Editorial

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The objective of sustainable management is to establish a long-term balance between the economic, environmental and social impacts of entrepreneurial activities. Recently, this is increasingly discussed in the context of supply chains, based on the assumption that this objective can be fulfilled at a higher level if the activities of enterprises in a value chain are coordinated. Thereby, novel planning and coordination problems arise, as multiple criteria evaluation as well as distributed decision-making have to be regarded. Against this background, a broad variety of topics of sustainable supply chain management, like network design, sustainable innovations, backflow forecasting, coordination in networks, remanufacturing planning, etc., were discussed at the annual spring conference of the Erich-Gutenberg-Arbeitsgemeinschaft in 2012. Researchers who presented their results at this conference were invited to submit full papers for a special issue of the *Journal of Business Economics*. We received a number of papers, all dealing with highly relevant problems and providing interesting results for the management of sustainable supply chains. Out of these, five papers could be accepted after a blind review process with at least two reviewers per paper. As result, this special issue contains papers which focus in particular on the economic and environmental

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perspective of sustainability. Papers address strategic problems of network design and facility location, tactical problems like coordination of distributed product development processes and acquisition of used products, as well as the operational-tactical problem of lot sizing in closed-loop supply chains. Whilst the strategic problems are handled from the viewpoint of centralized coordination, the (operational-) tactical problems deal with the design of contracts for a decentralized control.

Strategic network design is a planning problem that can have a strong impact on the environmental performance of the supply chain. In this context, *Altmann* and *Bogaschewsky* first point out in detail the environmental aspects of facility location, supplier selection, investment planning, process allocation, logistics and inventory planning based on a literature review. Using this as a motivation they formulate an integrated, multi-criteria planning model taking into account all costs and emissions resulting from the manufacturing of final products, as well as from the collection, remanufacturing and/or disposal of used products. Due to the long-term orientation of network design problems, aspects of uncertainty/ambiguity have to be regarded. Assuming a risk-averse decision behavior, the authors use scenario based modeling to determine planning robust optimal solutions. By means of a numerical study based on a four-echelon supply chain, insights into the dependencies of network design problems are provided.

The strategic nature of facility location problems directly corresponds to the long-term orientation of sustainability. In this context, *Treidl* and *Jammernegg* point out that the transport performance is mainly influenced by the structure of a company's distribution network. In their paper, they focus on the measurement of the economic and environmental dimensions of sustainability. In order to form a basis for environmental extensions of *facility location problems* the authors identify options for measuring the environmental performance and show how the CO₂-equivalent emissions can formally be included into the p-median problem and the capacitated warehouse location problem. The application of these problem formulations to a real-world case is used to identify the trade-off between total distribution costs and transport emissions. A detailed analysis reveals that a small deviation from the cost-optimal solution allows for noticeable reductions in carbon emissions, and that current prices of carbon emission certificates do not influence the optimal decision.

Product development processes in supply chains can be organized in a distributed way, such that a system integrator delegates the individual tasks to independent specialized suppliers. If coordination is aimed at in such a decentralized setting, the system integrator has to take interdependencies between tasks and uncertain task fulfillment into consideration. Such interdependencies exist for recycling oriented product development processes in automotive supply chains, since total recycling and recovery rates of a vehicle result from the sum of the recycling and recovery rates of individual components weighted by their mass. In this context, *Schmidt*, *Volling* and *Spengler* model the decisions to be taken in a converging supply chain with two suppliers and one system integrator as a Stackelberg game with the system integrator as the leader. They compare the total expected supply chain profit of the centralized setting with the profits the system integrator gains when applying a

wholesale price contract and a penalty contract. The analyses show that coordination of distributed development processes cannot be achieved, neither with a wholesale price contract nor with a penalty contract.

Gönsch deals with the question whether it is better to actively *acquire used products* at fixed or at bargained prices. His analysis comprises different market structures. A first setting considers the case of a monopolist (OEM) who manufactures new products and remanufactures used ones. The profits that can be gained with posted pricing are derived using traditional price theory, whereas the profits of the bargaining case are derived from the generalized Nash bargaining solution. A comparison of both profits reveals that bargaining is always to prefer to posted pricing. Thereby, the higher profit is the result of a larger quantity bought in the case of bargaining. In a second setting, the same question is answered for the situation, in which the OEM competes with an independent remanufacturer of used products. Profits that can be gained in a Cournot duopoly and in a Stackelberg game led by the OEM are compared. It turns out that in the setting of the Cournot duopoly posted pricing will be chosen by both actors, while in the Stackelberg game the OEM will choose posted pricing, whereas the decision of the remanufacturer depends on his bargaining power.

In closed-loop supply chains the flow of final products and returning goods needs to be coordinated. In the case of independent supply chain partners, this can be done using decentralized control. Pishchulov *et al.* analyze the situation, in which the *lot sizing decisions* of a vendor and a purchaser become mutually dependent due to the remanufacturing of the backflow. They extend the joint economic lot size model so that the return of used items is considered. Thereby, the purchaser can influence the fraction of returns. The coordination by centralized control is compared with decentralized control using transfer payment, a combination of transfer payment and a two-part tariff as well as a novel three-part tariff. It is shown that a transfer payment alone is not able to induce coordinated behavior. However, coordination is achieved if the transfer payment is applied in combination with a two-part tariff for the subcase of a pure collection policy. Furthermore, a novel three-part tariff is developed, which in combination with transfer payments leads to coordination in the considered setting of the closed-loop supply chain.

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