

DE-GREENING OF LOGISTICS THROUGH PROVIDER-SHIPPER INTERACTION

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ABSTRACT

PURPOSE OF THE PAPER

In contrast to the general perception of logistics service providers, recent research suggests that logistics service providers can be considered as more open to developing green services than their customers are to require them. The purpose of this paper is to explain how green efforts and ambitions are transformed when logistics service providers co-operate with their customers.

RESEARCH METHOD

The paper is based on a multiple case study of two networks, symmetrically composed of two relationships each with an LSP as the common actor. The networks are analysed first on a dyad level, which is the basis for a network analysis of the cases. The two cases are finally compared in order to identify patterns between the cases.

RESEARCH FINDINGS

The findings suggest that even though the logistics service providers display a certain level of greenness in their own appearance, the level of greenness decreases to different extent in the interaction with the shippers. The attitude among the shippers is an important reason to how the green efforts are transformed in the relationships, as they are in overall control of the relationships. In addition, even if the shipper is positive and contributes to a positive development the shipper's customers can constitute a barrier in the LSP-shipper interaction. On the other hand, a mutually positive attitude may impose synergetic effects in the dyad.

CONTRIBUTION

The paper applies the concept of network paradoxes to greening logistics in LSP-shipper dyads, and increases the understanding of why the green efforts among logistics service providers are not directly transferred to the surrounding network of shippers/customers. This contributes to the small but emerging body of literature on the greening of industrial networks, but also to a further understanding of the role of inter-organisational relationships in literature on green supply chain management and green logistics.

Keywords: Network paradoxes, green logistics, green supply chain management, logistics service providers, dyads

Competitive paper

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INTRODUCTION

While logistics service providers (LSPs) are generally seen as responsive and slow-moving vis-à-vis their customers, recent research shows that this picture does not necessarily tell the whole story, and that logistics service providers in many ways can be considered as more open to developing green services than their customers are to require them (Martinsen and Björklund, 2012; Wolf and Seuring, 2010). More specifically, Martinsen and Björklund suggest that there is a gap between the green service offer of LSPs and the green demands from the buying companies. Moreover, the research indicated that the customers have limited awareness with regards to the green offer from LSPs, which illustrates a related, but different gap. The question then arises: How can these gaps be overcome in order to further develop the greening of logistics?

The importance of expanding the analysis of logistics' environmental consequences from a single company perspective to a network perspective was highlighted by Öberg et al. (2012). The authors demonstrated that through expanding the network horizon, new insights were gained, which increased the content of the analysis and helped to nuance the results. Depending on the network horizon taken (single firm, dyad or network) the same action would imply different results. Further, the authors pointed out interaction in relationships as key to overcome the environmental paradoxes that seemingly occurred.

While interaction in business relationships surfaces as a crucial means to improve the environmental performance in supply chains and network, it is not for any one company to control or manage the network from its own position, according to its own aims and needs. As indicated above, although the LSPs had high ambitions as well as capabilities, these were not transferred to their customer companies to any high extent. Håkansson and Ford (2002) suggest network paradoxes as a way to explain why companies both can thrive and be inhibited by the fact that they exist in a network of business relationship. With a stance in these paradoxes, **the purpose of this paper is to explain how green efforts and ambitions are transformed when logistics service providers interact with their customers.**

In this paper the term *Logistics Service Provider (LSP)* is applied to companies that provide logistics services, such as transports, warehousing and packaging operations. The transports can be operated by the LSP itself or by other transport providers. LSPs' *customers* are the ones reacting to and buying the service offers from the providers. This type of actor is also referred to in this paper as *the shippers*. Moreover, *environmental improvement* refers to the effects of the green measures taken in LSP-shipper dyads. However, it is outside the scope of this paper to evaluate if the measures taken actually lead to environmental improvements. In this paper we identify the measures and when they are used by one actor or in a business relationship. *Greening logistics* more specifically refer to measures taken with the aim to improve the environmental performance in logistics systems.

This paper is structured as follows. Following this introduction is an overview of relevant areas of literature: one part concerns green logistics and green supply chain management, whereas the other deals with business relationships in the context of networks. The two areas of literature result in three research questions of interest for this paper. Thereafter, the

research methods are presented, followed by a presentation of four studied provider-customer relationships. Next, an analysis of each of the cases is conducted and in a subsequent step possible patterns in the networks are identified. The paper ends with a concluding discussion.

LITERATURE

Green logistics (GL) is the label on research and literature that focuses on the environmental aspects of logistics (McKinnon, 2010). However, green logistics often take a system's perspective and focuses on the systemic aspects of logistics per se, while the organisational issues that arise in response to changing logistics systems are more or less overlooked (Evangelista et al., 2013). Business consequences of greening operations are however considered in the literature on Green Supply Chain Management (GSCM), where the supply chain is the focal entity. Hence, a range of relational issues is accounted for, but mainly from a supply perspective. These two areas contribute to this paper through highlighting what can be done on order to green logistics, and to relational aspects.

In order to widen the understanding of business relational issues, literature on business relationships from a network perspective will be applied, as it provides a wider and more general framework for furthering the understanding of the role of business relationships in greening logistics.

GREEN LOGISTICS AND GREEN SUPPLY CHAIN MANAGEMENT

Over the past two decades, the interest for the environmental aspects of logistics has increased, due to a growing pressure from the public and from the government (McKinnon, 2010). The issues covered by the label Green Logistics (GL) are many and can be split into five areas: Reducing freight transport externalities; City Logistics; Reverse Logistics; Logistics in corporate environmental strategies; and Green Supply Chain Management (GSCM) (ibid). Despite the width of areas, most research efforts relating to traditional logistics issues are performed on a logistics system level, and refer only to a small extent to companies or to business aspects. A few exceptions are Kohn & Hüge-Brodin (2008), who analyses the cost- and service effects of introducing efforts that reduce transport externalities, and Aronsson & Hüge-Brodin (2006), who suggest how companies' decisions of different nature can affect each other and, ultimately, the environmental performance of the logistics activities. Common though for the latter two studies is that they take the single company perspective.

As concluded by amongst others Björklund et al. (2012), Hüge-Brodin et al. (2009) and Öberg et al. (2012), assessing the environmental effect of logistics system is often better accomplished on a level where multiple actors are part of the analysis. This forestalls that the study takes a too narrow perspective and fails to consider important effect outside the studied object. The former authors further point to the importance of the interaction between companies in defining actions, routines and standards for following up on the inter-company level, which is overall considered as a challenge for all those involved.

One of the sub-areas of GL, GSCM, has interorganisational issues as a core concept. However this area has not dealt to any high extent with traditional logistics issues. According to Zhu et al. (2008, p. 578) GSCM is "*designed to incorporate environmental considerations into decision making at each inbound logistics stage of materials management all the way*

through to the outbound logistics stage of post-consumer disposal and the ‘closing-the-loop’ concept of reverse logistics”. Research within GSCM has to a large extent focused on manufacturing companies and their operations, including purchasing and supply, product design, production, distribution, environmental management and customer attitudes (Walker, 2009) and has to a large extent focused on upstream parts of the supply chain (Abbasi and Nilsson, 2012). Despite the environmental impact from transport operations, LSPs and their role in GSCM are only researched to a very limited extent. This is for example implied by the some recent literature reviews into GSCM, in which LSP are barely mentioned (see e.g. Abbasi and Nilsson, 2012; Sarkis, 2012; Sarkis et al., 2011; Srivastava, 2007). Moreover, even though the concept of GSCM includes interorganisational considerations, the relationships as such has not been given vary much attention. Based on a systematic literature review, Ashby et al. (2012) concludes that there is limited research into how supply chain relationships can be exploited in order to improve environmental performance. In the more general GL literature, there is an even greater absence of relationship focus. However, a small but emerging stream of literature within Green Logistics does acknowledge the business perspective in the interaction between LSPs and shippers. While Björklund (2011) concludes that there is a lack of adequate tools and standards for purchasing logistics services, Evangelista et al. (2013) discuss the consequences for purchasing from LSPs’ attitude towards environmental sustainability. Lieb & Lieb (2010) as well as Colicchia et al. (2012) present empirical studies of the greening of the LSP industries in the US and in Italy respectively. Although these studies in some respect address the business sides of green logistics toward suppliers or customers, there is still a gap in addressing the dyadic perspective between the LSP and the shipper (Huge-Brodin, 2012; Wolf and Seuring, 2010).

Both in the green logistics literature as well as within the field of GSCM there is a lack of concretisation with regards to what can be done in terms of environmental work in relationships in general, and LSP relationships in particular. When discussing environmental work, this paper takes its starting-point in to the nine green factors identified by Martinsen and Huge-Brodin (2010):

- *Vehicle technologies*: Changes in for example engine and exhaust systems, aerodynamic profiling, reduction in vehicle tare weight and improved tyre performance can have an effect on environmental performance.
- *Alternative fuels*: Switching to a fuel with low carbon intensity has implications for the environmental impact.
- *Mode choice and intermodal transports*: Carbon intensity of different modes (road, rail, sea and air) varies and the proportion amongst them thus affects environmental impact. Intermodal transports refer to a combination of different transport modes.
- *Behavioural aspects*: Eco-driving is one well-known measure to apply in order to lower environmental impact from transports.
- *Logistics system design*: This factor for example affects the distances that goods are transported. Centralised versus decentralised distribution structures is one parameter that can be of importance for the environmental impact from the logistics system.
- *Transport management*: Fill-rate and distances of empty-running vehicles are aspects of importance for environmental performance. Route-planning and freight consolidation are aspect of relevance here.
- *Choice of partners*: Who to partner with and how to manage the relationships are two factors of interest when the aim is to lower the environmental impact of supply chains.

- *Environmental management systems:* Examples of these are ISO 14001 and EMAS and they can often be related to the minimum performance required by buying companies.
- *Emissions- and energy data:* Many companies measure their own environmental impact in some way and some also monitor their suppliers. Currently, CO₂ emissions is one common indicator to measure.

Further details about the nine categories can for example be found in McKinnon (2003; 2008), and McKinnon and Piecyk (2009), Wu and Dunn (1995), Aronsson and Hüge-Brodin (2006) and Sarkis (2003).

BUSINESS RELATIONSHIPS IN A NETWORK CONTEXT

A business relationship can be described as what occurs between two companies, which undertake exchange (Easton, 1992). It can be understood and explained through the respective companies' characteristics and the interactive process, but in order to improve the understanding a wider network perspective can be applied (Hertz, 1998; Håkansson and Snehota, 1995). Whether business relationships are stronger or weaker, it is appropriate to consider them as parts of networks (Easton, 1992).

From a logistics perspective Supply Chain Management (SCM) is an area that expands logistics consideration beyond the single company borders, and embraces business relationships. Even though LSPs are an important part of logistics, supply chain literature has more or less ignored these actors. Shippers are commonly researched, but with a focus on the interaction between shippers and recipients of goods (Stefansson, 2006). There are several reasons as to the secluded role of LSPs in the literature. Fabbe-Costes et al. (2009) suggest that LSPs are the forgotten actors of supply chain integrations. Spens and Bask (2002) note that LSPs are often merely seen as actors that support other members of the supply chain, providing resources, knowledge, utilities or assets for primary members, and Lemoine and Skjoett-Larsen (2004) that LSPs are the least integrated link in supply chains. Huemer (2012) explains this through the differences in idea and activity structures, and further suggests that the prevalent linear supply chain logic fails to catch the particularities of the LSP, and thereby inhibits the further understanding of LSP-shipper dyads, in research as well as practice.

While single companies manage and control their own resources, the resource interdependencies between companies are managed through exchange relationships (Johanson and Mattsson, 1992). Exchange, or as earlier defined, business relationships are by nature ambiguous vis-à-vis the freedom to decide for the individual firm, and Håkansson and Ford (2002) introduce three paradoxes as a means to explain this dimension of the business relationship.

The first paradox suggested by Håkansson and Ford (2002) refers to opportunities and limitations in networks. While the network enables a company to access important resources as well as to spread its products and services onwards in the network, being in a network circumscribes their freedom in that they need to interact with others through its network relationships and thereby adapt their own internal goals to what is feasible. The opportunities and limitations are connected both to the company's own internal capabilities and to the resources invested in the specific relationship.

The second paradox refers to a company's want to influence the network in order to realise its strategies, meanwhile the actors in its network are influencing it. This view opposes the prevalent strategic view that companies are able to influence its co-actors without being influenced by them. The paradox raises the awareness that companies should really strive to bundle with the right counterparts.

The third paradox is about control. It seems generally acknowledged that any company strives to gain as much control as possible over its network, through its business relationships (Håkansson and Ford, 2002). However, as a company based on its position practices its possibilities to control the network, the efficiency and the innovativeness in the network is supposed to decrease.

The three paradoxes are closely related, but differ from each other in taking partly different vantage points. In the analysis, the paradoxes will be applied to four different cases on business relationships between LSPs and their customers, in order to further understand why, and why not, the greening of logistics, from a network perspective, can be hindered or supported through business relationships. With the purpose to explain how environmental efforts are transformed (and to some extent seem to fade away) in the interaction between LSPs and their customers, the analysis will address the following research questions:

- How can the network paradoxes explain how green efforts and ambitions are transferred between LSPs and shippers?
- How can the network paradoxes explain the further network effects in the transformation of green efforts and ambitions between LSPs and shippers?
- How can different actor characteristics affect the network paradoxes between LSPs and shippers?

RESEARCH METHOD

In this paper, the business relationships between two LSPs and their customers are studied in a multiple-case study. The paper is based on a study of the relationships which was provoked by the gaps between LSPs and providers identified by Martinsen and Björklund (2012). Case studies were chosen in order to try to explain the reasons behind the gaps (in accordance with Merriam, 1994; Yin, 2009). Furthermore, the relationship was highlighted by Martinsen and Björklund (2012) as a possible ground for further explanation, why the interaction around environmental issues was studied in four specific provider-customer relationships. Based on the results from the wide and open study of the relationships, some optional frameworks have been defined, one of which is *network paradoxes*.

The paper relies on a base of literature from two areas: Green Logistics and Green supply chain management; and business relationships in a network context. Both areas are described in this paper based on previous literature searches, for partly different purposes, and complemented with more direct searches through a snowball approach for specific key concepts. The concept of network paradoxes was selected as a basis for the analysis since fellow researchers recommended it as a possibly fruitful model for analysing the relationships.

SELECTION OF CASES

Two LSPs were selected and for each of the LSPs two customer relationships were studied. Choosing two LSPs enables a comparative analysis between the cases, which expands the richness and generalizability of the results. Following the theoretical sampling approach suggested by Eisenhardt and Graebner (2007), the strategy for selecting these cases was to 1) select LSPs that were had been acknowledged for their environmental work, and 2) had similar roles, i.e. they both have the role of coordinating their transport providers in order to provide their customers with logistics services. The cases however differed in terms of geographical domain; while case 1 *Alltransport* provides transport and logistics services in a region in the south of Sweden, case 2 *DGF (DHL Global Forwarding)* provides logistics services for Swedish customers on a global basis. There are also differences in size. The differences mirror a presumption that is often made among the actors themselves; larger companies should be able to invest more into environmental efforts than small ones. In table 1 there is an overview of the studied LSPs.

Table 1: The LSPs of the case companies

Company name:	Legal home of mother company	Division studied	Turnover (2009)	Employees
Alltransport	Sweden	“Long-distance and distribution	€75 M	95
DHL	Germany	DHL Global forwarding in Sweden (DGF)	€385 M	325

Two customers were selected for each of the LSPs, and the main criteria was that environmental issues should be part of the business exchange, and took off from a list of potential customer that had clearly stated their commitment to environmental issues. The selection was discussed with the environmental managers of the LSPs in order to pinpoint fruitful collaborations.

The companies selected among Alltransport’s customers were: *Holmen*, a Sweden-based forest industry group that manufactures printing paper, paperboard and sawn timber; and *Onninen*, a Finland based wholesaler of lighting, electricity, gas, industrial, refrigeration & air conditioning, telecommunications, sewage and plumbing. The companies selected among DGFs customers were: *SECO Tools*, Sweden-based provider of cutting tools for various industries all over the world; and *Ericsson*, Sweden-based provider of telecommunication networks and services, also all over the world.

The cases are further referred to as the Alltransport case (case 1) and the DGF case (case 2). The business relationships with the customers are referred to as: sub-case 1a (Alltransport-Holmen); 1b (Alltransport-Onninen); 2a (DGF-SECO Tools); and 2b (DGF-Ericsson).

DATA COLLECTION AND ANALYSIS

The case data collection was mainly based on interviews, but additional information has been gathered from the case companies’ web pages, as well as from their annual reports and sustainability reports. Three to four interviews were conducted for each of the sub-cases. The interviews were semi-structured and questions concerned aspects of internal environmental work, relationship-specific environmental as well as more general relationship characteristics. The people interviewed where the persons involved in the business relationship.

The analysis is performed in steps and mainly takes a pattern-matching approach (Yin, 2009). First, cases are analysed one by one, in which the four business relationships (sub-cases) are analysed per se, and the three network paradoxes are applied to the different cases. Further, each case is analysed as a network and also relating to the wider networks in which they exist, in order to be able to detect further network effects. The last step in the analysis compares the two cases in which the differences are discussed, as they too can offer some explanations to why the greening efforts differ.

THE CASES

The cases in this paper can be described as two different network cases, each containing 2 business relationships (see figure 1). The unit of analysis is for all sub-cases the relationship between an LSP and one of its customers. The starting point for each case is the LSP and its environmental work, which in different ways is transformed to the network through the relationship with the customer. The unit of analysis for the network analysis is the network made up by one LSP and two of its customers.

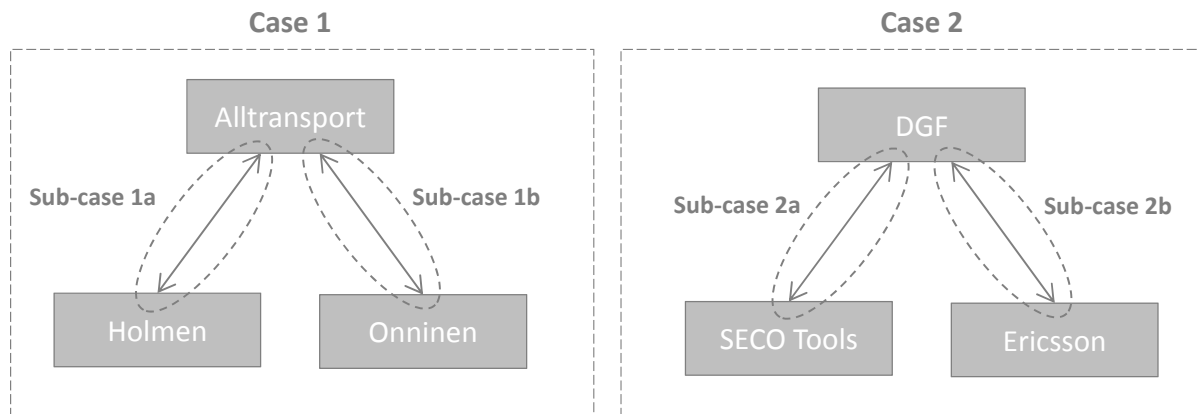


Figure 1: The two cases and their according sub-cases

In the following sections, an overview of the environmental work of the separate companies is given and the basic characteristics of the four sub-cases are described.

CASE 1

Alltransport and the Environment

The awareness of environmental issues is considered to be high at Alltransport, since it is an area that the whole company is working with and one that Alltransport tries to profile themselves with. Alltransport is certified according to the environmental certification ISO 14001. With regard to specific competences, the quality and environmental manager is perhaps the most important person as she is responsible for the environmental work at Alltransport. In order to increase the environmental competence of the employees, an internal training day is held once a year within the field of quality and environment. The goal of these days is to get involved actors to understand the different types of environmental work that Alltransport conducts and what type of affects these measures have. Much of this work is done with the company's sustainability reports as a guide. Alltransport was given an award for their sustainability report in 2008.

Sub-case 1a: Alltransport-Holmen

Holmen Paper is Alltransport's largest customer and represents 20% of Alltransport's turnover. For Holmen Paper, in its turn, Alltransport represent about 5% of transport costs. Even though 5% may seem like a small figure, Alltransport is the largest transporter of products from Holmen's production site Braviken to destinations within Sweden.

There is an environmental department at the Holmen Head Office in Stockholm that is responsible for environmental issues for Holmen as a whole. The environmental staffs at the different factories are responsible for their specific sites. There is no department or person responsible for environmental issues in logistics. However, every second year Holmen conducts a follow-up on how much they have emitted in terms of for example sulphur, Nox and CO₂. The follow-up gives Holmen an idea of how well or badly they are performing. The estimations are based on calculations made by Holmen.

Holmen has been a customer to Alltransport for so many years that no one at the two companies seems to know the exact length of the relationship. Deals are renewed at regular intervals, and although the number of tons that Alltransport transports varies, the company has during the relationship always had some business with Holmen. The duration of the contracts between Alltransport and Holmen is usually two to three years and vary according to Holmen's situation. If Holmen knows of big changes planned within their company, they do not want to sign deals with Alltransport that are longer than two years. Alltransport on the other hand, tries to make the contracts last as long as possible.

There are basically two situations when the people interviewed at Alltransport and Holmen Paper is in contact with each. One is when negotiations for new contracts are made and once a year when price adjustments are discussed. The other situation that requires contact between Alltransport and Holmen is when trouble arises.

Sub-case 1b: Alltransport-Onninen

Onninen represent about 3% of Alltransport's turnover, which makes them an average customer for the company, or "*a good medium-sized customer*" as the business area manager for Alltransport puts it. As for Onninen, Alltransport represent around 4.5% of total transport costs. All Onninen's goods that are to be delivered in Östergötland are transported by Alltransport. The logistics service provider is involved in deliveries of almost the whole range of heating and sanitation products and in the smaller deliveries of the electric power products offered by Onninen. Onninen has been a customer of Alltransport for about three years.

Environmental efforts at Onninen include for example environmental criteria for the company cars and waste management. With regards to logistics, the most important factor is to keep the need for transports as low as possible. This measure is also closely related to cost savings and that is what Onninen focuses on. However, decreased costs are believed to go hand in hand with lowered environmental impact at Onninen.

The transport manager at Onninen has known the company Alltransport, and some of the people there, for seven years and worked with them in his previous job as a transport salesperson. At that time, Alltransport and the transport manager's transports were coordinated at times, whereas the transport manager is now "at the other side of the table" and buys transports from Alltransport. This means that he is tougher in his relationship with them now and he also knows how to deal with them since he has been on the other side.

The employees interviewed at Alltransport and Onninen are in contact with each other approximately once or twice a week and they meet physically every two months. The two companies generally have contact for three different reasons, other than the negotiation process; problems, new circumstances or invoice issues.

CASE 2

DGF and the Environment

DHL started to work more resolutely with environmental issues four or five years ago. One example of this is that in 2007 DHL set a global target to cut CO₂ emissions by 30% by the year 2020. As a complement to the 30% goal mentioned above, DHL set a goal to cut CO₂ emissions by 10% by 2012 for their own vehicles and planes, which mostly belong to DHL Express and DHL Freight (trucks). With regards to DGF's environmental impact (DGF is DHL Global Forwarding, a division of DHL that mainly provide overseas and intercontinental transport- and logistics services), their own operations – business trips, company cars and electricity for the offices – cause 0.5% of the total environmental impact if the transports DGF perform for customers are taken into account. Consequently, instead of trying to cut emissions for their own direct operations, DGF tries to involve customers and subcontractors in the environmental work. Therefore, a large part of the environmental work is to inform customers and to try to get them interested in working towards environmental improvements together with DGF.

At DHL, there are environmental managers on a global level as well as on domestic levels. Within DHL Global Forwarding in Sweden, one environmental manager is responsible for environmental issues.

DHL has for won an IT-award in the category “the sustainable project of the year” for its emission simulation tool.

Sub-case 2a: DGF-SECO Tools

SECO Tools is an important customer for DHL, and is sometimes the fourth and sometimes the fifth largest customer for DGF. DHL transports in total about 30% of SECO Tools' volumes, including both DHL Global Forwarding and DHL Express. DGF often transports large volumes to distribution centres around the world, where DHL Express, or in some cases, regional actors, take over and distribute the separate parcels. SECO Tools mostly transports goods by air, but they use road and sea whenever possible.

On a corporate group level at SECO Tools, environmental issues are taken very seriously and the environmental consciousness is high. SECO Tools has a department that is responsible for quality, environment and work environment and the people that work there act as support and internal auditors for the different subsidiaries. They also give SECO personnel updates on the management system, including the environmental aspects of that system. With regards to logistics, SECO Tools includes environmental work of LSPs as one of three criteria (the other being service and price) when logistics providers are selected. The first step is to have an environmental management system, which does not necessarily have to be ISO 14 001.

SECO Tools has to report their environmental impact and present how they systematically work in order to decrease, or at least maintain today's levels of, environmental impact.

SECO Tools has been a DGF customer since 2003. The two companies have continuous contracts, where no end-date is set and where price adjustments are negotiated once a year. If

either DHL or SECO Tools are dissatisfied, there are varying terms of notice depending on the specific situation.

With regard to the contact between DHL and SECO Tools, a Customer Relationship Manager (CRM) is the global co-ordinator for SECO Tools. The manager of global transport solutions at SECO Tools and the CRM at DHL have known each other professionally for many years and the CRM is SECO Tools' way into DHL no matter which division it concerns. Moreover, the CRM is convinced that DHL and SECO Tools do more business together because of the personal connection between himself and the global transport solutions manager. Besides communication with the CRM, the global transport solutions manager keeps in contact with DHL through global or regional managers within DHL Global Forwarding or DHL Express.

Sub-case 2b: DGF-Ericsson

DHL takes care of about 20% of the inbound flows at Ericsson, which corresponds to 150 million SEK. Ericsson is a major customer of DHL and is also the most expansive within DGF. DGF does not merely provide sea and air freight, but also has control tower operations which mean that they function as support for the logistics department at Ericsson. DHL is also one of five transporters that take care of Ericsson's outbound flows. Ericsson has been a customer of DHL for a long time.

Ericsson basically wants to be a part of creating a more sustainable world. The company wants to empower both individuals and companies to actually do something about the problems that the world faces. There are a number of people within Ericsson that work with environmental issues, such as those that are dedicated to environmental design and the development of products. Concerning logistics, Ericsson works with quarterly reports on transport emissions, where different parts of the company report to the corporate level. Moreover, Ericsson measures the quantity of goods that are sent via so-called surface transports (road, rail and ocean) and air. Ericsson sends a lot of goods by plane, but as a part of their environmental work they are trying to decrease the percentage of air freight.

On a global level, the contracts between Ericsson and DHL do not have an expiry date. These so-called sales agreements enable regional and local Ericsson divisions to negotiate more detailed agreements that suit the local conditions. The local contracts in Sweden have a duration period of one year and constitute an extension to the global sales agreement. During negotiations, DHL's share of Ericsson's transportation can change.

DHL has a meeting at every Ericsson site in Sweden once a month. At these meetings, all flows are discussed and questions that arise are answered. Market tendencies are discussed as well as organisational changes and KPIs (Key Performance Indicators) and why they might have changed. DHL is also in contact with some of Ericsson's suppliers and discusses how the transport bookings should be handled.

ANALYSIS

In this section the two cases are analysed with respect to the interaction around green logistics aspects. As a starting point, each LSP-shipper relationship (the sub-cases) is analysed per se. The focus is on the interaction between the LSP and the shipper regarding environmental issues, and each analysis ends with a characterisation of the relationships in terms of network paradoxes. After this the cases are analysed on a network level. The last step on the analysis is a comparison between the two cases.

CASE 1

Sub-case 1a: Alltransport – Holmen

There is very little evidence of environmental work in the Alltransport-Holmen relationship, despite the fact that environmental issues are of importance for the LSP as well as the shipper. Alltransport views some of the activities in the relationship as environmental, whereas the shipper does not. One such example is the aim in the relationship to keep fill-rates as high as possible. Holmen never speaks about the fill-rates in environmental terms; the measures to reach high fill-rates are for financial reasons. Even though Alltransport views this as environmental work, the company is aware that the shipper does not share the same view.

As implied above, environmental work is not a reason for why Holmen has selected Alltransport as LSP. Service is the most important aspect, but if different LSPs can offer the same high service level, then environmental work could potentially be a factor that affects the selection of LSP for Holmen. It is also clear that Holmen is not willing to pay for environmental work.

As a consequence, the environmental work that Alltransport performs in the relationship with Holmen is at Alltransport's own initiative, since there are no requests from Holmen. If a truck is on its way back to Norrköping from somewhere in Sweden, Alltransport tries to fill it up with recycled paper for Holmens factory in Braviken. This benefits Holmen in the end, since Alltransport gets an efficient transport flow and costs are decreased.

According to Alltransport, Holmen is aware of the environmental work that Alltransport conducts, through information from Alltransport orally as well as in written form (sustainability report). Holmen Paper admits to be aware that Alltransport works internally with environmental factors, but has no awareness of what Alltransport could offer in the interaction with Holmen. Alltransport has never really tried to clarify the details of their environmental work, and Holmen has not asked for a clarification either.

The environmental efforts of Alltransport appear to be fading in the interaction with Holmen. One possible explanation for this could be found in the *first network paradox*. Alltransport and Holmen have had a relationship for many years and during the years the thread that is their specific relationship is likely to have become stronger. This gives different effects. On the opportunities-side is the stability that provides safety and a long planning horizon for Alltransport, which is also underlined by, for the business itself, long contracts. This safety would potentially encourage Alltransport to introduce environmental initiatives. The other side of the strong relationship delimits the interaction. The longevity of the relationship brings a lot of experience, and old habits of how, and about what, to interact. The interaction between the two companies is managed in a certain way and the people involved know what to expect from each other. Bringing new, environmental aspects into business might be seen with some doubt from Holmen, which appears to be happy with the interaction in the relationship the way it is. In addition, the long contracts can be hindering the development. Greening logistics operation is at present a fast developing area (e.g. McKinnon, 2010), and since contracts are valid over a number of years, new opportunities may be excluded due to contractual matters based on a "historic" situation.

The *second network paradox* is also in play in this relationship. While Alltransport believes that they try to some extent to influence Holmen to introduce more environmental efforts into the transport services, Holmen seem more or less unaware of these efforts. This, together

with the non-interest from Holmen of greening their logistics interaction with Alltransport, suggests that Holmen exerts a countervailing influence regarding greening the logistics in the relationship, which in turn clearly impedes the adoption of green initiatives.

The *third network paradox* can be traced to the two companies' position vis-à-vis each other, where Holmen is by far the largest player, and is also less dependent overall on Alltransport than the other way around. In fact, Holmen controls the relationship in the power of its position in terms of dependency as well as being a customer (Johansson & Mattsson, 1992). From the case study it becomes evident that Holmen more or less one-sidedly controls the content of the relationship, and hereby the potential innovations by which Alltransport could enrich the environmental content of the relationship are efficaciously disregarded.

Sub-case 1b: Alltransport – Onninen

Environmental factors were not an issue during the negotiations between Alltransport and Onninen and instead, focus was on on-time deliveries and price. With regards to this, Onninen's transport manager says:

“Unfortunately we didn't think about environmental things when we made the deal with Alltransport, although I know that they work with environmental issues. But that has not been the critical detail in this case.”

Alltransport has tried to show what they are doing within the environmental field, but despite this there is, according to the LSP, nothing in the relationship that is about environmental work. From Onninen's perspective, it is recognised that their wish for environmentally high-quality vehicles and high-fill rates is beneficial from an environmental point of view, but this part is merely seen as a bonus. The important thing for Onninen is that their customers do not want more than one vehicle delivering goods and this drives a need for high fill-rates. Moreover, Onninen concludes it is not financially possible for Alltransport not to consolidate goods, and thus view it as a part of the LSP's business model.

All of Onninen's suppliers need to have some environmental management system and the fact that Alltransport is certified according to the environmental standard ISO 14001 is therefore of importance for Onninen.

In comparison to the previous case, this business relationship demonstrates a weaker thread between the two actors. This can be seen from the shorter history of the relationship and that the two companies are volume wise less important to each other's' businesses as the previous two. However, as Onninen was actually recommended for the study by Alltransport as an environmentally conscious shipper, it can be assumed that Alltransport rather see the relationship with Onninen as a potential future opportunity for expanding on the environmental content of the business exchange. Despite the minimal interest shown so far, a similar interest can be traced from Onninen towards Alltransport. Taken together, this points to future-directed mutual opportunities in the relationship. However, what probably will delimit the development is the low strategic impact of transports, and specifically the environmental content of the transports, in Onninen's business. In that sense, we can see the *first network paradox* in play here.

As is the previous case, we can also see the *third network paradox* in the relationship between Alltransport and Onninen, and in a very similar way. Onninen holds the strongest position and thereby controls the relationship and its content, which in turn does not give any room for introducing any environmental innovations from Alltransport. Compared to the previous case, this one represents an even weaker position for the LSP vis-à-vis the shipper.

Network Patterns in Case 1

The first paradox in this case reflects the present state in Alltransport's network. The amount of green efforts in Alltransport's relationships is rather small today, even in those two that were selected based on a high green content. This is not mainly due to a lack of ambition from Alltransport's side, but rather a lack of interest from the customers, which is identified as the main limitation to green logistics (Håkansson and Ford, 2002; cf. Hüge-Brodin, 2012). However there are some indications that in the relationship with Onninen there is still hope for a positive turn, in the not-so-far future. Potentially this could constitute an important opportunity for Alltransport to increase the green efforts in their business as a whole, and also improve their competence not only in greening logistics, but also how to approach shippers with green offers.

Although Alltransport is environmentally aware and would like to influence its customers, this does not seem to happen in the described sub-cases. The situation is nonetheless that Alltransport has committed itself to working with environmental issues and it is one part of their offer to customers. However, the cases indicate that the customers has not put any demands with regards to environmental work which, in accordance with *the second network paradox*, suggests that Alltransport is influenced by other parts of the network in their strive to be a "green" company. One possibility is that Alltransport is influenced by, and in turn influences, other actors in the network such as competitors that have also started working with environmental issues.

As illustrated in both sub-cases, there is little evidence of environmental work in any of them, despite the fact that the case descriptions point to that Alltransport has tried to influence the shippers. This illustrates *the third network paradox*, in which control is an important element. Even if Holmen is more important to Alltransport than Onninen, both sub-case 1a and 1b illustrate situations in which the shippers are in control of the relationships. According to the network paradox, this inhibits the shippers to embrace environmental ideas from Alltransport. There is a possibility that Alltransport more successfully would be able to promote environmental work in relationships where the dependence situation is more equal than in the described cases. However, the fact that the relationships were suggested by Alltransport as "green" relationships indicate that the LSP has few, if any, other relationships in which they manage to influence their customers to become greener.

CASE 2

Sub-case 2a: DHL-Seco Tools

Environmental concern is relevant in the relationship between DHL and SECO Tools, and the two companies communicate well with regard to environmental issues. According to the CRM, DHL does not have the same substantial environmental discussion with all customers. He says:

"With regard to environmental work, we have a very good dialog with SECO Tools in particular."

For SECO Tools' part, environmental work is one of the criteria that the company needs to consider when suppliers are chosen. More specifically, suppliers are measured on the quality of the technical solution, lead time, price and environmental data. If all other things are equal, environmental considerations are taken into account in the choice of supplier.

SECO Tools' customers value 1) the product 2) on-time deliveries and 3) price, and in that particular order. The fact that on-time deliveries are an important factor sets boundaries for

the environmental work. More specifically, even though SECO Tools is interested in environmental issues, the company needs to live up to customers' demands.

The CRM at DHL thinks that the tight time schedule that customers demand is one of the largest problems for environmental work in general for LSPs. If SECO Tools' customers could order their goods 24 hours earlier than is done today, it would open up new possibilities for the transport planning. The CRM says:

“If it would be possible to increase the awareness of environmental issues – not at SECO Tools, but at SECO Tools' customers – then you would get a large environmental effect.”

There are basically three main projects that DHL and SECO Tools have performed, or are working on, together in terms of environmental work; decrease the amount of pick-up trucks at the DC in Brussels, open a new DC in China and open a national DC in Sweden. In addition to these, SECO Tools has stopped the using air freight to their site in India, and they have made changes in their planning which enables some large deliveries to be transported by ship.

These projects include studies that have been performed in collaboration between DHL and SECO Tools. DHL has also assisted SECO Tools in assessing the environmental effects of the proposed changes, and in providing suggestions for future environmental work.

DHL manages well in the “*green competition*”, according to SECO Tools' global transport solutions manager. He says that for standard transactions, DHL can use their system, press a button and out comes the environmental report. For SECO Tools, many of the DHL services performed are not standard products. Therefore the environmental manager at DHL has had to work hard to provide SECO Tools with the data they require. The global transport solutions manager believes that DHL has an advantage because of the work that the environmental manager conducts. He says:

“The specific supplier, no matter who, that has Linda [Bergsten] as their environmental manager, has an advantage over the others. I have never met a person more devoted to environmental issues.”

DHL also works with a GoGreen concept, where customers can pay an extra fee covering the CO₂ cost they cause and become a part of the decision about what that extra money should be used for. SECO Tools has not yet bought the GoGreen concept, but could consider it if they would find somewhere useful to invest the extra money. However, SECO Tools has other green demands. The environmental data that SECO Tools requires is CO₂ emissions, partially because CO₂ emissions are the specific indicator for which an international standard has started to be developed. They have planned to add other indicators as well in the future

In terms of *the first network paradox*, the opportunities for DGF in this relationship lies in the high attention that SECO Tools pays to environmental aspects in their supplier interaction. This contributes to facilitate the interaction on environmental issues both on a contract and on a daily basis. The most important limitation towards transferring green improvements to the network lies with the priorities among SECO Tools customers, which in turn forces SECO Tools to prioritise on-time deliveries over environmental opportunities.

In this relationship the LSP is the one with the clearest influence on the shipper, regarding green improvements in logistics. This is manifested in the provision of reports and foremost the provision of suggestions for future environmental improvements, which is appreciated by the shipper. The most profound countervailing influences on the greening of logistics not

from the shipper itself, but rather originates from its customers. This influence inhibits the shipper's adoption of environmental improvements. Together, these influences illustrate how *the second network paradox* is in play in this relationship.

With regard to *the third network paradox*, SECO Tools is in control of the relationship *per se*, which is indicated in their possibilities to order specific green services outside DGF's standardised scope, which DGF is happy to supply despite that it occupies considerable resources. On the other hand DGF is in control of a crucial asset when it comes to greening logistics; a specific competence in the matter generally, and in particular the environmental manager, who is considered to be key to the success of this relationship, manifested through realised environmental improvements. In that sense the mutual control situation appears to work in favour of introducing green innovations into the logistics-related interaction between DGF and SECO Tools.

Sub-case 2b: DHL-Ericsson

Initially, the environmental aspects of the Ericsson-DHL relationship were about emission reports. Since there is no standard as to how these emissions should be measured, there was a discussion about how it should be done. Ericsson now requires that DHL reports environmental data every month, following a specific format that Ericsson has decided.

Ericsson wants all five of their logistics service providers to conduct an environmental project every year. The project should be something that is beneficial to both Ericsson and the involved logistics service provider. In 2009, DHL and Ericsson had a project that concerned eco-driving on a specific route, and that project resulted in less fuel consumption. In 2010, DHL was in charge of one environmental project in which a milk round was initiated. The milk round means that trucks go from one production site to the next to pick up goods, where the alternative would be to pick up only from one site at a time. The trucks follow a time schedule, like buses do, and employees at the sites know when the trucks are scheduled to arrive.

The subcontractors that are responsible for the transports in the milk round have installed computers in their trucks and "are in full control", as the environmental manager at DHL says. The project has resulted in high fill-rates and low emissions per tonne-km. DHL has recently started to provide Ericsson with environmental reports on these changes. These reports appear more useful than the general reports about emissions and goods transported, since they clearly show the effects that a scheduled loop has on costs and the environment. Indeed, the project has also resulted in cost savings. DHL has persuaded Ericsson to send documents with trucks that already go between the different sites, instead of sending the documents with a separate courier.

According to DHL's inbound & domestic development manager, the project was not "forced" on DHL from Ericsson; instead it was driven by DHL employees. The inbound & domestic development manager says that DHL and Ericsson have achieved a lot with regard to environmental work and continues:

"This is what is fun about this – there is enormous potential; there are no limits."

Although Ericsson is considered interested in improvement of environmental issues, DHL is aware of that their customer is not prepared to pay extra for environmental services.

Ericsson's core business is the products, and not transports, while the logistics service providers are experts on transportation. In general, LSPs are not considered to be driving forces in environmental work. The environmental advisor says:

"Sometimes I feel like we are pushing them...I don't think that the suppliers show what they can do [in terms of environmental work]; instead, Ericsson presents something and then they react."

Both companies seem to agree that DHL can fulfil all Ericsson's green demands. DHL's environmental manager says:

"Yes, we can. What they have required are environmental reports and that we do an environmental project each year, plus that we have to use shipping companies that are included in the Clean Shipping Project. And we can match that. What they haven't done, is to demand that we should control their transports more, and that's something we would be able to do to a larger extent."

The environmental advisor at Distribution Logistics at Ericsson also thinks that DGF are capable of offering all environmental work that DHL ask of them. However, she adds:

"Those [environmental] things we've said that we want, they have done. But there might be other things possible that we don't know about."

DHL's inbound & domestic development manager does not find it is strange that DFG is able to fulfil Ericsson's green demand since he believes that DGF is leading the environmental work in the relationship. The environmental manager agrees with this to some extent, but adds that globally, Ericsson is the actor that drives the environmental work in the relationship. Locally, however, she believes that DHL is a driver of this work.

The inbound & domestic development manager at DHL states that it is the relationship that has to encourage the environmental work. DHL knows about transports and can provide ideas in that area, but they need to work together with the customer in order to achieve as much as possible in the "green relationship". He adds that the customer has to be involved in this work and says that the environmental advisor at Distribution Logistics and her inbound manager at every Ericsson site have to be involved in the different concepts, both with regard to costs and to environmental gains.

The latter comment clearly defines the relationship in itself as an opportunity to spread the environmental work in a wider network. Further, from DGFs point of view Ericsson's way of challenging the logistics providers to suggest viable green logistics projects can be seen as one manifestation of this opportunity. But, as concluded in *the first network paradox*, with opportunities come limitations. Although the green logistics work appears as fairly proactive, it is nevertheless inhibited to some extent. One limitation could be the lack of green logistics competence within Ericsson, which would impede the adoption of green logistics initiatives. However Ericsson seems to be at ease with this, and instead rely on their expert partner: DGF. Another limitation that more evidently comes into play here is the generally recognised unwillingness to pay extra for the environmental services.

With regard to *the second network paradox* it is demonstrated in this case that influence goes both ways. Again, by challenging its logistics providers Ericsson clearly signals its interest in these issues, and encourages the logistics providers to come up with new ideas. In the relationship with DGF this is an important driving force for putting extra effort into developing the joint projects beyond the "standard" expectations from DGFs majority of customers. It is also clear that there is an influence from DGF on Ericsson to support the

greening of logistics, for instance that DGF persuaded Ericsson to do things otherwise not done (sending documents in particular, and in general by being given the expert role in green logistics development).

As DGF is in control of its subcontractors, it is in practice in control of vital parts of Ericsson's providing their customers with goods. As it appears, Ericsson allows DGF full control over the daily work, which paves the way for environmental improvements at DGF's initiative. On the other hand, on the contract level Ericsson is the one procuring the service and is thus in full control over who it lets into its network of logistics providers. This can be considered as a type of balanced situation, where both parties to a certain and similar extent are dependent on each other's good intents, and thus illustrates *the third network paradox*.

Network patterns in Case 2

The first paradox demonstrates that the opportunities as well as limitations can be understood through the network structure. The common opportunities lie in that both the studied shipper companies pay high attention to environmental issues, and are in general positive to the efforts from DGF. However the shippers' customers constitute the most important limitations. This is indicated either directly, as SECO Tools customers are not interested, or in terms of economical reasons. From DGF's perspective, these limitations are consequences from the wider network and the indirect relationships, while the opportunities stem from the direct relationships. This is in line with the close interaction in the direct relationships, which indicates that the investments in the relationships are high (cf. Håkansson and Ford, 2002) and consequently increases the opportunities to green the logistics operations.

With respect to the influence patterns relating to *the second paradox*, the two relationships in the network show similar patterns, however not precisely as described in literature. DGF works actively to influence both the shippers to enhance the environmental efforts regarding logistics. Meanwhile, the two shippers strive to challenge their LSPs in different ways to come up with new solutions. We identify mutual influence, but not in a countervailing manner but rather as enforcing of each other. In the case of greening logistics, the two counterparts in each relationship seem to share an ambition of going greener, albeit in different paces as indicated in the specific relationship analyses. Although we cannot see how any of the specific relationships influence the other one, it can be presumed that the positive influences in one relationship enforce the development in others. However, can this then be considered as a paradox in line with Håkansson and Ford (2002). The findings clearly underline the importance of bundling with the right counterpart.

Regarding control and *the third paradox*, both shipper companies are in overall control of their relationships with DGF. However, DGF has reached a position where they are more or less in control of the logistics operations and daily work, and of the greening efforts both short- and long term. This can be explained by access to important resources, foremost that of competence regarding green issues including the environmental manager. Through their competence-based position in the relationships, DGF is allowed to maintain and enforce its green logistics competence as a company, but based on the interaction within single shipper relationships. This serves to further improve its competence and hence its position and its possibilities to control the interaction. This control is used to improve the greening efforts, and hence to support the introduction of green innovations into the relationship, despite the overall control that lies with the shipper companies (cf. Håkansson and Ford, 2002).

DIFFERENT COMPANIES – DIFFERENT STARTING POINTS – DIFFERENT OUTCOME

The *first paradox* helps to explain the differences in the two studied networks. No matter how ambitious LSPs are, the relationships with shippers constitute opportunities as well as limitations to how green the logistics in the relationship becomes. The main feature is the pro-activeness of the shipper, which can be an opportunity, as in case 2, or a limitation, as in case 1. Both the LSPs are acknowledged for their environmental work and show ambitious agendas, however the green efforts are accommodated in totally different ways in their relationships. Despite that both LSPs possess a green logistics competence superior to their abase-provider>EBSCOhost</remote-database-provider></record></Cite></EndNote>(1 !! HYPERLINK \l "_ENREF_12" \o "Huemer, 201 position in the relationship with their shippers. DGF invests heavily in their customer relationships, as they are encouraged to do so, and their goals are coherent with those of their customers. Alltransport, on the other hand, have adapted their ambition in the specific relationships, in accordance with Håkansson and Ford (2002).

The *second network paradox* suggests that a company tries to influence the network in order to realise its strategies, while at the same time being influenced by other actors in the network. Both Alltransport and DGF can be said to have a similar environmental strategy, while the extent to which they manage to influence their customers differ between them. In case 1, Alltransport has little success in influencing their customers, and the shippers' influence on Alltransport can be described as countervailing with regards to environmental work. In case 2, however, the case descriptions suggest that DGF's environmental strategy match well with the environmental strategy of the shippers. In both sub-case 2a and 2b there is evidence of both actors influencing each other in the same overall direction with regards to environmental work. In some situations they can also be said to trigger each other in their environmental work and thus improve separately due to the other actor. This can also have implications for the environmental work in DGF's other relationships as well. The two different cases thus illustrate network paradox two in very different ways. Whereas the actors in case 1 can be said to work against each other and struggle with the environmental content in the relationships, the actors in case 2 work together and benefit from this in their environmental work.

The third paradox further helps to explain why case 2, in terms of spreading green efforts, is more successful than case 1. Alltransport holds a comparably weak position vis-à-vis its customers, and show little evidence of controlling the relationship or even the green logistics aspects of it. At the same time DGF, still being a supplier, holds a base of competence that is both acknowledged by, and apparently valuable to its shippers. It is also evident, between the cases, that in line with Håkansson and Ford (2002) the green innovations are transferred more frequently and to a higher extent in the relationships where the LSP holds a considerable amount of control. Various other aspects, such as size, might also help explain the power balances as well as imbalances between the cases, but what is clear is that the competence, and how it is valued by the shippers vis-à-vis its total business is essential in these cases of how green logistics efforts are transformed in the network.

CONCLUDING DISCUSSION

While the increased focus on environmental concern is widely acknowledged among practitioners as well as researchers, the environmental work and efforts among LSPs still seem to have less impact on networks and supply chains than could be expected (Wolf and Seuring, 2010; Martinsen and Björklund, 2012). The research presented in this paper

demonstrated that there are big differences between different cases, with respect to how the green efforts of LSPs are reflected in their customers' business.

By applying the concept of network paradoxes, as suggested by Håkansson and Ford (2002), it has been possible to identify some explanations to why green efforts in relationships between LSPs and shippers sometimes seem to fade, thus demonstrating a de-greening of the supply chain, while they sometimes do not. Despite the relatively high competence in green logistics among the studied LSPs, the outcome of the transformation differs and a major difference identified is the attitude among the customers.

The matching between LSPs and shippers seem to play a crucial role when it comes to realising ambitions for greening logistics. Main opportunities as well as limitations lie, in the studied cases, in the strategic ambition among the customers. This highlights the first network paradox (Håkansson and Ford, 2002), but also emphasizes that the same aspect can be either an opportunity or a limitation to the specific case. The missing commitment among the shippers is also highlighted by e.g. Wolf and Seuring (2010) and Huge-Brodin (2012) and can thus be singled out as an important reason for the de-greening of supply chains and business networks.

This research demonstrated that the better match there is between the strategic ambitions of the counterparts, the more green innovations are transferred between the LSP and its customer. This is in line with Håkansson and Ford's (2002) second network paradox, underlining the importance of selecting the right counterpart. Martinsen and Huge-Brodin (2010) also points to that this aspect should be considered as part of the green logistics offer.

The more balanced a LSP-shipper relationship is, the more innovations are transferred from the LSP to the shipper. Despite the position of the provider as a supplier, it can improve its position by being able to provide a competence to the shipper, which is valuable. The balance act in the studied cases promoted the greening of the logistics operation, which is in line with the third network paradox (Håkansson and Ford, 2002). The positioning and the bargaining power amongst actors in the area of GL and of GSCM are still to be explored.

The customers to the shippers are only indirectly related to the LSPs, still their influence on the transformation of green efforts in the network is evident. This supports taking a network perspective when studying business relationships (Håkansson and Snehota 1995), and further highlights the importance of not taking a too narrow perspective in the network analysis, as suggested by Öberg et al. (2012) and by Björklund et al. (2012). It also points to the need to understand the interplay between the more traditional and business oriented aspects of logistics and environmental aspects (cf. Kohn and Huge-Brodin, 2008).

One of the paradoxes still puzzles. The second paradox takes very different shapes between the two studied cases. One case clearly illustrates the "countervailing" influences between actors, which in turn decreases the influence of one actor over another. The second case, however, shows more of a synergetic behaviour as the two parties' influences over each other aim in the same direction and reinforces the effects on the relationship's green content. Is it then relevant to describe this as a paradox? The notion of a paradox takes the stance that there are opposite sides that strive to outbalance or contradict each other, while in this case there is instead a mutual strive. We would prefer to label this situation as a synergy or as emergence.

Although fruitful, the application of paradoxes to the studied cases posed some challenges. The concepts that the paradoxes aim to capture are partly overlapping and not unambiguously defined. For instance, the same reasons that explain the control balance (paradox three) in a business relationship is directly related to the influence balance (paradox two), although there is a clear difference. Further, the opportunities and the limitations of the first paradox rely on the second and the third paradoxes, according to our results. In addition, the different actors attempt to apply influence in order to compensate for the other actor's wielded control. In all, a further analysis into how these paradoxes interact could be a way to bring the understanding further of how green logistics efforts are transformed between LSPs and shippers.

Although the research field of GSCM addresses a wide spectrum of topics, still there is very little attention paid to the role of the LSPs. This is somewhat surprising, since logistics is more and more often outsourced and logistics in many cases is considered as a value-adding strategic part of a product offer. The research presented here thus breaks ground for an additional sub-area of GSCM, namely that of the inclusion of LSPs into the concept of the supply chain.

Company-internal decisions about logistics systems effect on the environmental performance and Aronsson and Huge-Brodin (2006) describe how strategic decisions provide opportunities as well as sets limitations for lower-level decisions, which in turn have more direct effect on the environment. This paper demonstrates that the generic pattern can be transferred beyond the intra-company level to the business relationship level, through the first of the paradoxes described by Håkansson & Ford (2002). Extending the model from Aronsson and Huge-Brodin (2006) for logistics decisions would mean including the business relationship level into the decision making model. However, whether it should be of more or less strategic importance than the "logistics structure" decision (highest in the decision hierarchy) would definitely be case specific. If the business relationship is dependency-wise in favour of the focal firm, the relationship level is subordinate to the logistics structure-decision vis-à-vis the opposite situation where the business relationship might very well be of the highest strategic significance.

Finally, the findings presented in this paper can also support logistics service providers in the development of their own, as well as their customers' (the shippers'), businesses towards accelerating the green content of their service offering. Seeking customers with matching attitudes and strategies can enable LSPs to realise their own green ambitions. Shippers may also benefit from insights about how their pro-activity can be met by the right LSP in a mutually beneficiary way, while their passiveness can impede the greening of industrial networks and supply chains.

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