University of Salford A Greater Manchester University
University of Essex ESSEX BUSINESS SCHOOL Centre for Entrepreneurship Research
The General Jonas Žemaitis Military Academy of Lithuania
Ministry of National Defence Republic of Lithuania
Vilnius Gediminas Technical University
RISEBA
Estonian Business School
NATO Energy Security Centre of Excellence
ENTREPRENEURSHIP AND SUSTAINABILITY CENTER
AVADA

Journal of Security and Sustainability Issues *www.lka.lt/index.php/lt/217049/*
ISSN 2029-7017/ISSN 2029-7025 online
2014 Volume 3(3): 15–22
http://dx.doi.org/10.9770/jssi.2014.3.3(2)

SUSTAINABLE SUPPLY CHAIN MANAGEMENT IN GERMAN AUTOMOTIVE INDUSTRY: EXPERIENCES AND SUCCESS FACTORS

Kristina Hunke[1], Gunnar Prause[2]

[1,2]Tallinn School of Economics and Business Administration, Tallinn University of Technology
Akadeemia tee 3, Tallinn, Estonia
E-mails: [1]kristina.hunke@ttu.ee; [2]gunnar.prause@ttu.ee

Received 30 September 2013; accepted 15 December 2013

Abstract. Climate change and environmental aspects are key issues on public agenda. Governments and politicians try to implement new regulations and limits to reduce the environmental burden of the industries around the globe. However, success can be seen only to a limited extend in many areas. On the other hand some industrial sectors themselves start to think about solutions to handle the big impacts. Some pioneers in this field discovered already also the competitive and economic advantage of implementing so called green and sustainable solutions in their business. This includes production, manufacturing and transport activities but also ways how to manage and monitor such activities from an eco-friendly perspective. This paper will give an overview of the implication of green logistics along the supply chain in regard to the automotive industry including supply companies from SME sector and will demonstrate the application of this issue. For that an example of the European market leader Volkswagen AG in Germany is chosen and analyzed in the case description.

Keywords: Supply Chain Management, sustainability, green logistics, automotive industry.

Reference to this paper should be made as follows: Hunke, K.; Prause, G. 2014. Sustainable supply chain management in German automotive industry: experiences and success factors, *Journal of Security and Sustainability Issues* 3(3): 15–22. DOI: http://dx.doi.org/10.9770/jssi.2014.3.3(2)

JEL Classifications: D85, L62, M11, Q01.

1. Introduction

Global warming is the rise in the average temperature of Earth's atmosphere and oceans that it is primarily caused by increasing concentrations of greenhouse gases produced by human activities such as the burning of fossil fuels and deforestation. The Intergovernmental Panel on Climate Change (IPCC 2007) report claimed global warming as the most important environmental problem of today's society and industries. Due to globalization, today's industry is not dependent solely on location of resources and raw materials but is present all around the globe and decision makers chose their locations more in consideration of cost factors like labor costs, real estate prices and tax regulations, but not on geographically close location to the markets and low transportation costs. Therefore, one of the main challenges connected to energy provision and use in a green logistics perspective is the energy consumption during transportation of goods. In a supply chain, CO2 emissions related transportation accounts for 14% of the total emissions according to Stern (2006). Transportation of goods usually also involves emissions of NOX, SOX and PM.

The challenge of today's society is how industrial development can exist symbiotically next to the environmental concerns in a long-term perspective (Beamon 2005). When it comes to growth on the one hand and sustainable development on the other hand, the responsibility lies mainly on the companies' shoulders as the supply chains can be seen as the key fac-

tors in creating a sustainable supply to the customers (Seuring 2004). In order to increase the acceptance of this ecological responsibility many governments introduced laws and regulations to the industry. These are for example the packaging and waste directive of the European Union since 1994 or the German Act on closed-loop resource management (1996). The aim is to provide a legal frame to force companies to reduce waste and to protect natural resources in the production process and the life cycle of the product. One of the major difficulties in implementing green logistics in most companies is the high cost investments that often have to be done long in advance of any returns. To do investments without return is not a normal thing to do for a business, at least not in the private sector. The fact that the problem of environmental problems is something that applies to everyone also makes it a problem that applies to no one. The thought of something serving the greater good can be used for a charity investment, but not for a business philosophy. Many companies are facing the issue that they try to balance between being environmental friendly and saving the nature on one hand and pleasing profit-hungry shareholders on the other side (Gifford 1997). Nevertheless newer studies are showing that sustainable and green business strategies have a positive impact on the performance of a company (AT Kearney 2011; WiWo 2012).

2. Green supply chain management

Green and sustainable supply chain management is based on the principle of supply chain management with an extra add-on on green impacts, meaning environmental friendly and efficient aspects. Supply chain management aims at providing the logistic aspects of the production process in the company in the most efficient way. That means that also suppliers, manufactures, customers and disposal companies are involved in the supply chain activities including the involved SME sector. In the context of green supply chain management, there exists interdependency between conventional supply chain management and eco-programs (Sarkis 2001). This includes the approach on how ecological aspects can be considered in the whole business processes in the most effectively way. It can be assumed that the involvement of green aspects in the supply chain of a company also initiates changes in the supply chain itself. Of course, this will then also have an impact on the cooperative alliances with suppliers, manufactures and the customer at the end of the logistics chain. By integrating these ecological aspects of the product's entire life cycle into the overall closed-loop system, the extraction of raw materials is already taken into account, as well as processes after the useful life of a product, e.g. collection, transportation and inspection, until the product is finally disassembled, remanufactured or disposed (Trowbridge 2001).

The challenge within each supply chain is to choose the right mode of transportation, to use the right equipment, and to use the right fuel (Dekker *et al.* 2012). Among the modes of transportation we find plane, ship, truck, rail, barge and pipelines, all with different attributes when considering costs, lead time, environmental performance and availability. However, the reality is that it rarely happens that all modes of transportation are realistic options when shipping goods. The reason is that the goods might set limitations on which modes that can be used. The customers will also be very influential when choosing mode of transportation as they might be demanding a very high service level with quick delivery. When shipping goods over long distances, the alternatives are normally transport by air or ship. However, when distances are short, truck, airplane, train, or short sea ships are used (Dekker *et al*. 2012). Dekker *et al*. (2012) present a table which shows how the different modes of transportation performs up against another taking into consideration their emissions and kW h/t/km. The water- based modes can in general carry much higher weights than the land- based modes. Larger loads give better CO2 –efficiency. However, the diesel train and heavy truck is superior when measuring NOx- efficiency, while ships emit high levels of NOx. When comparing PM, there are not any significant differences between the modes. One of the modes, the Boing 747-400, is clearly the least environmental friendly of them all. It is not possible to prefer one of the modes in front of the other, as there are many variables to take into account when choosing the transportation mode. Presently, road transport contributes to the largest share of the emissions, but because of the strict limitations that the EU has set for emissions for trucks, they are closing in on the other transport modes. This is much thanks to the fact that trucks are only used for 3–5 years, which means that new technology gets implemented swiftly.

Another important factor that has great impact on the environmental performance is the type of fuel that is used. Today the main categories of fuel are

gasoline, biofuels, and electricity. Modern gasoline is much cleaner than it used to be. Biofuel can be mixed with regular gasoline, but if biofuel is used extensively, then the engine will have to go through some costly adaption. Biofuel is fuel based on organic waste, and in that sense it is environmental friendly, but the problem is that it takes a lot of gasoline to make biofuel, which makes the total environmental performance of biofuel quite pure. However, if the technology and methods that are used for making biofuel are improved in the future, the environmental performance might raise significantly. Electric vehicles are clearly environmental friendly as they have very low levels of emissions, and the production of electricity can be controlled in order to calculate the emissions. The most important restriction for electrical vehicles is their range, which is too limited in order to be fully competitive with the combustion engine. This limitation might be eliminated in the future if the technology on battery capacity moves forward (Dekker *et al.* 2012).

Finally, there is also a possibility for a development and use of other types of equipment. This might for instance be to use Giga-liners (long trucks), to use extra-long trains, and larger vessels at sea. These are all improvements that could decrease the emissions per kilo transported. However, if then the load factor drops, then the environmental performance might get lower than it originally was. Another method that already is used extensively is to lower the speed; this is for instance used in the shipping industry when the rates are low. A bi-effect is that the environmental performance rises. Additionally, Dekker *et al.* (2012) proposed that Operations Research (OR) leads to a more efficient use of resources, which is not only cost attractive, but also tends to create less emissions of greenhouse gases. Therefore, with new methodologies in OR these savings and reduction of emissions can be considered as one solution to the challenge of high energy consumption in the transport and logistics sector. Furthermore, OR helps to identify transport solutions, especially with multi-criteria decision analysis, when it comes to multi-modal choice and alternative route optimizations. One key aspect of new solutions is the exploration of new and innovative transport connections by using multi-modal transport chains. The method of multimodal transports allows cargo to be transported faster with lower environmental impact. One attempt, mainly in the European aspect, is to consider transport chains as transport clusters along certain routes, the so called transport corridors. The emphasis is laid on green transport corridors, i.e. transshipment routes with concentration of freight traffic between major hubs and by relatively long distances of transport marked by reduced environmental and climate impact while increasing safety and efficiency with application of sustainable logistics solutions (COM 2011). Already in 2001, the Transport White Paper (COM 2001) of European Commission expressed the necessity of shifting some volumes of the dominant road traffic to other efficient transport modes. The goal was to prepare for an environmental friendly transport sector and at the same time to provide safer and efficient transportation by reducing accidents, congestions and negative impacts through emissions, i.e. noise and pollution.

3. Investments for sustainable supply chain management

One of the major difficulties in implementing green logistics in most organizations is the high cost investments that often have to be done long in advance of any results. Recent results of Global Supply Chain Survey 2013 revealed that sustainability aspects in supply chain management are considered by about 60% companies but concrete investment measures are still very rare (PwC 2012). Only 42% of the participants of the PwC survey think that sustainable supply chain management is an important management issue at all. The crucial question asked before an investment from a company is who is paying for the investment and how does the society benefit from this investment. The three different options for who will be left with the bill are the company itself, the consumer or the society. In some areas the society pays for upgrades through handouts or tax-cuts to companies that operate more environmentally friendly. An example of this is the Norwegian shipping industry, where the government, through special taxes, pays for up to 80 percent of the costs of installing environmental friendly equipment (NHO 2011). In other businesses the customers pays more for a certain product because it is made in an environmentally friendly manner. This strategy is most often used for food and groceries and will for some customers add a feeling of superior quality as well. This is impossible in many industries as customers are less aware of the environmental part of different products. For companies not covered by either of these two, it is important that the changes in them-

selves are economically defendable and that it gives them lower costs or higher profits. There have been few empirical studies on the impact of green investments, but a study done by Rao and Holt (2005) reveals some interesting findings. They have separated the logistics in to three different areas:

- Inbound logistic
- Production
- Outbound logistics

In the inbound logistics there was huge savings by having green suppliers. The savings came in waste reduction, compliance with regulations and resource utilization. The greening of production led to savings in raw materials because of re-use, and water and energy usage. The lowering of costs in the supply-chain led to greater competitiveness and a better opportunity to steal market shares from competitors, through efficiency.

The problem for these industries is to see the opportunities and get over the initial large investments. If the investments needed to become greener are too great, there should be possibilities for tax cuts or other carrots to help them overcome this obstacle. It is also a problem with an uneven playing field. In an international marketplace there need to be common rules that applies to everyone, by forcing every actor to do the heavy investments it will get easier for everyone.

4. Sustainability improves the business performance

But there exist also other investigations about sustainable supply chain management which give a more positive picture by pointing out that green supply chain management has a positive impact on the business performance. A couple of recent studies revealed that sustainability pays offs for companies (AT Kearny 2011; WiWo 2012). These results are not restricted to logistics sector but they bear a special relevance for the supply chain management. The largest global study on CO2 – reduction, the Carbon Disclosure Project (CDP), brought to light that sustainability in supply chains leads to a better company performance and a higher Return on Investments (AT Kearny 2011). The reason for that is that the cooperation of sustainable supply companies and the optimization of supply chains according to CO2 – aspects represent a powerful tool for cost cuttings. CDP explored that more than half of all larger companies and about a quarter of all suppliers experienced significant cost reduction by sustainable supply chain activities. The results of the CDP project are based on a survey of more than 1000 leading, globally operating companies and they are fixed in the Supply Chain Report 2011.

Whereas the results of the CDP project are stressing more the cost reduction possibilities of green and sustainable business activities the results of two studies of the German business journal "Wirtschaftswoche" which were realized in cooperation with the two consulting companies "Serviceplan" and "Biesalski & Company" are pointing out a strong relationship between sustainable business strategies and demand and turnover (WiWo 2012). The studies focused on consumer behavior and are based on a sample of 7700 persons. Both studies were able to prove that those companies which were considered as sustainable in the client perception generated additional turnover due to a green company image. The additional turnover depends on the business sector and can yield up to 10% like the following figures show:

- Logistics & Travelling: 7.7 %
- Automotive: 7.0 %
- Energy: 5.2 %
- Telecommunication: 5.0 %

The second important outcome of the two studies is a sustainability ranking of 101 well known German companies where the 20 upper ranked companies are shown in the following picture including the four most important German car manufacturers (Table 1).

Table 1. Sustainability ranking of German companies

1	**Hipp**	**11**	Milupa
2	**Alete**	**12**	Bosh
3	**BMW**	**13**	Frosta
4	**Miele**	**14**	Toyota
5	**Bärenmarke**	**15**	Coppenrath & Wiese
6	Landliebe	**16**	Volkswagen
7	Audi	**17**	Storck
8	Otto	**18**	Iglo
9	Mercedes-Benz	**19**	Haribo
10	dm-Drogeriemarkt	**20**	ING-Diba

Source: WiWo (2012)

It is easy to see that the four big German automotive companies understood the lesson and worked on the development of strong green images in order

strengthen their market position. All together it can be stated that green and sustainable business strategies improve the performance of a company.

5. Green supply chain management in automotive industry

The empirical study of Thun and Müller (2010) about the green supply chain management in the German automotive industry showed that the supply chain management has been applied for a longer period of time than green supply chain management. The majority of the participating companies in this study have implemented the latter only within the last years. Green supply chain management still seems to be a new concept which has just started to evolve over the last decades. According to the study the implementation of green supply chain management was only done to a satisfying extend when the companies were forced by law or legal regulation. Only economic benefits seem not to be the motivation.

However, the study among German players showed that the fulfillment of the legal requirements was even higher than requested as the competition is big and the customer demand even more than the laws require. While customers and competitors are mentioned as important drivers, government and management as internal drivers only play a secondary role (Thun, Müller 2010). Therefore, green supply chain management can be regarded as market driven. A reason for this is the fact that in terms of the automotive supply industry the customers are original equipment manufacturers which are forced by legislation to deal with environmental aspects (Crotty, Smith 2006). Accordingly, they demand eco-friendly products and processes from their suppliers. Hence, customers are a driving force and green supply chain management is a way for automotive suppliers to gain competitive advantage.

In the study also internal and external barriers were identified. The main internal barriers are the lack of acceptance in the company and the increased costs. As an external barrier, and this applies mainly to global companies with production facilities in different countries, was mentioned the number of different environmental acts and regulations which result in a high complexity. However, since the green supply chain management seems to be a new or at least unknown concept many companies fear the dependency from partners in their eco-oriented partnerships. They prefer an internal focus first before trying to integrate eco-programs externally with their partners. Nevertheless, the cooperation with partners and the establishment of functioning partnerships with suppliers is the key factor in successful green supply chain management in the automotive industry.

6. Case description

Volkswagen Group (parent company is the German Volkswagen Aktiengesellschaft) is a German multinational automotive manufacturing company headquartered in Wolfsburg, Germany. It designs, engineers, manufactures and distributes passenger cars, commercial vehicles, motorcycles, engines and turbo-machinery, and offers related services including financing, leasing and fleet management. It is the world's largest motor vehicle manufacturer by 2011 unit sales and has maintained the largest market share in Europe for over two decades. Volkswagen Group sells passenger cars under different brands like Audi, Bentley, Bugatti, Lamborghini, Porsche, SEAT, Škoda and Volkswagen marques. Motorcycles are offered under the Ducati brand; and commercial vehicles under the MAN, Scania and Volkswagen Commercial Vehicles marques. The Volkswagen Group is divided into two primary divisions, the Automotive Division and the Financial Services Division, and consists of approximately 340 subsidiary companies. The company has operations in approximately 150 countries worldwide and operates 94 production facilities across 24 countries. Volkswagen Aktiengesellschaft is a public company and has a primary listing on the Frankfurt Stock Exchange, where it is a constituent of the DAX index, and secondary listings on the London Stock Exchange, Luxembourg Stock Exchange, New York Stock Exchange and SIX Swiss Exchange. As of September 2012, 20% of the voting rights are owned by the State of Lower Saxony.

From the Sustainability Report 2012 (Volkswagen 2012) it can be read that Volkswagen aims to be the market leader by 2018. A logical consequence is that the production has to and will continue to grow. This means, also the resource and energy consumption will increase. Volkswagen intends to take also the ecological leadership. So already now, concrete measures for greater efficiency in the production must be taken to mitigate the increasing resource and energy requirements of the future growth. Therefore, under the program *think blue. Factory* the production will

be more environmentally friendly by a total of 25% until 2018. This will apply to all Volkswagen plants in regard to energy consumption, waste generation, emissions of airborne emissions and water consumption which will be reduced by 25% (Figure 1). In 2011, Volkswagen has implemented many concrete steps in the production.

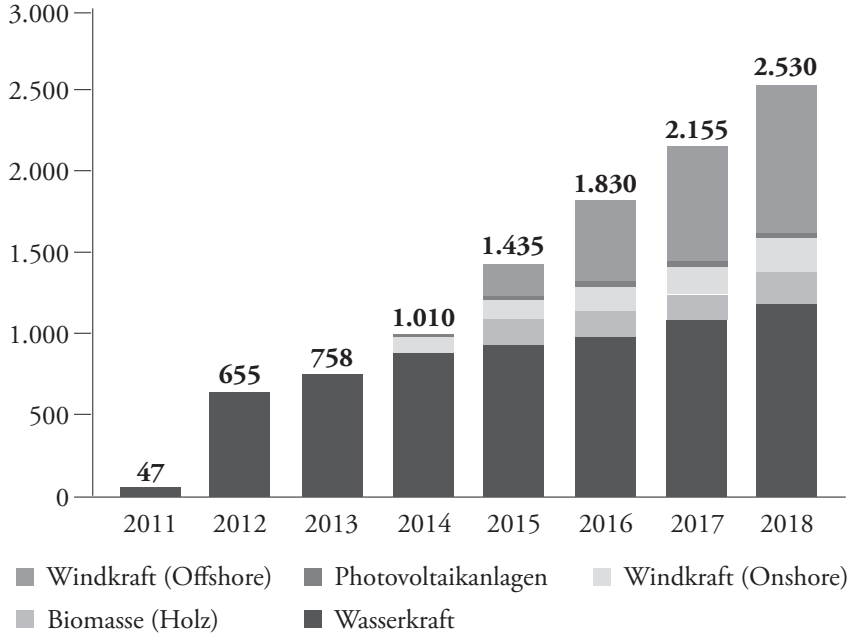

Fig.1. Renewable energy resources of Volkswagen [GWh]

Source: Volkswagen 2012

There is a new system responsible for the efficiency measurement of the production. Standards were developed which apply to the whole organization around the globe. For example, only very energy efficient machineries and equipment is allowed to be purchases for production. Internally, the Volkswagen organization promotes to transfer knowledge and exchange best practice examples of different production locations. The energy management in production locations of SEAT in Martorell and Barcelona (Zona Franca), Spain, are certified according to the ISO 50.001 and UNE 16.001standards. Thus, SEAT is the first Spanish company which is certified according to ISO 50.001 and can therefore testifies its position in the Spanish market when it comes to environmental protection.

Another tool in monitoring environmental efficiency is the so called energy consultant in the intranet of Volkswagen. All employees can see information and advises in order to save energy consumption and conscious usage of electricity. Typical users of energy are shown in the departments of management, production, planning and controlling who give exemplary advises how to save energy. Additionally, background information is given and the employees can learn about the standards and methods applied.

7. Volkswagen AG and green supply chain management

The sustainability efforts of the Volkswagen company are not only limited to the production of automobiles but also and especially to the logistics of the production and the product. In that respect it is paid attention to sustainability on the whole logistics process in all steps. The processes are analyzed and in cases where it is economically and ecologically necessary improvements were made. This applies to the internal logistic in the operation but also to the logistics of the suppliers of raw material and components as well the transport and shipment of the final products, the finished cars. This must be the responsibility of a global company especially when the complexity of the products and transshipments becomes bigger as the production grows worldwide. When it comes to Green Logistics Volkswagen aims at reducing the consumption of resources and water, reduction of emissions, particulate matter and waste. In the following some examples are shown how Volkswagen is taking these challenges of green logistics.

The transportation of components between the two locations in Spain, Martorell and Zona Franca, or the transportation of finished cars to the port of Barcelona, is only made with trains. SEAT, the local company, invested around 8.6 million € in building the appropriate infrastructure for that. But the savings are accounted significantly as more than 57.000 drives by truck each year can be circumvented.

At the main location in Wolfsburg, Germany, all short distance transshipments are made with bio-gas driven trucks. This pilot project was implemented by a research team of the Vienna University. This project resulted in the reduction of CO2 emissions of 20 %. The emissions of nitric oxide could be reduced by 30% whereas the noise emissions were reduced even with 50 %. Due to these positive effects this project will be also transferred to other locations in near future.

Another example of how also the single sub-brands handle the sustainability efforts in logistics is shown with the company Audi. Audi opened a new logistic centre at the location Neckarsulm, Germany. Because of the increasing number of new arrivals and model variations, the number of small part deliveries also increased. Small part deliveries are small transport boxes for components and small supplies. Since 2008 the number of these deliveries doubled. Traditionally these parts had to be sorted and distributed manually. However, with the new small part distribution center machines can now handle approx. 1,300 boxes each hour. Together with architectural improvements and energy saving measures only in the location Neckarsulm up to 500 tons of CO2 are saved every year. For this resource saving and partly CO2 emission free transport concept Audi was awarded already with the sustainability award of the Federal Association Logistic Austria and Germany (BVL 2012).

Audi also uses sustainable transport solutions for their finished cars. Since October this year, the DB Schenker Rail will transport the new manufactured cars of Audi from Neckarsulm to the port of Emden. And this transport will be totally CO2 neutral. This transport route is already the second one next to the transport between Ingolstadt and the port of Emden. The electricity which is used for running the train comes exclusively from renewable energy sources. This successful implementation of CO2 neutral transportation is another big step towards a total CO2 production of Audi, says the Audi- production director Dr. Frank Dreves (DB 2012).

Conclusions

As the case shows and also the results of the empirical survey of Thun and Müller (2010) green supply chain management is a hot topic in the German automotive industry however, some constraints still exists as the concept is fairly new and unknown. Volkswagen AG paid a lot of attention to implement the green logistics concept in the supply chains and until now can also report positive results in regard to their performance. They are the European market leader. And this is not solely because of their green logistics approach but this is for sure also a driver for business performance. One result of the study was also that green supply chain management leads to better performance in terms of indicators such as environmental protection and efficient usage of resources. Therefore, the attempt of green supply chain management should be promoted further. It can be stated that companies are aware of the environmental issues but still lacking behind realizing the full potential of green supply chain management. Most businesses need more incentives to do environmental investments, either by law or by economic motivations. But there are also positive signs that green and sustainable supply chain management leads to cost reductions and a better business performance. Especially the consumers appreciate green business strategies so the green image of a company helps to strengthen the market position.

References

AT Kearny. 2011. Supply Chain Report 2011 - Carbon Disclosure Project. London.

Beamon, B.M. 2005: Environmental and sustainability ethics in supply chain management, *Science and Engineering Ethics* (2): 221–234.

BVL (Bundesvereinigung Logistik). 2012. Sustainability award logistics. Available on the Internet: <http://www.bvl.de/presse/meldungen/nachhaltigkeitspreis-logistik-2013>.

COM. 2001. White Paper: European transport policy for 2010: time to decide. Commission of the European Communities. Brussels.

COM. 2011. Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. Commission of European Communities. Brussels.

Crotty, J.; Smith, M. 2006. Strategic responses to environmental regulation in the U.K. automotive sector: the European Union End-of-Life Vehicle Directive and the Porter hypothesis, *Journal of Industrial Ecology* 10(4): 95–111.

Dekker, R.; Bloemhof, J.; Mallidis, I. 2012. Operations Research

for green logistics – An overview of aspects, issues, contributions and challenges, *European Journal of Operational Research* 219: 671–679.

DB (Deutsche Bahn). 2012 Available on the Internet: <http://www.deutschebahn.com/de/konzern/im_blickpunkt/3000686/eco_rail_20120928.html>.

Gifford, D. Jr. 1997. The value of going green, *Harvard Business Review* 75(5): 11–12.

IPCC. 2007. Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

NHO (National Health Organization). 2011. Application for support. Available on the Internet: <http://www.nho.no/support-from-the-fund/category479.html>.

PwC. 2012. Global Supply Chain Survey 2013. PricewaterhouseCoopers.

Rao, P.; Holt, D. 2005. Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management* 25(9): 898–916.

Sarkis, J. 2001. Greening Supply Chain Management: Introduction, *Greener Management International* 35(3):21–25.

Seuring, S. 2004. Integrated chain management and supply chain management comparative analysis and illustrative cases, *Journal of Cleaner Production* 12: 1059–1071.

Stern, N., 2006. The Stern Review: The Economics of Climate Change. HM Treasury, London. Available on the Internet: < http://siteresources.worldbank.org/INTINDONESIA/Resources/226271-1170911056314/3428109-174614780539/SternReviewEng.pdf (29.10.2012)>.

Thun, J.-H.; Müller, A. 2010: An Empirical Analysis of Green Supply Chain Management in the German Automotive Industry, *Business Strategy and the Environment* 19(2): 119–132.

Trowbridge, P. 2001: A case study of green supply chain management at Advanced Micro Devices, *Greener Management International* 35(3): 21–135.

Volkswagen. 2012. Sustainability Report 2012. Available on the Internet: <http://www.volkswagenag.com/content/vwcorp/content/en/sustainability_and_responsibility/Sustainability_Report_.html>.

WiWo. 2012. Die Gut-Geschäftler [The good business makers], *Wirtschaftswoche* [Business Week] 23: 110–112.