individual companies, it will move the focus of the companies on the supply chains. There is no sense to speak of corporate strategy, business strategy and green supply chain separately. Both the risk management and the exploitation of opportunities need strategic responses that can only be achieved by the sequential and simultaneous development of a strategy, using all the outlined principles. As it is apparent based on the case study of Skanska SA in the strategic approach each time unique applications are required.

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