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A SCOR perspective on Green SCM

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Abstract

Supply chain management is an area which gains much attention both from scholars and practitioners when considering the relationship between economic and ecologic issues and goals. Initiatives from Green IT and Green IS are widely discussed and broad supply chain management concepts like Green SCM, which extends the concept of global supply chain management with ecological aspects like resource optimization and recycling. Current research shows, that concepts like Green SCM might be a first step towards an ecologic more responsible supply chain. The current scientific discussion only covers parts of the supply chain like transport management or sourcing strategies. But the question for a holistic concept for sustainable economic supply chain remains still open. To address this issue, this paper proposes the integration of the industry standard Supply Chain Operations Reference Model (SCOR) with Green IS to establish a sustainable supply chain management model Green SCOR beyond Green SCM. By applying Green SCOR to a selected Green SCM concept, we show the comprehensive approach in contrast to existing isolated concepts. Green SCOR may be used to analyze existing supply chains on their long-term sustainability and as a blueprint for the development of sustainable, supply chain management systems.

Keywords

Supply Chain Management, SCOR, Green IS, Green SCM, Green SCOR.

1 Motivation

Environmental changes like global warming (Stern, 2011) or resource finiteness (Deutsche Rohstoffagentur, 2012) have been topics that have attracted interests all over the world. These observations have made up the interest to identify causes and find solutions the address these changes (Porter & Kramer, 2006). To face these challenges, legislations and environmental requirement to companies have but put forward by government and environmental organization. An example for this is the Carbon Disclosure Project (CDP) which addresses a global consistent reporting of environmental relevant indicators on a company level (Carbon Disclosure Project). In addition, rising energy and resource costs forces companies to find new ways to reduce energy and resource consumption to remain competitive in the market.

In order to be able to produce and offer goods and services, a supply network started by primary product suppliers, whose products come from raw materials, is required and needs to be applied efficiently. Supply networks are a typical inter-organizational system, engaging numerous companies, processes, and technologies. Supply Chain Management (SCM) covers the process chains in a supply network and allows for long-term cooperation between all participating vendors and service suppliers all the way to the customer (Cooper, Lambert, & Pagh, 1997). It ensures that under consideration of total efficiency, optimal solutions can be implemented for investments and costs, such as transportation and information flow.

Tasks and resource usage in the supply chain have been identified in having a significant impact on the natural environment. Bloemhof-Ruward et al. describe that the wastes and emissions caused by the supply chain have become the main source of current environmental problems (Bloemhof-Ruwaard, Van Wassenhove, Gabel, & Weaver). Following this, companies are increasingly "greening" their supply chain by integrating environmental issues into supply chain management (Nikbakhsh, 2009). This so-called Green Supply Chain Management (Green SCM) has developed as a strategic asset for companies to achieve cost-optimization in the supply chain as well as reputation on the market as eco-friendly and environment-responsible company.
Green SCM makes use of this circular approach, while additionally dealing with aspects of environmental sustainability and resource optimization in order to address emerging environmental degradation and its effects before they occur(Sheu, Chou, & Hu, 2005). It also considers the recycling of goods (Ying & Li-jun, 2012) in making the entire supply chain process more sustainable. But current Green SCM measures and activities are not enough to accomplish a long-term sustainability in these complex supply chain structures. By looking at the current state of research in the area of sustainable supply chain management, the investigation of long-term aspects, which are typically covered in the strategic aspects of supply chain management, are clearly underrepresented (Srivastava, 2007; Wittstruck & Teuteberg, 2010). Therefore, the question arises, how this research gap can be addressed for further improvements. This paper answers this question by integration ecological thinking into SCOR, an industry standard reference model for supply chain management. With this approach, this paper bridges the gap between long-term sustainability and the established concepts of supply chain management to unite economic and environmental benefits and provides a holistic approach.

The paper is structured as follows: in Section 2, we explain the research approach. In Section 3, we provide the current state of research on the relevant foundations of this research. We present a current introduction to Supply Chain Management and Green SCM as well as an overview of the concept of SCOR as an established reference model for supply chain management. In section 4, we investigate SCOR in terms of resource-related activities in all process steps. This leads to the identification of resource and energy relevant activities and task when using SCOR for the implementation of Green SCM as a blueprint. In Section 5, we apply the Green SCOR model to the issue of Green SCM. We discuss some findings from the model's application in Section 6. The paper closes with a brief summary and an outlook on future research in Section 7.

2 Research Method

The main objective of this research is to create a supply chain management model with a focus on aspects of Green IT/IS. The research uses a design science approach. Design science is a research method to solve organizational problems by creating and evaluating IT artifacts (Hevner, March, Park, & Ram, 2004). These IT artifacts are defined as constructs, models, methods, and instantiations (March & Smith, 1995). Several methodological approaches for the conduction of design science research are proposed in the literature (see for example Kuechler & Vaishnavi, 2008; March & Smith, 1995; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2008). For this research, we have adapted the design science research methodology from Vaishnavi & Kuechler. Based on their five-step approach, we conducted the research according to Figure 1.

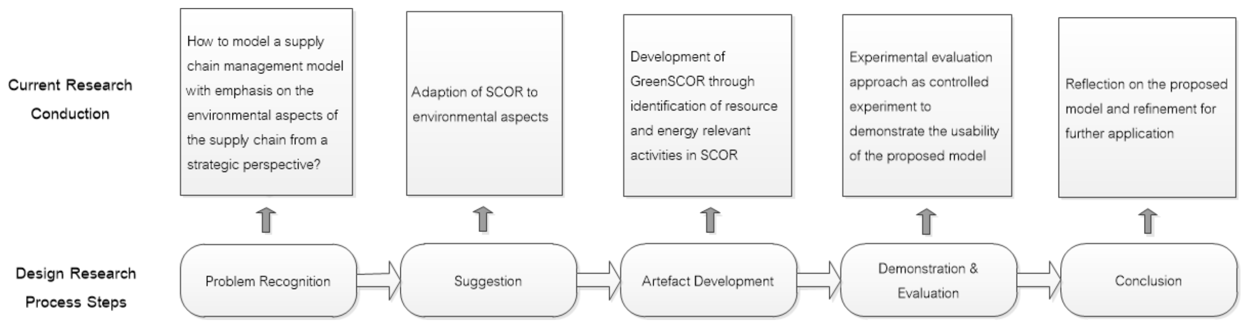

Figure 1: Research Design

The first process step, problem recognition, has been addressed in the introduction. This leads to the main research question: How to model a supply chain management model with emphasis on the environmental aspects of the supply chain from a strategic perspective? In the second process step, we recommend the adaption of the SCOR model as a reference model industry standard for supply chain modeling. In research step 3, development, we construct a new supply chain management model Green SCOR for the development and enhancement of environmental-oriented, strategic supply chains. For this, we identify activities in SCOR, which are highly related to resources and energy issues. For the evaluation of the proposed supply chain management model, we follow the guidelines for design science research according to Hevner et al. (Hevner et al., 2004). In our research, we selected an experimental evaluation approach in terms of controlled experiments to demonstrate the usability of the proposed model. In the conclusion, we reflect on the proposed model and discuss refining its further application.

3 Research Background

3.1 Supply Chain Management

In 1961, Forrester (Forrester, 1996) considered material flow and the reduction of total inventory before these issues were blanketed under the term "supply chain management" (SCM). SCM was purely concerned with the external logistical integration of customers and suppliers (see also Bowersox & Closs, 2005). The logistical literature essentially presumed rational co-operation between buyers, suppliers, and service providers and on this basis strived to find optimal solutions for inventory, transportation, information flow, etc. In contrast SCM also considered the behavioral and political dimensions of trust and power, and conflict and dependence between supplier and buyer. Logistics research focused on minimizing total cost, while SCM was concerned with long-term profitability of serving customers and their customers (Lamey, 1996). Finally, the traditional focus of logistics was often intra-organizational, while SCM became inherently inter-organizational (Larson & Rogers, 1998). Hence (Cooper et al., 1997) used the term “supply chain” to represent an alignment of firms. They defined SCM as: “The integration of business processes from original suppliers to the end-user that provide products, services, and information that adds value for customers.” Introducing the term “network” into the SCM arena has extended the SCM concept into more strategic areas, which covers long-term aspects of the customer-supplier relationship. One proposition was that competition occurred not only between firms but between supply chains and networks, see (Cunningham, 1990) and (Yoffie & Gomes-Casseres, 1994). Through a supply network’s perspective a focal company views its whole supply network in order to compare performance in its multiple supply chains, to identify potential competitive problems and opportunities, and to identify overall process improvements trough supply chain style thinking. Current industrial supply networks are formed by the flow of materials, services and associated information, supported by modern information and communication technology (ICT).

3.2 Green SCM

Green SCM has its foundation in the scientific discussion on Green IT and Green IS. There are several approaches for the definition of Green IT, depending on the focus of the application. This has lead to a variety of different terms and concepts. Murugesan defines Green IT as “… the study and practice of designing, manufacturing, using and disposing of computer, servers and associated subsystems … efficiently and effectively with minimal or no impact on the environment.” (Murugesan, 2008). Green IS puts a broader scope on the intersection between IT and the ecological impact, which includes the usage of information systems to improve sustainability within an economy (Watson, 2008).

Green SCM is a combination of SCM and Environmental Management, and it forms the sub-area of Sustainable SCM (SSCM). Since the end of the 1960’s, Environmental Management has been pursuing the idea of protecting environment by managing human´s interaction and their impacts by controlling and preventing pollution and managing entire ecosystems. (Nikbakhsh, 2009). In 1987, the committee World Commission on Environment and Development (WCED) defined the concept of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development, 1987) It has three main aspects: environmental, social, and economical. These dimensions made their way into many industry concepts such as SCM for example.

Mainly for the ecological aspects, Green SCM addresses these issues endeavors to handle incurred environmental damage and impacts, ideally before they occur (Nikbakhsh, 2009). Green SCM deals with the command challenges of SCM and additionally with aspects of environmental sustainability and challenges of resource optimization. The classical SCM only concerns itself with the one-way point of view, the one from the supplier to the customer. Green SCM brings the circle to a close by adding recycling (Ying & Li-jun, 2012). It can be framed as “…integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life.” (Srivastava, 2007). Green SCM can be divided into two blocks, Green Design and Green Operations. The first area focuses on environmentally conscious design and life-cycle assessment, while the second is dedicated to manufacturing and remanufacturing, reverse logistics and network design as well as waste management. Green SCM measures give companies cost and risk advantages such as benefits in productivity, property value, and environment. Thus, raw materials and energy costs can be lowered, low emission production can be designed, and the company's image can be improved, which can lead to higher product sales and a high societal acceptance (Nikbakhsh, 2009). Therefore, consumers, environmental groups, and other organizations are motivated to Green SCM measures, but political statements also stimulate a restructuring to environmentally sustainable business processes (Wohlfahrt & Vogt).

3.4 SCOR Model

There exist several business process frameworks to structure supply chain management processes in literature (see for example Hewitt Hewitt, 1994 or Cooper et al. Cooper et al., 1997). In order to obtain a holistic view on the opportunities of industrialization in supply chain management processes, we decide to use a more high-level framework. The framework chosen for such a holistic approach is the SCOR (Supply Chain Operations Reference) model (Poluha, 2005). This model was designed by the Supply Chain Council as a reference model for describing business processes in the Supply Chain (Supply Chain Council, 2010). It draws on both corporate and enterprise-wide business processes and has established itself as a model for the market, especially shown by the fact that more than 1000 companies worldwide have joined the Supply Chain Council. The SCOR model includes five key supply chain operations: Plan, Source, Make, Deliver, and Return.

Figure 2: Supply Chain Operations Reference Model (SCOR) (Supply Chain Council, 2010)

SCOR has four levels of description. Level 1 is the process level and thus represents the highest level, whose scope is the organization and the content of its supply chain. There are five processes considered: Plan (the interplay of supply and demand), source (procurement of products, components and services for service provision), make (the manufacturing of products, intermediate products, and services to different manufacturing processes), deliver (the supply of products and services to the customer with the appropriate accompanying documentation) and return (to receive a faulty product or a return of primary products or raw materials to the supplier). The second level of description is the configuration level. On this level, the core processes are divided into process categories. A distinction is made between planning processes, implementation processes, and support processes. The detailing of the processes takes place in level 3. On this level of description of the specific process steps, the sequence of activities and the input and output information are described. This level of consideration, referred to as a design level, completes the SCOR model. The viewing plane 4 is the implementation level, which is not included in the model. In this level, it is about company-specific considerations, not by general considerations concerning all types of companies.

4 Greening the SCOR Model

Despite the fact that SCOR is a well established industry standard for supply chain management, there is only a very narrow scientific knowledgebase on the interlinkage between issues from Green IS and SCOR. This is additionally remarkable since supply chain management is considered as industry area with a significant impact on environmental factors and is well discussed in industrial practice. On Green SCOR, there is the work of Cash & Wilkerson (Cash & Wilkerson, 2003). They are investigating SCOR on environmental issues, but the work is based on SCOR version 5 and combines best practices in environmental management into SCOR. Therefore, it is rather a practical approach, which is based on an outdated SCOR version. Qianhan et al. developed a Green SCOR model which was based on several industry cases in the Chinese automotive industry (Xing Qianhan, Wang Jing, & Zhu Rongyan, 2010). They extended to SCOR model, but did not reflect on the existing activities in the SCOR model. In 2008, the Supply Chain Counsel itself released Green SCOR as a new module for SCOR version 9.0 for managing the environmental footprint in supply chain management (Wilkerson, 2008). Three activities in the area of waste disposal and 12 metrics have been added to the original SCOR model. These extensions, which are still valid in version 10 of SCOR, lead only to a small fraction of environmental understanding in a holistic view on supply chain management. The question, how the current release of SCOR may be adapted to the requirements for environmental issues in the supply chain remains open.

To close this gap, the SCOR model release 10.0 is investigated on its relationship to environmental issues. For this, all activities on SCOR level 3 have been investigated und split in activities which are independent of any resource activities and those, which are related to resource activities. Those activities, which are related to resource activities, are those activities which have to be considered when implementing a Green Supply Chain Management based on the SCOR model.

For an overview of the result of the investigation, see Table 1:

SCOR section	# activities	# resource-relevant activities	Percentage	Resource-relevant activities
Plan	20	10	50%	sP1.2: Identify, Prioritize, and Aggregate Supply Chain Resources sP1.3: Balance Supply Chain Resources with Supply Chain Requirements sP2.2: Identify, Assess, and Aggregate Product Resources sP2.3: Balance Product Resources with Product Requirements sP3.2: Identify, Assess, and Aggregate Production Resources sP3.3: Balance Production Resources with Production Requirements sP4.2: Identify, Assess, and Aggregate Delivery Resources sP4.3: Balance Delivery Resources with Delivery Requirements sP5.2: Identify, Assess, and Aggregate Return Resources sP5.3: Balance Return Resources with Return Requirements
Source	7	5	71%	sS3.1: Identify Sources of Supply sS3.5: Verify Product sS3.2: Select Final Supplier(s) and Negotiate sS3.6: Transfer Product sS3.4: Receive Product
Make	8	4	50%	sM3.1: Finalize Product Engineering sM3.5: Package sM3.4: Produce and Test sM3.8: Waste Disposal
Deliver	15	7	47%	sD3.3: Enter Order, Commit Resources, and Launch Program sD3.10: Pack Product sD3.6: Route Shipments sD3.12: Ship Product sD3.7: Select Carriers and Rate Shipments sD3.14: Install Product sD3.8: Receive Product from Source or Make
Return	27	9	33%	sSR1.1: Identify Defective Product Condition sSR1.5: Return Defective Product sSR2.1: Identify MRO Product Condition sSR2.5: Return MRO Product sSR3.1: Identify Excess Product Condition sSR3.5: Return Excess Product sDR1.4: Transfer Defective Product sDR2.4: Transfer MRO Product sDR1.4: Transfer Excess Product

Table 1: Resource-relevant activities in the Supply Chain Operations Reference Model (SCOR)

The Plan processes cover the planning activities which are necessary to operate a supply chain. The planning process enfolds all process steps of the SCOR model and can be regarded as overall planning activities for the whole supply chain. On level 3, planning consists of 20 activities (Supply Chain Council, 2010). Ten activities are directly related to resource management (see Table 1). The Source processes describe the ordering (or scheduling) and receipt of goods and services. In SCOR, the source processes are divided into three sourcing strategies in relation to their production strategies: sourcing of a stocked product, sourcing of a make-to-order product, and sourcing of an engineer-to-order product. Due to the highest ratio of environmental issues in the activities, the activities for the engineer-to-order product are investigated. In this sourcing strategy, seven activities are defined on SCOR level 3. Five of them are related to resource management (see Table 1). The Make processes cover all activities dealing with the conversion of materials. Material conversion is a much broader application than classic production or manufacturing. In the sense of SCOR, make covers conversions like repair, recycling, maintenance, remanufacturing, and many more. As already seen in the sourcing process, the production process is also subdivided into three different production strategies: make-to-stock, make-to-order, and engineer-to-order. In alignment with the sourcing process, the engineer-to-order activities will be investigated. On SCOR level 3, there are eight activities in the make process. Four of them are directly related to resource management (see Table 1). The Delivery processes describe the activities associated with the creation, maintenance, and fulfillment of customer orders. In SCOR, the delivery processes are subdivided into four distinct delivery strategies on description level 2: delivery for stocked products, make-to-order products, engineer-to-order products, and retail products. The first three strategies are quite overlapping in their activities, while the delivery of retail products differs significantly from the others. In alignment with the sourcing and making strategies, an investigation will be done for the delivery activities for the engineer-to-order products. In this delivery strategy, 15 activities are defined on SCOR level 3. Seven among them are directly related to resource management (see Table 1). The Return processes describe the activities associated with the reverse flow of goods back from the customer. In SCOR, return is more about the coordination and documenting the return of products. Activities like repairing, recycling and remanufacturing take place in the make-section of SCOR. Return in SCOR is subdivided into six different return strategies, depending on the type of return reason. There are three different reasons considered: returning a defective product, returning an MRO (maintenance, repair and operations) product, and returning an excess product. All of them have a strong overlapping in their activities. For a holistic view on the return process, all of the return strategies are investigated. On SCOR level 3, there are 27 activities in the return processes. 9 of them are directly related to resource management (see Table 1).

5 Applying Green SCOR: The case of an European Green SCM Case Study

The concept of Green Supply Chain Management (Green SCM) is widely discussed in industrial practice (for some examples on the current discussion, see Dao, Langella, & Carbo, 2011; Green, Morton, & New, 1998; Nikbakhsh, 2009; Sheu et al., 2005). Most discussions on Green SCM result in the proposition of initiatives which should be undertaken to achieve the potential goals on a broad Green SCM approach. The question remains, whether the proposition of the initiatives is really a holistic approach or whether they put a focus on specific issues of the supply chain based on different reasons. To demonstrate this, we selected a published study on Green SCM from Bearingpoint (Wohlfahrt & Vogt). This study is based on a survey of 450 companies on a European level. Based on this survey, the study proposes 22 initiatives developing towards a Green Supply Chain. These 22 initiatives are divided in 15 intra-organizational and 7 inter-organizational initiatives.

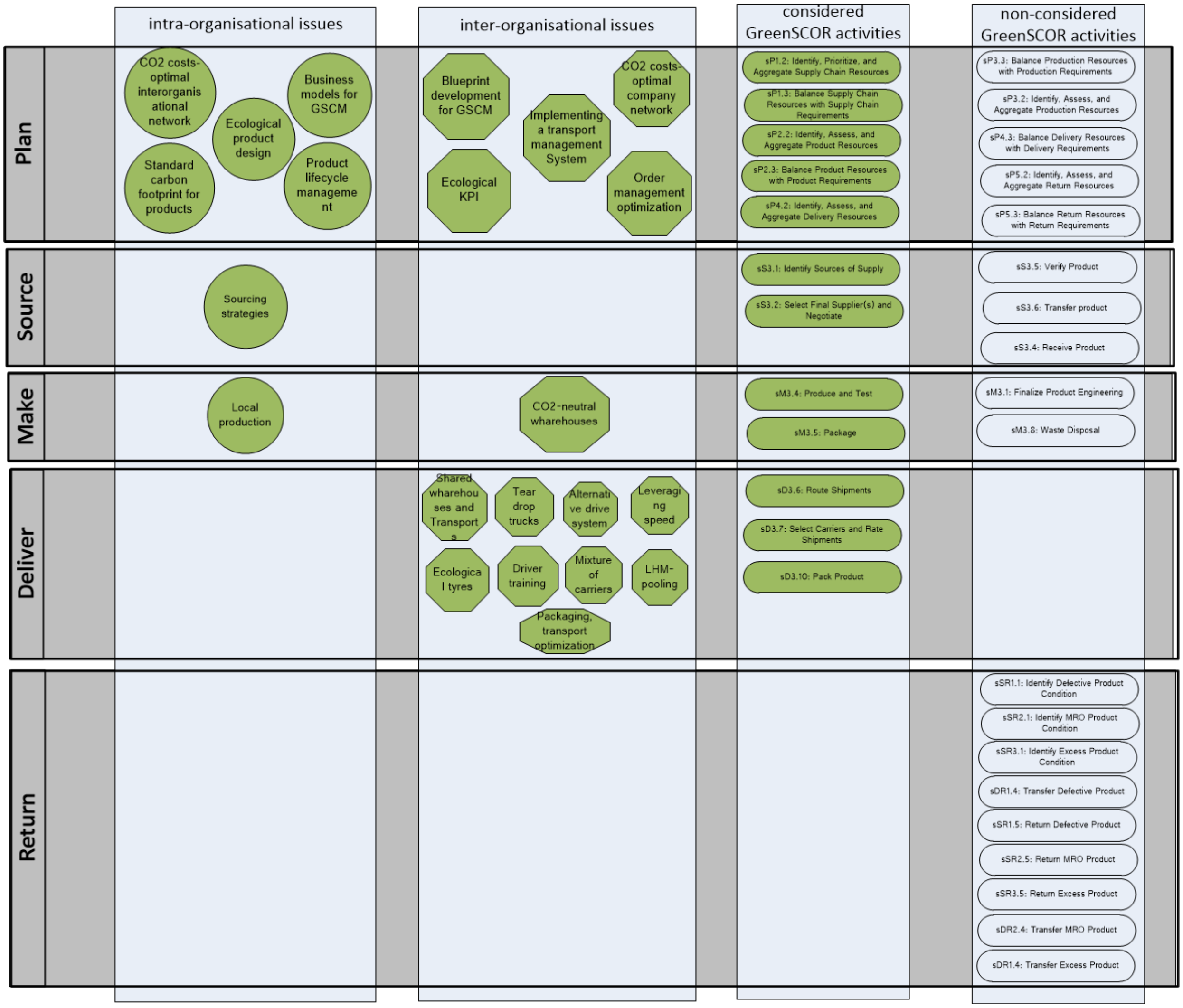

Figure 3: Applied GreenSCOR on a selected Green SCM initiative

With this assessment it is easy to see that the proposed Green SCM concept has several focus points in the Green SCOR model, whereas other areas are not considered at all. One area, which is very broadly covered, is the area of delivery. Eight initiatives from the complete concept can be identified as relevant tasks for the area of delivery. This is remarkable from two viewpoints. First, delivery is fully covered by the proposed Green SCM initiative. This is aligned with most other proposed Green SCM initiatives from a practical side of view, because there seems to be broad experience and methods to develop ecological-friendly tasks. But second, all eight initiatives are inter-company issues. But delivery is also a local issue with complex intra-company processes, especially in the production industry. The discussion on this is missing in the Green SCM concept. The area of Return is not covered at all. This is also quite remarkable since the return processes are responsible to transfer material back into the economic cycle. But the proposed initiative does not cover these aspects at all. All of the nine resource-related activities remain open to improvement. To sum up, from a holistic viewpoint, the proposed Green SCM initiative covers only isolated parts of the complete supply chain and leaves important areas open without discussion.

6 Discussion

The previous section has shown that the proposed GreenSCOR model provides a holistic view on a resource-oriented, sustainable supply chain. In the application in a given Green SCM scenario, the model was able to identify weaknesses and missing topics. This is just one example for a possible application area of the proposed model. In general, the model may act as a tool for investigating resource-oriented concepts in an inter-organizational context for their sustainability. Therefore, the proposed model can be regarded as a first step towards a reference model for a resource-oriented sustainable supply chain model, which may act as a blueprint for the development and extension of classical supply chains to sustainable one.

Due to its resource-oriented focus, the emphasis of the proposed model lies in the management of tangible goods and classic production processes. In several industries, there is a broad discussion about the substitution of tangible goods through service-based solutions. One outstanding example of this development is in the area of cloud computing. The IT infrastructure for a company, composed of hardware and software, was mainly provided by an internal IT department, which was responsible for creating, running, and maintaining servers, communication networks, databases and applications. Cloud computing has made it so the IT department is no longer running its own infrastructure, but is rather sourcing IT services from external providers and orchestrating them to run complex business applications. This has a tremendous impact on sourcing, developing, and maintaining processes and a completely new perspective on resources in this area (see for example Bensch & Schrödl, 2012). The question is how this development may be reflected in the proposed Green SCOR model? In a first approach we assume, that the distinction between make and delivery has to be redesigned. In the service industry, we see a principle called uno actu, which means that in the service industry the making of a service and the consumption of a service may occur simultaneously. This principle changes the meaning of delivery and might create a much closer relationship between make and delivery in a revised model. This is in alignment with the design of SCOR where all relevant recycling activities are clustered in the process step of Make.

7 Summary

The aim of this paper was the development of a supply chain management model which emphasis environmental aspects from a strategic perspective. To achieve this, the reference model of a SCOR has been selected as a modeling foundation. SCOR has been investigated on activities which are closely related to resource and energy issues. SCOR in its current version 10.0 contains 77 activities on description level 3, of which 35 of them could be identified as environmental significant. Emphasis on these 35 activities leads to Green SCOR as a blueprint for the establishment of strategic supply chains with emphasis on minimized environmental impact and provides a new framework for the development and establishment of sustainable supply chain management structure. The proposed model has been applied to a selected case for Green SCM. It could be shown that the proposed approach for Green SCM lacks generality and covers only parts of the relevant aspects. Core issues like return processes are not covered at all. The discussion of the proposed model shows that it has the potential also for extending into a more service-based industry. In this sense, the proposed model acts as a blueprint for current issues in strategic supply chain management with environmental focus and as foundation for the future development of a generic approach towards product-independent supply chain management development.

Several further steps are an option for future research. One core development for the future would be to take a closer look at the product type. As already discussed, the proposed model has its foundation in the production industry for tangible goods. The question remains how to design the model for service products or other intangible goods. A second step further would be a discussion of the proposed model in an applied industrial context. This discussion in different industrial cases would lead to a deeper understanding of the mechanism within the model and would be a relevant task towards an instantiation of the model in a specific industrial context.

References

Bensch, S., & Schrödl, H. (2012). Purchasing Cloud-Based Product-Service Bundles in Value Networks - The Role of Manageable Workloads. In Proceedings of the European Conference on Information Systems (ECIS2012) (pp. Paper 204).

Bloemhof-Ruwaard, J. M., Van Wassenhove, L. N., Gabel, H. L., & Weaver, P. M. An environmental life cycle optimization model for the European pulp and paper industry. Wageningen.

Bowersox, D. J., & Closs, D. J. (2005). Logistical management: The integrated supply chain process (4th ed.). McGraw-Hill series in marketing. New York: McGraw-Hill.

Carbon Disclosure Project. About Us. Retrieved from https://www.cdproject.net/en-US/Pages/About-Us.aspx

Cash, R. & Wilkerson, T. (2003). GreenSCOR: Developing a Green Supply Chain Analytical Tool.

Cooper, M. C., Lambert, D. M., & Pagh, J. D. (1997). Supply Chain Management: More Than a New Name for Logistics. The International Journal of Logistics Management, 8(1), 1–14. doi:10.1108/09574099710805556

Cunningham, M. T. (1990). Survival and growth strategies in new technology markets. In Proceedings of the 6th IMP Conference (pp. 346-372). Milan.

Dao, V., Langella, I., & Carbo, J. (2011). From green to sustainability: Information Technology and an integrated sustainability framework. The Journal of Strategic Information Systems, 20(1), 63–79. doi:10.1016/j.jsis.2011.01.002

Deutsche Rohstoffagentur. (2012). DERA Rohstoffinformationen: Deutschland - Rohstoffsituation 2011. Berlin. Retrieved from http://www.bgr.bund.de/DE/Gemeinsames/Produkte/Downloads/DERA_Rohstoffinformationen/rohstoffinformationen-13.pdf;jsessionid=BE2CD3C2484F2F78752EBF9B8D8DABD9.1_cid324?__blob=publicationFile&v=3

Forrester, J. W. (1996). Industrial dynamics. Portland, Oregon: Productivity.

Green, K., Morton, B., & New, S. (1998). Green purchasing and supply policies: do they improve companies' environmental performance? Supply Chain Management: An International Journal, 3(2), 89–95. doi:10.1108/13598549810215405

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. MIS Quarterly, 28(1), 75–105.

Hewitt, F. (1994). Supply Chain Redesign. The International Journal of Logistics Management, 5(2), 1–10. doi:10.1108/09574099410805162
Kuechler, B., & Vaishnavi, V. (2008). On theory development in design science research: anatomy of a research project. European Journal of Information Systems, 17(5), 489–504. doi:10.1057/ejis.2008.40
Lamey, J. (1996). Supply chain management: Best practice and the impact of new partnerships. Financial Times management reports. London: Financial Times. Retrieved from http://media.obvsg.at/AC01630970-1001
Larson, P. D., & Rogers, D. S. (1998). Supply chain management: definition, growth and approaches. Journal of Marketing Theory and Practice, 6(4), 1–5.
March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. Decision Support Systems, 15(4), 251–266. doi:10.1016/0167-9236(94)00041-2
Murugesan, S. (2008). Harnessing Green IT: Principles and Practices. IT Professional, title=Harnessing Green IT: Principles and Practices, 10(1), 24–33. doi:10.1109/MITP.2008.10
Nikbakhsh, E. (2009). Green Supply Chain Management. In R. Zanjirani Farahani, N. Asgari, & H. Davarzani (Eds.), Contributions to Management Science. Supply Chain and Logistics in National, International and Governmental Environment (pp. 195–220). Heidelberg: Physica-Verlag HD.
Peffers, K. E., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2008). A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems, 24(3), 45–77.
Poluha, R. G. (2005). Anwendung des SCOR-Modells zur Analyse der Supply Chain: Explorative empirische Untersuchung von Unternehmen aus Europa, Nordamerika und Asien. (Dissertation). Universität zu Köln, Köln.
Porter, M. E., & Kramer, M. R. (2006). Strategy and society: the link between competitive advantage and corporate social responsibility. Harvard business review, 84(12), 78–92.
Sheu, J.-B., Chou, Y.-H., & Hu, C.-C. (2005). An integrated logistics operational model for green-supply chain management. Transportation Research Part E: Logistics and Transportation Review, 41(4), 287–313. doi:10.1016/j.tre.2004.07.001
Srivastava, S. K. (2007). Green supply-chain management: A state-of-the-art literature review. International Journal of Management Reviews, 9(1), 53–80. doi:10.1111/j.1468-2370.2007.00202.x
Stern, N. (2011). The economics of climate change: The Stern review (1. ed., 7. print.). Cambridge: Cambridge Univ. Press.
Supply Chain Council, I. (2010). Supply Chain Operations Reference (SCOR) model: Overview - Version 10.0. Cypress.
Watson, R. (2008). Green IS: Building Sustainable Business Practices. Information Systems: A Global Text, 1–15.
Wilkerson, T. (2008). GreenSCOR: Integrating Green Supply Chain Practices into the SCOR model. Retrieved from http://supply-chain.org/f/SCWNA08%20-%20%20WilkersonC.pdf
Wittstruck, D., & Teuteberg, F. (2010). Ein Referenzmodell für das Sustainable Supply Chain Management. Zeitschrift für Management, 5(2), 141–164. doi:10.1007/s12354-010-0122-0
Wohlfahrt, M. & Vogt, S. Green SCM - Von der lokalen Einzelmaßnahme bis zur globalen ökologisch optimierten Lieferkette: Die Roadmap zur Vereinigung ökonomischer und

ökologischer Effizienz. Retrieved from http://toolbox.bearingpoint.de/images/pdf/NI-11002_CMS_0525_WP_DE_GSC_final_neu_web.pdf

World Commission on Environment and Development. (1987). Our Common Future: Report of the World Commission on Environment and Development. Retrieved from http://www.un-documents.net/our-common-future.pdf

Xing Qianhan, Wang Jing, & Zhu Rongyan (2010). Research on green supply chain management for manufacturing enterprises based on Green SCOR Model. In Computer and Communication Technologies in Agriculture Engineering (CCTAE), 2010 International Conference on Computer and Communication Technologies in Agriculture Engineering, (Vol. 2, pp. 375–378).

Ying, J., & Li-jun, Z. (2012). Study on Green Supply Chain Management Based on Circular Economy. Physics Procedia, 25, 1682–1688. doi:10.1016/j.phpro.2012.03.295

Yoffie, D. B., & Gomes-Casseres, B. (1994). International trade and competition: Cases and notes in strategy and management (2nd ed.). McGraw-Hill series in management. New York: McGraw-Hill. Retrieved from http://www.gbv.de/dms/hbz/toc/ht006270922.pdf