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Energy & Transport

Sustainable Transports through Improved Actor Interfaces – End of Project Report

Activities and outcomes of the **SusInt** project



Title: SusInt – Sustainable Transports through Improved Actor Interfaces

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Abstract:

The SusInt project addresses the question of how logistics and transport systems can become more environmentally sustainable.

The stance taken is that the business models of logistics service providers and their customers do not match, which impedes the provision of more environmentally friendly services.

The differences in business models have been analysed, and based on case studies as well as surveys the SusInt project concludes that:

- The conflicting business models can in part explain the poor development
- Logistics service providers offer value to their customers in various ways, which could be further exploited to promote greening of transport and logistics.
- Network size and characteristics drive value creation as well as environmental performance.
- Cooperative efforts and gains depend much on the understanding of network logics among both logistics service providers and their customers

Based on the analyses and conclusions recommendations are presented that can support logistics service providers, their customers and authorities and policy makers to contribute to a greener and value based transport and logistics system.

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Executive Summary

Background and purpose

Despite a growing knowledge about what makes logistics greener, progress is still slow and numerous areas remain to be addressed by practice (Wolf and Seuring, 2010). One such area is the business side of green logistics. Even when the actions needed are quite straight forward, recent research suggests that there is a lack of drivers for logistics companies to pursue green logistics, and a key to improvement is suggested to be the interface between logistics service providers and their customers.

While the idea of increased cooperation is widely acknowledged as a means to greening logistics and supply chains, there are still knowledge gaps regarding drivers for as well as barriers against increased interaction. In addition, the poor performance could be the result of which business model different companies apply, why this element is of interest as well in relation to the cooperation regarding green logistics.

In the interaction between the supply chain members and their different support networks, the interaction and interplay with logistics service providers (LSPs) proposes a challenge, as the business logic and hence the business models of the logistics service providers differ from that of their customers.

Hence, the purpose of the SusInt project is to analyse the interface and the interplay between logistics companies and their customers (shippers).

The *first main objective* is to identify the level of cooperation among the actors, and the drivers and barriers that can contribute to explain the present situation.

The *second main objective* is to explore the business models among logistics service providers and their customers, and seek explanations to differences in behaviour.

The *third main objective* is to develop roadmaps for companies as well as policy implications for authorities, to guide towards an increased sustainability and competitiveness for logistics companies, and consequently for supply chains in the Nordic region.

Project methodology

The overall research process The SusInt project is an analysis project, and hence no implementation phase was part of the project execution. The project was carried out in an abductive way, indicating that different types of research activities were carried out in an iterative way. E.g. the literature review was the start of the project, but has been refined during the project's progress, and its final presentation has been influenced by the findings from the empirical studies. The analysis of the literature and the empirical findings has been an ongoing process throughout the execution of the project.

The study object in the project is the interface and the interplay between logistics service providers and their customers. The interface and interplay between the two types of actors was studied from both sides; while case studies captured the collaborative as well as environmental effort among logistics service providers, survey questionnaires were used to capture the customer side.

In more detail the project's activities included

- Literature review: The areas of Green Supply Chain Management, Green Logistics Management and Strategic perspectives on the interaction between logistics service providers and their customers were studied, and a Frame-of-Reference report was developed.
- Case studies of logistics service providers: Four different LSPs were selected. Interviews were held with key informants, and the cases were described based on the interviews and finally approved by the companies. The cases are focused on the business models of the LSPs and their interaction with their customers; in general as well as regarding environmental efforts.
- Surveys: based on the literature review and the case studies of logistics service providers a survey questionnaire was developed, and launched in Denmark and Sweden. The project also got the opportunity to participate in a large Nordic Survey managed by one of the Norwegian case companies. Due to delays in the project, the data collection from the surveys is still ongoing, but preliminary data have been used to analyse the customer side.
- Analyses: the analyses have been performed in steps, where the interface and interplay between LSPs and their customers has been illuminated from the two sides.

During the process different stakeholders have contributed to ascertain the relevance as well as the clarity of the project's investigation. Members of a reference group have contributed with feedback on the development of the Frame-of-Reference, into the cases and also by providing feedback on the survey instrument.

Conclusions

The conclusions from the project aim to improve the understanding of why greening of logistics is hampered in the interface between logistics service providers and their customers; and also how the interplay regarding greening logistics can be improved.

The actual business models in use by LSPs and their customers emphasize different aspects (physical products vs. relationships, chains vs. networks). This explains certain barriers to cooperation. Also the drivers of these business models differ. Whereas LSPs customers are cost oriented in their emphasis on economies of scale (synergies in terms of high production of transportation volumes to cut costs), the LSPs' awareness of network externalities is a value argument in itself; depending on product/customers characteristics in the LSP network the provider may leverage the network to create new and more sustainable offerings. Our findings indicate a significant leverage with respect to more cooperation, not only between LSPs and their customers but also between the customers of the LSPs.

Network size and network composition are **driving** value in LSPs networks, which was also confirmed in the LSP studies. Joint LSP and customer gains can be traced to increased efficiency and decreased fuel consumption, leading to a decrease in emissions. However, the drive for customers to demand higher environmental performance emanates mainly from their respective customers, and the priorities and requirements from those. And in essence, their priorities are not environmental considerations in the context of transport and logistics services.

Cooperative efforts depend on the LSP's understanding of network leverage but also on the cooperative attitude of its customer base. The level of cooperation between LSPs and their customers can depend on the initiatives of LSPs, but also on how willing/receptive their customers are towards such cooperative efforts. While customers in general are neutral-positive to cooperating and sharing information with LSPs regarding traditional logistics aspects, they appear to be less positive when it comes to environmental efforts in relation to transport and logistics services.

Another driver often mentioned as prominent in research into environmental sustainability is increased legislation. The research presented here gives little support for legislation as a major driver; rather its role would be to set the lowest level for various environmental measures. Already today LSPs are required by shippers to be one step more ambitious than legislation demands, in the form of environmental certificates or standardised environmental management systems. However, the presence of such systems is required while the actual ambition of the LSP plays an inferior role.

The most prominent **barrier** identified in this project is the mismatch between the LSPs' and the shippers' respective business models. This difference poses a barrier to greening transports and logistics, i.e. the shippers focus on products and supply chains, while the LSPs focus on relationships and networks. Thus, the two types of companies seek value in different ways, which can be very difficult to unite.

Scale is important to make a network efficient from a financial point of view, and hence environmental solutions are seldom customised but rather built into the entire business of the LSPs. The strive to reach higher efficiency through economies of scale normally also makes a positive environmental contribution, as increased efficiency often equals decreases in fuel and energy consumption, which contributes to reduce the transport emissions. This would suggest ways to overcome the barriers above, however the scale- and efficiency analysis would be most relevant for large LSPs with high goods volumes. Smaller LSPs would need to identify other value gains, in order to overcome these barriers.

A focus on finding efficiency in every action may inhibit the options of supporting a more environmentally pro-active customer in finding new and innovative solutions. The recurring gathering of important customers into groups that have been observed creates a counter movement, in which the customers inspire and encourage each other in identifying and designing new solutions for their logistics. This can be a prosperous path also for suggesting environmentally sounder solutions that can bring down negative environmental externalities without jeopardizing the efficiencies in the network. On the contrary, this form of shipper-shipper interaction has the potential to bring more value to the network members, including the customers as well as the LSP.

The project has covered a spectrum of aspects that capture the interaction between LSPs and shippers, as was the task for the project to handle. But researching these issues, other dimensions of interaction have been identified. Those are interaction between different customers, which have been facilitated by LSPs, as well as cooperation among competing LSPs around environmental issues, triggered by the will to present a more standardized interface towards the customers. Such interactions and actor interplays can presumably also lead to an increase in the environmental ambition among the different actor, provided that there is an increased drive for promoting environmental improvement.

The project's results highlights the importance of researching greening of logistics and transports not from a single company perspective, not even from a single relationship perspective but rather from a network perspective which allows for increased understanding that in turn can generate more innovative solutions to the problem of greening transports and logistics. Some future paths for research, based on the findings from this project, are:

- Research into externalities, positive and negative, and the interaction between them, in order to understand the complex effects of greening transport and logistics in supply chains and networks.
- A combination of strategic management and logistics, in order to better understand how to make greening of logistics come true, as it demands strategic alignment and strategic efforts.

- Value creation and appropriation, in specific between logistics service providers and their customers. Legislation is considered as lagging, and continent-wide, tough legislation is believed not to happen, why it is claimed that increased sustainability needs to rely on the creation and appropriation of value, in different dimensions.

Policy Implications

Based on the project's conclusions some recommendations can be given to corporate actors (LSPs and LSPs' customers) as well as to authorities and policy makers.

For corporate actors in general:

What is the best solution for one actor does not necessarily imply the best solution for the supply chain or for the network. Therefore the network characteristics play an important role, and *the matching between an LSP's network and its customers' needs become a key* in reaching gains in both financial and environmental dimensions.

The results of this project indicate that rail transports are considered to perform too poorly in the speed and delivery accuracy dimensions. At the same time, there is a surprisingly large agreement among shippers, that they often demand fast transports out of old habits rather than serious considerations. Therefore we would like to challenge the LSPs as well as their customers in questioning the need of fast transports.

For Logistics service providers:

LSPs should strategically choose their customers in a way that each customer contributes to increasing the value in the network for the LSP and for its other customers. Value is here understood in terms of positive externalities (e.g. more scale economy leading to higher transport efficiency) and reducing the negative externalities (customers with matching environmental ambition contribute to making environmental efforts more efficient).

LSPs should as a consequence make deliberate selections of customers, which in terms of environmental effort can mean:

- Selecting customers that value and are prepared to pay for more environmentally ambitious technology
- Selecting customers that share ambitions regarding reporting, in order to make the network more homogenous
- Pick the customers that contribute to fill-rate efficiency

By facilitating customer-customer interfaces, LSPs also brings value to its customer additional to that perceived within the frame of transport and logistics services.

For customers of LSPs:

The selection of LSP resides on service- and cost performance. In addition, and in order to support greening, shipper should also consider:

- The network of the LSP in terms of physical flows (in order to add, not decrease the value in terms of costs as well as emissions).
- The other customers of the LSP in terms of environmental ambitions overall, and in terms of willingness to pay for sustainable technology.
- Customers with matching demands also regarding which environmental efforts should be undertaken.

For authorities and policy makers:

Policy makers and authorities are central for the development of greener logistics, and we suggest the following measures for promoting greener transports and logistics:

- Increase the legislative pressure for environmental regulation on the transport and logistics market, BUT it is of essence that such legislation includes large regions rather than single countries.
- Legally force product owners that are unable to reach satisfactory transport efficiency in their own transports to cooperate with others, even competitors.
- Release the restrictions for cooperation among competitors, when it comes to exploiting cooperative solutions that can benefit the environment.
- Support the establishment of standards for assessing the environmental performance of transport and logistics, beyond emission calculation models.
- Let the public sector become the most environmentally ambitious customer of transports and logistics - with their large proportion of transports such demands can speed up greening of the transport and logistics system.

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1 Introduction

1.1 Purpose of project and main objectives

The *purpose* of the project is to analyse the interface and the interplay between logistics companies and their customers (shippers). Such an analysis will provide knowledge that can support logistics service providers, goods-owners and supply chain members in their quest for sustainable competitiveness.

The project addresses overall the area: "Business Development in Freight Transportation". The focus in the project is on the interface and the interplay between logistics service providers and their customers, which also calls for addressing the role of authorities regarding this interplay.

Therefore the *first main objective* is to identify the level of cooperation among the actors, and the drivers and barriers that can contribute to explain the present situation.

As each business, and consequently each company's business model is unique, there is a need to further explore how business models (including company strategies, market positions, resource bases and customer offerings) can explain their actions regarding green logistics.

Therefore the *second main objective* is to explore the business models among logistics service providers and their customers, and seek explanations to differences in behaviour.

In order for the knowledge derived in this project to reach its consumers, the results need to be communicated in ways, which are accessible and understandable, and also to reach important stakeholders.

Therefore, the *third main objective* is to, based on the results of the empirical analyses, develop roadmaps for companies as well as policy implications for authorities, to guide towards an increased sustainability and competitiveness for logistics companies, and consequently for supply chains in the Nordic region.

1.2 Project background

Despite a growing knowledge about what makes logistics greener (see e.g. McKinnon, 2010; Piecyk, 2010), progress is still slow and numerous areas remain to be addressed by practice (Wolf and Seuring, 2010). One such area is the business side of green logistics; since the market in general is unaware of the options available, and unwilling to pay extra for greener solutions, existing solutions only reach the market to a small extent (Martinsen and Björklund, 2012). Even when the actions needed are quite straight forward, recent research suggests that there is a lack of drivers for logistics companies to pursue green logistics initiatives (Isaksson and Hüge-Brodin, 2010; Lieb and Lieb, 2010). One clearly underdeveloped area is the interface between logistics service providers and their customers (Wolf and Seuring, 2010; Martinsen, 2011).

While the idea of increased cooperation is widely acknowledged, there are still knowledge gaps regarding drivers for as well as hinders against increased interaction. Barriers and hinders can be internal to the corporations involved, but also rely on a mis-match and low levels of trust between them. Further, authorities' role in imposing barriers as well as encouraging the development is prominent.

To understand the rationale behind the different positions taken regarding green logistics offerings (Evangelista et al., 2011), there is a need to analyse the importance of company typology, both on the supply and the demand side. In addition, the positions taken could be the result of which business model the companies apply, why this element is of interest as well in relation to the cooperation regarding green logistics.

A business model is generally not well defined as a concept, and has taken many shapes both in practice and in literature. When designing and analysing supply chains, a common approach is to relate to the supply chain context and, in quoting Fisher (1997) ask: "What is the right supply chain for your product?". This question relies on the conception that supply chains are designed from the goods-owner / shipper perspective.

In the interaction between the supply chain members and its different support networks, the interaction and interplay with logistics service providers proposes a challenge, as the logic of the logistics service providers differs from that of the actors that we traditionally see as supply chain members. Their logic relies on building networks that are robust and efficient, and to them the Fisher question above may be posed in a different way: "Which are the right customers/shippers for your network?".

These differences in business logic between the two types of actors is the starting point for analysing the match and/or mis-matches between business models in the interaction and in the interplay between logistics service providers and shippers. The theoretical background is further developed in Appendix 1: SusInt Frame-of-Reference, and applied in chapter 5 in this report.

1.3 Expected results of the project

The research results will provide a deeper understanding of the difficulties that companies in a supply chain encounter when greening their logistics management and operations. Beside the contribution to research, such an increased understanding can support the business development among logistics service providers as well as their customers: the shippers.

Based on previous research experience, we are confident that the results will be relevant to, and formulated in a way, which will enable the stakeholders to deepen their understanding as well as adopting suitable parts of the results.

The roadmaps and the policy implications will be distributed among stakeholders in each of the research groups' networks and will be accessible on their homepages.

As the researchers all belong to Universities i.e. educational institutions, the results from the project will be part of the course curricula provided among the research groups. This means, that master students of business administration, industrial engineering and management, and mechanical engineering will also carry this knowledge to the different stakeholder groups as they commence their careers.

In concrete terms, the Conclusions from the research projects are presented in this report, in Practitioner Roadmaps in Policy Implications and in research article synopses.

1.4 Definitions

In this research project we have applied the term Logistics Service Providers (LSPs) as one side of the interface between logistics companies and their customers. In the project, the term LSP includes what is traditionally understood as Third Party and Fourth Party logistics providers respectively. Third party logistics providers refer to companies that offer transportation services but also additional services such as packaging, assembly, order handling, warehousing and sometimes transport and logistics management. Transports and warehousing can be carried out by themselves, but can also be outsourced to transport and/or warehouse service providers, for instance. Fourth party logistic providers generally offer the services of logistics management. What these actor types have in common is that they *offer a set of similar services, related to logistics, to a range of customers*, and thereby build efficiency into their operations. Logistics service providers are often in this report abbreviated to LSPs.

The counterpart of the Logistics service providers is sometimes referred to as shippers, as customers or as clients. In essence, these three terms should be seen as synonymous in the frame of this project. The reasons for the different use of terms relate basically to different use of terms in the literature, different use of term between the studied companies, and to different traditions between the involved research groups.

This project addresses the environmental consequences from different ways of cooperation in the interface between two types of actors. However, it is not within the scope of the project to actually assess the environmental consequences of suggested actions. Instead, the researchers have taken a stance in actions suggested by previous research that presumably will lead to decreasing the environmental consequences (see for instance McKinnon, 2010).

2 Method and implementation

In order to address the project's objectives in a proper scientific way the initial project methodology was refined during the first stages of the project. In this chapter the actual research process and applied research methods are described. The chapter starts with an overview of the total process, followed by more detailed descriptions of the different parts.

2.1 The overall research process

The aim of the SusInt project was to increase the understanding of the interface between logistics service providers and their customers, the shippers, and how that interface affected the greening of logistics and supply chain. In order to increase understanding, including a range of how- and why questions, a case-based research is recommended (Yin, 2009). This project includes a range of data collected in order to make numerical analyses, relating to the qualitative data. Thus the project can be characterized as a mix between qualitative and quantitative research, still a case-study approach would be the most suitable overall heading (in line with Arbnor and Bjerke 2009).

Overall, the scientific approach of the project can be described as abductive (Dubois and Gadde, 2002). Abductive research can be described as "systematic combining" (ibid) of different research methods, and is specifically recommended for case-based research. In line with this approach, the activities of literature studies, data gathering and analysis will be combined in a way, where each activity contributes to input in another activity and so forth, and thereby the research project as a whole will close in on the research objective all through the research process. For instance, the initial literature search is complemented at different stages depending on what data reveals; data is gathered in different steps, guided by previous and novel literature searches; and analysis is performed stepwise in and intertwined with the other activities.

A basis for the research is relevant *literature* relating to the topic, and three areas were identified already during the application process: Green logistics management, Green Supply Chain Management and Strategic perspectives on logistics and the interface between logistics service providers and shippers. The literature review process was most intensive during the early phases of the project, but has not actually ceased until the end of the project, once the data is coming into place.

For the empirical part of the research different approaches were discussed. The concluding idea was to select one case in each country (Denmark, Norway and Sweden), and within each case illustrate the interface between logistics service providers and shippers through case studies (LSP side) and a survey (shipper side). That would enable the researchers to address the focus interface in identical ways. Due to various conditions the final method had to be modified and adapted to access to data, which resulted in two specific interface studies, but of a little different character, and one final interface study covering the Nordic logistics market (except Iceland). The case- and the survey methodologies are described in the sections below. In figure 1, the final data set-up is illustrated.

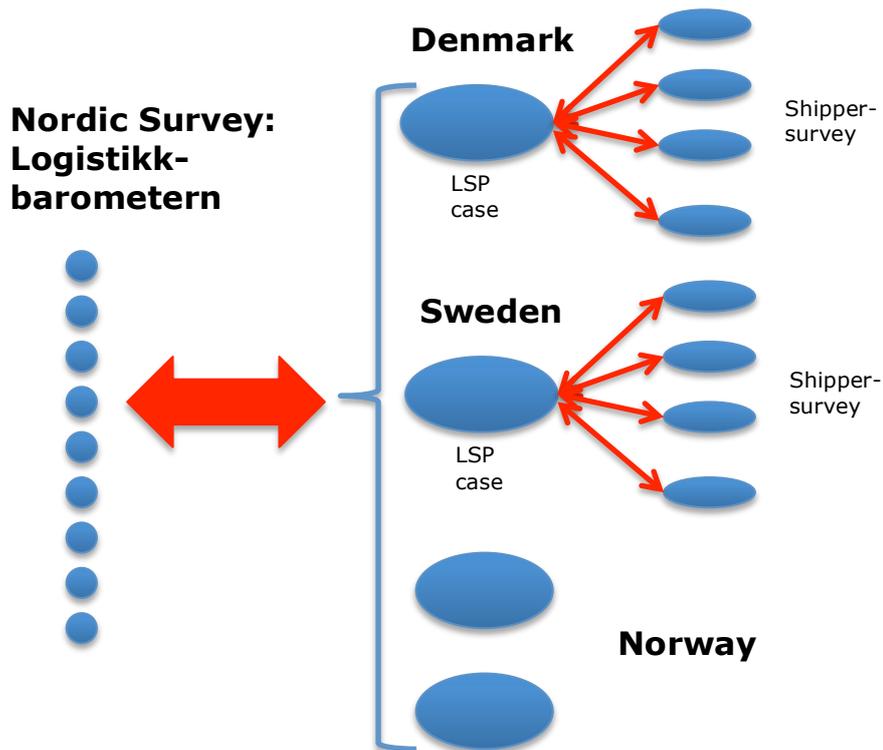


Figure 1: Data set-up for the SusInt project, covering case studies and surveys. The arrows in the figure indicate the analyses regarding interfaces between LSPs and shippers.

Below the different specific research techniques, and how they were applied, are described together with how the reference group members contributed to the project.

2.2 Literature review

The literature review covers three areas, of which two are partly overlapping (Green Logistics Management and Green Supply Chain Management) and one takes a strategic perspective on business models in interface between logistics service providers and shippers. Green Supply Chain Management can also be described as the field that unites the two others, as it covers various green logistics aspects (from the green logistics management area) and focuses on interaction between companies. Therefore, the main efforts in structured literature searches were made regarding Green Supply Chain Management, while Green logistics management and the Strategic perspective is gathered through structured searches and complementary, previously known literature. The results of the literature studies, based on selected search results, are presented in Appendix 1: SusInt Frame-of-Reference.

The literature review as part of this research on green supply chain management is based on searches in the scientific library databases. The purpose was to identify main theoretical knowledge and frameworks as well as already published literature reviews given the extensive amount of available literature within each of the respective research fields. In the literature, reviews have been performed with different goals in mind, such as categorizing the research fields based on topics, content and context, as well as investigating and coming to conclusions on trends within the research fields and suggesting directions for future research. The main references identified are thus the ones included as can be seen in Appendix 1: SusInt Frame-of-Reference. The

literature search was structured using a four-step process of analysis based on the methodological procedure as explained by Srivastava (2007), Seuring and Müller (2008) and Gold and Seuring (2011). The steps comprise:

- 1) Defining the unit of analysis: The unit of analysis for the review is single research papers as identified through the literature search. This indicates that books and other non-article-based sources of evidence are excluded from the literature review and as part of the Frame-of-Reference for the GSCM field.
- 2) Collecting publications and delimiting the body of literature: The literature was identified from searches in the five scientific databases EBSCO (Academic Search Premier), Emerald Journals, Science Direct, Taylor & Francis and Wiley Online Library. Hence, the literature review focus upon English, peer-reviewed scientific journals and publications (academic research articles) as these are the most common resource for knowledge exchange among international researchers. This excludes publications in other languages. Searches in the selected databases were kept similar to ensure consistency, both in relation to keywords and criteria used. To account for both green supply chain management, capturing the shipper perspective, and logistics service providers, two searches were performed. First, a search was performed in the five scientific databases, searching in 'title', 'abstract' or 'keywords' using the keyword "logistics service provider". To establish a time span, a starting point was set at 2000 until 2011 in order to account for whole years, thereby ensuring reproducibility of the literature search and increasing reliability. Including only publications from 2000 is based on the argument that development in practices is quite recent in green logistics management, with previous literature searches indicating limited hits before this period (Aronsson & Hüge-Brodin 2006, Maack & Hüge-Brodin 2009, Martinsen & Hüge-Brodin 2010, Isaksson & Björkund 2010). Later a second search was performed in the same databases, also searching in 'title', 'abstract' or 'keywords', but using the keyword "green supply chain management". The time span was set at 2000 until 2012, again to account for whole years and ensure the reliability of the literature search. Including only publications from 2000 is based on Sarkis et al. (2011) who identified that some of the earlier reviews of the green supply chain management literature, typically from the 1990s, have provided useful but also non-theoretical frameworks such as practical, systems and prescriptive frameworks. Based on this, emphasis is given to later publications regarding both green logistics management and green supply chain management as these are expected to be built on a stronger theoretical grounding. In addition, a snowball sampling approach was applied in order to add to and strengthen the Frame-of-Reference. The Frame-of-Reference was also complemented with additional references based on the knowledge of the researchers in the project group.
- 3) Classification context: The papers are structured and categorized based on two contexts: a) general characteristics such as the database used for identification, the journal of the published academic research article, and the number of publications per year, providing the background for subsequent theoretical analysis, and b) the research content in relation to the themes in this project. As explained earlier, the results of the literature studies in terms of content is presented in Appendix 1: SusInt Frame-of-Reference.
- 4) Material evaluation: All identified articles from the literature search were analysed within the above-described classification context. This analysis provides the framework for categorization of the literature and interpretation of results of the literature review.

The literature search identified 250 publications (academic research articles) using the search term "logistics service provider" and 303 publications using the search term "green supply chain management" in the five selected scientific research databases, summing up to a total of 553 publications. However, the amount of unique articles was 226 and 212 publications, respectively, due to the fact that 115 of the publications reappeared in searches using the different databases (overlap in coverage by databases). An overview of the number of publications as identified by using each of the two search terms in the five databases can be seen in Table 1, while Table 2 and Table 3 provide an overview of the allocation of publications in the selected time span for each of the literature studies.

Table 1: Results based on searches in scientific library databases.

Database	Logistics Service Provider	Green Supply Chain Management
Academic Search Premier	45	44
Emerald Journals	50	93
Science Direct	37	128
Taylor & Francis	83	16
Wiley Online Library	35	22
Total	Unique 226 (250)	Unique 212 (303)

Table 2: Distribution of logistics service provider publications per year across the time span.

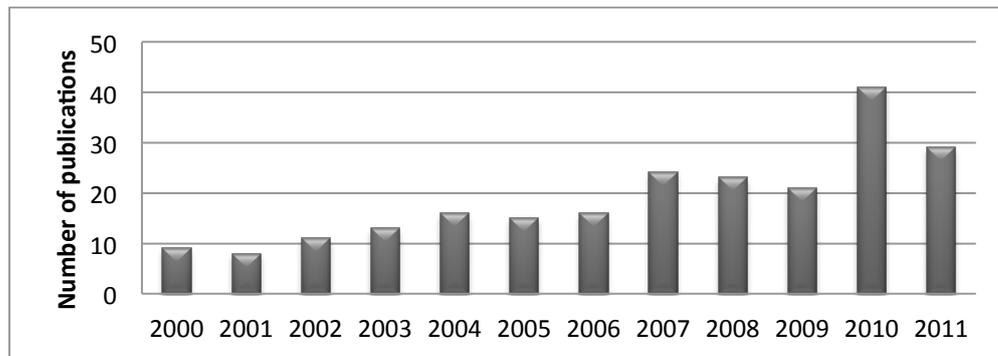
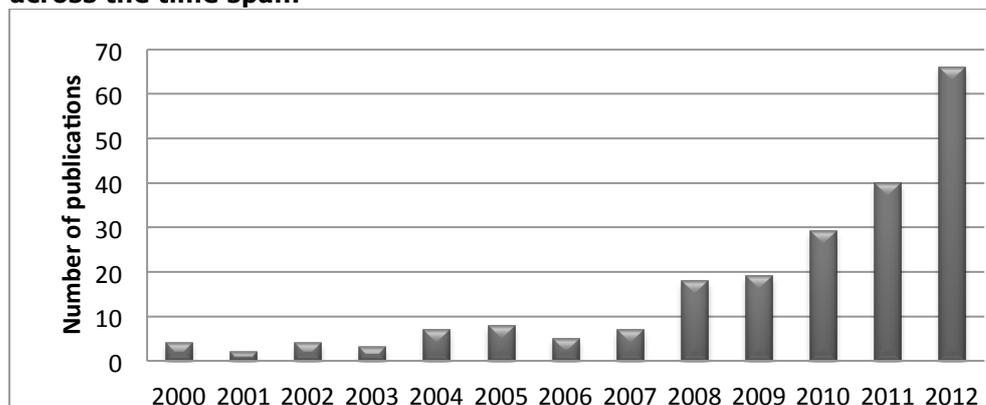


Table 3: Distribution of green supply chain management publications per year across the time span.



From Tables 2 and 3, it is evident that the number of articles published that concern logistics service providers and green supply chain management increases from

approximately 10 and 3 publications per year during 2000-2003 to 29 and 39 publications during 2009-2011 and 2010-2012, respectively. This indicates that both research fields has increased in importance in recent years and are increasingly of interest by both researchers and academic journals. It is also evident that academic research articles have been published during the entire time span that the literature review covers, indicating that identification of at least some additional publications would be expected if the time span is expanded, although the number of additional publications is expected to be limited. Given that contributions in relation to green logistics management and green supply chain management were identified in 101 and 80 different academic journals, respectively, it was decided to provide two additional tables for overview. Table 4 presents contributions from journals containing the highest number of articles published for logistics service providers, whereas Table 5 presents the articles published within green supply chain management.

Table 4: Logistics service provider; grouped by timeline and journal, most frequent journals

Journal	Total	Year (2000-2011)											
		00	01	02	03	04	05	06	07	08	09	10	11
International Journal of Physical Distribution & Logistics Management	17	0	0	0	0	1	1	2	1	2	1	5	4
International Journal of Logistics Research and Applications	17	3	2	1	1	2	0	0	1	1	2	3	1
Journal of Business Logistics and Transportation Research Part E: Logistics and Transportation Review	11	0	0	0	2	0	1	0	2	3	0	2	1
Journal of Supply Chain Management	9	1	0	1	0	1	3	0	2	0	0	1	0
Maritime Policy & Management	6	0	0	0	0	1	0	0	0	1	1	1	2
Naval Research Logistics	6	0	0	1	0	0	0	0	0	1	3	1	0
Supply Chain Management: An International Journal	6	0	1	0	0	0	0	1	1	0	0	1	2
Transport	6	0	0	0	0	1	1	2	1	0	0	0	1
Remaining journals	142	5	4	8	8	9	9	11	16	15	13	27	17
TOTAL	226	9	8	11	13	16	15	16	24	23	21	41	29

According to the literature study as seen in Table 4, the most frequent journals in relation to the logistics service provider literature are International Journal of Physical Distribution & Logistics Management and International Journal of Logistics Research and Applications with both 17 publications in the time period. Journal of Business Logistics and Transportation Research Part E: Logistics and Transportation Review are also frequently publishing articles in this area with 11 and 9 publications in the time period, respectively.

Table 5: Green supply chain management; grouped by timeline and journal, most frequent journals

Journal	Total	Year (2000-2012)												
		00	01	02	03	04	05	06	07	08	09	10	11	12
Supply Chain Management: An International Journal	18	1	1	0	1	1	1	1	0	3	0	1	0	8
Journal of Cleaner Production	16	0	0	1	2	1	0	2	1	2	1	3	2	1
International Journal of	13	0	0	0	0	0	0	1	0	2	0	3	1	6

Production Economics														
International Journal of Physical Distribution & Logistics Management	9	1	0	0	0	0	0	0	1	0	1	3	1	2
Transportation Research Part E: Logistics and Transportation Review	9	0	0	0	0	0	1	0	0	2	1	0	5	0
Business Strategy and the Environment	8	0	0	0	0	1	1	0	0	1	2	0	1	2
International Journal of Operations & Production Management	8	0	0	1	0	0	2	1	1	0	0	0	0	3
Management Research Review	7	0	0	0	0	0	0	0	0	0	0	4	3	0
Procedia - Social and Behavioral Sciences	7	0	0	0	0	0	0	0	0	0	0	0	3	4
Remaining journals	117	2	1	2	0	4	3	0	4	8	14	15	24	40
TOTAL	212	4	2	4	3	7	8	5	7	18	19	29	40	66

According to the literature study as seen in Table 5, the most frequent journal in relation to green supply chain management is Supply Chain Management: An International Journal with 18 publications in the time period. Journal of Cleaner Production and International Journal of Production Economics are also frequently publishing articles in this area with 16 and 13 publications in the time period, respectively. As expected, green logistics management and green supply chain management have been comprehensively covered by supply chain, logistics and transportation journals as well as general management journals.

Literature on from the perspective of *green logistics management* complementary to that in the structured literature study was gathered through extraction from literature, previously gathered in various green logistics management research projects. This literature stream was complemented with results from previous research projects, published in scientific journals, book-chapters, dissertations and conference papers. In addition, a snowball sampling approach was applied in order to add to the frame of reference.

The literature searches regarding the *strategic and business model perspectives* were mainly performed in the database Business Source Complete. The search terms used were: Business models, green logistics, sustainable logistics, interorganisational relationships, logistics service provider + client, relationships, interactions, interdependencies and alliances. The results from the various searches were merged and literature on the interface between logistics and supply chain, and strategic management, was selected. This area was, as the green logistics management area, complemented with literature identified in previous research projects.

The literature review was carried out in each of the three research groups, and by mid-term the preliminary findings were discussed in a meeting between the researchers in order to fine-tune and direct further literature studies in a complementing way. The final content of the Frame-of-Reference was decided upon in early September 2013.

2.3 Case studies

The selection of cases is crucial to the success of the research. In identifying cases, i.e. LSPs with their customer bases, for the SusInt project, we were aware beforehand that environmental aspects are quite seldom part of the business between logistics service providers and their customers, the shippers. In addition, the business making among logistics service providers is in general considered as responsive rather than pro-active when it comes to bringing new ideas to business. Therefore our final case selection of cases relied on the following criteria:

- the case companies should have a more-than average strategic approach to environmental issues, in order for the researchers to be able to identify at least some variation in activities
- the case companies should apply interesting forms of cooperation with their customers, in order for the researchers to be able to identify options for greening logistics.
- the case companies should either cover a wide range of customers, in order for the researchers to capture cooperation with different types of shippers OR being highly specialized in order to identify contrasting pictures
- one (min.) case company from each participating country
- the case companies should be presumed to provide access for the researchers.

Different alternatives were discussed that could fit the criteria above, however the access criteria had a large importance in the final selection, in order for the project to run as smoothly as possible. The selected cases were: Post Denmark Logistics, Denmark; PostNord Logistik, Sweden; Tollpost Globe, Norway; and TLog (anonymized), Norway. The companies are briefly presented in table 6.

Table 6: The four studied cases in the SusInt project

Company name:	<i>PostNord, Logistik, Denmark</i>	<i>PostNord Logistik, Sweden</i>	<i>Tollpost Globe</i>	<i>TLog</i>
Size of business	1.4 billion DKK 75 employees	13 billion kSEK, 5500 employees	3 billion NOKm 1452 employees	
Customers	Corporate customers, Denmark	Corporate customers, Sweden	Corporate and private customers, Norway	Primarily retail clients in the fast moving consumer goods segments in Norway, Sweden, Finland
Services	National and international logistics solutions focusing on system logistics and transport solutions as well as related value-added services	Mediates and executes logistics and transport services	MyPack, E-service and business solutions	A variety of consultancy, supply chain design and mediating administrative 4PL services
Goods	Parcels and Palletized goods	Parcels and Palletized goods	Groupage and part loads, Parcels and Palletized goods	Fast-moving consumer goods and fashion

It should be noted that Post Denmark Logistics, PostNord Logistik in Sweden and Tollpost Globe are part of the same concern but have until now worked as independent business units.

The compilation of data for the case studies relies mainly on interviews of a semi-structured nature (the interview guide is presented in Appendix 2: SusInt Interview Guide), and followed the procedure:

- Agreement in the research group on specific topics to cover during the interviews
- Contact with the case companies, presenting the topics and identifying the right interviewee(s)
- Contact with the interviewees, introducing the topics, requesting input on the selected and additional topics for the project, based on its overall purpose
- Interviews, conducted in person or by telephone. The interviews were recorded, and...
- ...transcriptions of the interviews were sent to the interviewees for review and complementing information
- The confirmed transcriptions were converted into case-descriptions, of a work-in-progress character, and shared among the project researchers.

The case descriptions are rather focused on the project's overall topic, and by carefully selecting respondents the information for each case could be gathered through 1-2 interviews per case company. Each interview lasted between 1-2 hours, and the interviewees could also provide input to the project that complemented the content derived purely from literature. Some of the interviewees have also supported the project with counseling outside the interview situation, and are therefore also considered as reference persons to the project.

2.4 Surveys

Within the SusInt project one survey has been performed in two similar versions. In addition, the project had the opportunity to join the PostNord Annual Logistics Barometer.

The project specific survey was jointly developed in the research project. The main frame, the scope and tentative questions were thoroughly discussed at one of the project meetings, in light of the literature reviews under way. The results of the discussions were then developed into a comprehensive set of questions for potential inclusion in the survey.

After the case studies had been concluded and the literature reviews were next-to-finished, the survey questions were revisited. Hypotheses were developed, based on the case studies and the literature, and the questions were adapted in order to be able to contribute to confirming or rejecting the hypotheses. As the survey was considered too long to reach a satisfactory response rate, the questions were narrowed down to 11, including background questions on the responding company, questions about the companies' environmental strategies, and questions about their interaction with customers. The survey was tested among fellow academics with statistical expertise, and some response alternatives were shifted. In addition, several members of the reference group were asked to check the questions on the criteria of relevance and comprehensibility. The final version of the questionnaire is presented in Appendix 3: SusInt Survey Questionnaire.

After discussions with the respective LSPs in Denmark and Sweden slightly different strategies were established for collecting the data within the different countries.

For the Swedish version it was agreed, after discussions with the company contact, that the best way of reaching a high response rate would probably be if the PostNord

customers received paper copies of the questionnaire at personal meetings with sales personnel from PostNord in Sweden. The contact person is the sales manager in the western region, and his personnel would, over a couple of weeks, meet above 100 customers and distribute the questionnaire with a brief introduction to the project. Other regions were also invited, and the potential reach of the questionnaire added up to a few hundred potential respondents. Due to the delay in distributing the survey, too few responses were collected before the deadline of the report to make up a representative picture of PostNord's customers' perceptions.

For the Danish version it was originally planned to distribute the survey to customers of Post Denmark Logistics. However, due to delays in the process, the distribution of the survey ended up conflicting with distribution of other surveys by Post Denmark Logistics. Here, the concern was not to overburden the customers by distribution too many surveys within a specific timeframe. Consequently, the strategy for distributing the survey had to be altered. As an alternative, a list of production companies in Denmark was created using the Danish "Navne & Numre Erhverv" database comprising 650 Danish companies (survey population) and students were hired to call each of the companies. Each company on the list was then contacted by one of the students and asked whether they wanted to participate in the survey. If they agreed to participate, the students then distributed the survey using SurveyExact directly to the e-mail address as specified by each respondent. The responses that have reached the project so far are analysed in chapter 5, and the data collection is still ongoing until mid-October.

Due to 'questionnaire fatigue' an interesting alternative solution emerged in cooperation with Tollpost Globe, one of the project's Norwegian case firms. Since 2008, Tollpost Globe has taken the initiative to conduct an annual or bi-annual large pan-Nordic survey regarding, among other themes, logistic service provider-client interactions and sustainable logistics solutions. We negotiated access in the 2013 Logistikkbarometer instead of sending out yet another questionnaire to their clients. Three sub-questions all focusing on an awareness of externalities (which is one of our project's main theoretical/conceptual contributions) resulted in replies from more than 200 clients in the Nordic region (except Iceland). Responses to these three questions are analyzed in chapter 5.

2.5 Analyses

As described above the analysis phase cannot in a meaningful way be distinguished from the literature and the data collection phases, as it has in practice been performed in a successive manner, as described in principle by Dubois and Gadde (2002).

The analysis of the interface between the logistics service providers and the shippers is based on three different data sets: The Swedish interface between PostNord and its customers; the Danish interface between Post Nord and Danish shipper companies; and the three cases of PostNord Denmark, PostNord Sweden and Tollpost Globe reflected in the Logistics Barometer. In addition to analysing the three interfaces, a cross case approach was taken in order to establish patterns and to seek potential explanations to similarities and differences in the different interfaces. This can be described as pattern-matching (between cases and reflected in literature) and explanation building (Yin, 2009).

Taking a case study approach restricts the possibilities of empirical generalisation of the results since cases often only represent a small part of a potential population. In this project, the case selection, however, has granted access to some of the most important land-based logistics service providers in the respective logistics markets, why some results can claim to represent the business making of logistics service providers with a focus on land-based transports carrying palletized goods and parcels. Thus, the limits for generalisation of the results are defined by the case selection

criteria (Eisenhardt, 1989). Nevertheless, a case study provides the opportunity for theoretical generalisation (Yin 2009). In addition, in selecting cases where the logistics service providers were both environmentally aware well above the average level on the market, and showed signs of pro-activeness in their interplay with customers in general, we believe that the case-study takes the shape of a best-practice study, for other companies to benchmark. In this respect we believe that many other logistics service providers may benefit from the project's findings in their pursuit of greener and collaborative value creation together with their customers.

From a process perspective, the analysis was supported by triangulation strategies as described by Denzin (1978), in order to increase the validity of the research:

- Data triangulation. Through data sets that cover very similar cases but in different geographical areas, the research can distinguish between differences regarding both environmental awareness and collaborative strategies.
- Investigator triangulation: Multiple researchers were involved throughout the different phases of the project. This asserted that different experiences could benefit the project, and that flaws in research design could be avoided. It also provided an interactive analysis environment, where suggestions for interpretations from one researcher could be strengthened or questioned by other researchers, thus sharpening the project's outcome. The main and most fruitful interaction between the researches happened during the physical project meetings, while phone- and skype meetings as well as email correspondence supported the process further.
- Theory triangulation: by applying partly different literature bodies to the project, different perspectives could be illuminated compared to if only one literature stream had been focused. This provided a deeper understanding and more explanations to the differences in business models between logistics service providers and shippers.
- Methodological triangulation: The two methods case studies and questionnaires were combined in order to cover the issue at hand in the most distinct manner. Although the main method was case studies, the quantitative data increases the validity of the research in mirroring the shipper side of the interface with the logistics service providers.

2.6 Involvement of stakeholders

The *reference group* consists of some of the main interviewees, that we also discussed the project at large with, and other persons that we have discussed the project content with at different times. The reference group includes participants from the studied cases, other companies as well as a member from a general trade body.

No specific meeting gathering the total reference group has been arranged, in the original project plan this would have been arranged based on the collected empirical data, of which parts are still on-going.

In general, the reference group supported the project by providing:

- feedback on the content of the cases, in identifying additional interesting areas to those we originally derived, and also questioning and contributing to the ways in which the researchers approached the research area
- feedback on part results and analyses at different stages of the process.
- feedback during the development of the survey questionnaire

To the project's end the feed-back has included the literature findings, the case findings and the development of the survey instrument.

In wider audiences the project has been introduced to its content at the seminar *600 minutes supply chain* in Stockholm, September 2012, followed by extensive discussions with logistics service providers as well as their clients. In Norway, results from the project were presented to a group of 30 important customers of Tollpost Globe, June 2013. In addition, the project was presented and discussed among the 60 participants at Logistikkforeningen.no conference outside Oslo, in September 2013.

Such discussions among a multitude of participants have been useful for the project in providing pre-understanding to the problem area (600 MSC) and to get feedback on part results (Tollpost Globe's customers as well as Logistikkforeningen).

3 Milestones

ITEM	Date
Official project start	15 March 2012
Project start, kick-off phone-meeting and initial plan for the first project phase <u>approved</u> by the participants	23 April 2012
Project meeting in Linköping. Decision on practicalities of the questionnaire – Empirical <u>research design agreed</u> by the participants.	22 Aug. 2012
<i>Programme mid-tem meeting in Helsingborg</i>	17-18 Oct 2012
Project meeting in Oslo, First phase of literature reviews presented; <u>decision on scope</u> of the questionnaire.	25-26 Oct 2012
First data collection (case) phase <u>completed</u>	20 March 2013
Based on negotiations with case-companies for the survey data collection, <u>agreement</u> within the project to strengthen the analyses based on literature and cases, due to risk of not obtaining the amount of survey data originally planned for.	20 June 2013
Project meeting in Kolding, <u>agreement</u> on how to finalise the project	11-12 Sept. 2013
Final report <u>submitted</u>	30 Sept 2013
To come:	
<i>Final administrative report</i>	<i>To be submitted during Oct. 2013</i>
<i>Evaluation of running a NER project</i>	<i>To be submitted</i>
<i>Programme final meeting</i>	<i>6 Feb 2014</i>

4 Assessment of the results of the Project

The SusInt project was designed as an Analysis-project, in accordance with the original call for projects from NER. As such, no concrete results in terms of products, trials or demonstrations are part of the results.

Instead, the results from the project can be characterized as increased knowledge and understanding of the interface and the interplay between logistics service providers and their customers.

The main results from the project are included in this report, and will be further presented in more detail in three academic articles, which will be complemented with some additional data that is currently being collected as part of the project.

In brief, the findings from the project indicates that

- LSPs and their clients on a general level of analysis can be claimed to be guided by different business models; and that these models constitute different logics, which necessarily do not correspond with improved sustainability. There are tensions and trade-offs between chains and networks, which need to be explicitly acknowledged.
- there is less pressure than could be expected from the customers on the logistics service providers to go green. There is also very little pressure from final customers in the supply chains, which in turn would have put pressure on the logistics service providers.
- the Logistics service providers are rather well equipped to handle tougher demands from more of their customers. In fact, a more unified demand pattern would ease the process of increasing sustainability in terms of the environment AND in financial terms, due to the prevalent business models among the logistics service providers.
- Cooperation among competitors (both among logistics service providers and among customers) would be needed to reach significant sustainable improvements.
- Future paths for research, supported by the findings from this project, includes
 - o Research into externalities, positive and negative and the interaction between them, in order to understand the complex effects of greening supply chains
 - o A combination of strategic management and logistics, in order to better understand how to make greening of logistics come true, as it demands strategic alignment and strategic efforts.
 - o Value creation and appropriation, specifically between logistics service providers and their customers. Since legislation is considered as lagging and, continent-wise, tough legislation is believed not to happen, increased sustainability is suggested to need to rely on the creation and appropriation of value, in different dimensions.

5 Analysis

This chapter addresses the first two main objectives of the project. The first objective relies on the outcome of the second objective, why they are addressed in opposite order below in the analysis. Hence the first section addresses the 2nd objective, *Exploring business models*, while the second and the third sections together address aspects and dimensions of *cooperation*. Findings regarding *drivers and barriers* can be found among these analyses, and are summarized in chapter 6 Conclusions. The third objective, regarding policy recommendations, is addressed directly in chapter 7.

5.1 Exploring business models in the LSP-shipper interface

In order to address the business model-exploration objective, the first sub-section below explains the concept of a business model and how it has been applied in this project. The second subsection further explores the green-ness of logistics based on the studied cases and surveys.

Understanding the interface problem

The concept of business models is becoming widely used, however it is seldom clearly defined what is meant by it, and there are many interpretations both within industry and in academia. A common understanding is that a business model is the way a company makes money – simply the revenue model, which in practice is often connected to different more or less innovative ways of making customers pay for whatever is offered. An refinement and expansion is suggested by Boons and Leudeke-Freund (2013): in order for a company to be successful the business model concept would capture and combine several elements including 1) the value proposition to customer, 2) the configuration of value creating, which includes the way in which the company links suppliers and customers, and 3) the revenue model, that is, how costs and benefits are divided over economic actors in the supply chain system. However, from a strategic vantage point, which the SusInt project takes, it becomes more relevant to apply an even wider interpretation of the business model. A business model can overall be defined as “a description of how a company works in order to fulfil its strategies”. That implies that the business model includes revenue models but also marketing positioning, value system positioning and the internal organisation of resources and, perhaps most importantly, how these different areas can support and strengthen each other.

Firms differ in their ways of doing business, and the better firms understand not only their own business model but also the model of their significant counterparts, the higher the probability of successful interactions. One of our core claims is that current understanding of supply chain relationships in general and sustainability in logistics service provider-client interactions in particular is biased in emphasizing the business model of LSPs’ clients only.

Logistics research lacks a theoretical basis regarding strategy (e.g. Bask 2001; Selviaridis and Spring 2007). From a business model approach, supply chains consist of multiple logics (cf. Bettis and Prahalad 1995). However, the dominant logic, essentially building on the value chain model (Porter 1985) and the idea of sequentially interlinked firms, is rather uncritically applied to all actors in supply chains today, including LSPs. There is a need to complement the client or shipper perspective and ‘their’ supply chains with a business model guiding logistics service providers and ‘their’ networks.

A stronger emphasis on relationships and networks correspond with the argument that the way in which LSPs handle the effects of the total network of relationships is of basic importance for their strategic edge (Hertz and Alfredsson 2003). In this project

the generic business model of LSPs is represented by the value network framework (Stabell and Fjeldstad 1998). This approach is of particular relevance considering the claim that existing studies of logistics actors and networks do not examine the implications of indirect relationships and the mediating roles that are part of LSPs' core activities (cf. Selviaridis and Spring 2007).

The value network model portrays value creation by the facilitation of network relationships between a focal firm's customers, based on a mediating technology. The basic task of LSPs is then to connect senders and receivers, a claim expressed already by Thompson (1967), who suggested that the post office provides possible linkages to many members of the society. A mediating technology is central to a number of different firms such as banks (connecting lenders and borrowers); insurance companies (pooling risk between its members); telecom (linking calls); employment agencies (mediating between employees and employers); auction houses (connecting buyers and sellers) and LSPs (connecting senders and receivers).

Whereas the traditional understanding of economies of scale is product focused and cost oriented in the value chain, central drivers in value networks are network size and composition, building on the notion of network externalities. This will be further developed below regarding drivers. A critical determinant of value to any particular customer is the set of connected customers. Such demand-side economies of scale are characteristic of value network services (Katz and Shapiro, 1985) and the value of the service to existing customers increases with the addition of each new customer to the network. Facebook, for example, has managed to develop a considerable network size (number of users), which makes it attractive, but the absolute number of users is not the only factor that creates value; a Facebook without specific users (friends, colleagues, and acquaintances) is not interesting. That is, network externalities imply that value for a potential customer who wishes to join a network depends on the number of other customers in that network, but also on who these other actors are. It is their inherent characteristics which adds value or not to the network of relationship that a given mediator sets out to service. From a logistics service provider viewpoint, the number and nature of clients' supply chains create externality effects. That is, the logistics service providers' business model emphasizes mediation between senders and receives, but also (and commonly) between a set of senders.

LSP-Shipper interfaces – options and dilemmas

Three of the investigated cases (Post Denmark, PostNord in Sweden and Tollpost Globe in Norway) all manage very large national customer bases, with a wide coverage in their respective countries. There are different ways in which the respective LSPs work with efficiency, but basically their offerings rely on economies of scale. This may seem contradictory to the above, however it is in the ways they build their scale advantages that differ them from their customers' value logic. The firms all carry high volumes and strive to fill their transports with goods, which is promoted by a standardisation of the services offered to the customers. Therefore they can all accommodate new customers all over the country, and with a wide variety of products to be handled in the system. Geographical location as well as goods type could otherwise discriminate a customer from a network where it doesn't contribute to the efficiency but rather cause more costs than the value they bring as customers. It should also be noted, that customers in networks can bring value to the other members of the network (e.g. a new customer for the existing customers) through other externalities that add value to the network. This is further elaborated on below.

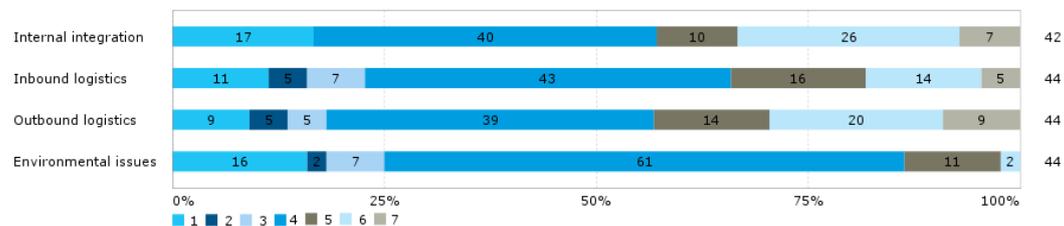
Too strict standardization will not enable logistics service providers to meet their customers' more specific demands, why different ways of handling the demands for efficient standardized solutions are identified. In the Post Denmark case, the starting point when setting up businesses with customers is that they to as high extent as possible should be included in the standard solution. However, there are possibilities for adjustments in order for the customers to perceive that Post Denmark is meeting their requirements in a customised way. The adjustments are typically made in the

pick-up and delivery phases, i.e in the direct interface between the logistics service providers and its customer and with the customer’s customer. Nevertheless, the vast part of the transport and/or logistics service is performed in the standardised transport production network.

As it can be seen in Table 7, the preliminary results from the Danish survey also indicate that a relatively high amount of customers demand customer specific solutions, at least to some degree. For instance, approximately 40% of respondents answer that they require customer solutions that are to a high degree (answered 5 or 6) or very high degree (answered 7) customer specific with regard to internal integration as well as inbound and outbound logistics. However, when it comes to environmental issues, customers do not consider their requirement to be customer specific but instead rather standard.

Table 7: Selected responses from the Danish survey 2013. Translation into English: How unique/firm specific are your logistics/supply chain requirements with respect to your:

(1 = standard; 7 = unique, customer specific)



It is interesting that the tension between the willingness to offer customized solutions and the requirements on customized solutions does not replicate with regard to environmental demands. One explanation could be, that the customers are not as knowledgeable about the environmental aspects of logistics; another that environmental aspects are of very little relevance compared to the other dimensions that more closely relate to the core of the outsources transport or logistics service. This issue will be further addressed in the section below.

PostNord in Sweden has chosen another path, where the standardised solutions include a pre-set variety of selection of e.g. a limited range of delivery schedules and delivery precision. That way, PostNord has a variety of options to offer their customers who can, in a pre-set number of ways, customise their logistics services while maintaining high network efficiency. This way of organising the network and elaborate on offerings resembles the way that production processes have been developed in order to both meet increasing demands for efficiency and increasing demands for customization: through modularized products.

The Tollpost case in Norway suggests a way to deal with standardisation beyond the LSP-customer interaction. A few years back Tollpost initiated a research project with the aim to develop an emission calculator. This tool has become central to Tollpost and their customers, and calculates emissions in a detailed manner. The environmental calculator shows the amount of emissions produced during the transportation of goods. Clients can experiment with the tool to find out if they can do anything to reduce their emission level. The tool gives an accurate environmental report, and also reveals how costs are altered with the different alternatives. Other LSPs (mainly characterized as competitors) have shown great interest in the tool and in taking part of the development, as a standardized way of measuring emissions is believed to benefit both the customers and the involved LSPs. This type of effort can be characterized as cooperative advantage rather than competitive advantage, and contributes to standardize the LSP-customer interface in one of the different environmental dimensions.

In two of the cases, more cooperative ways of dealing with customer demands have been observed. In the Tollpost case, the LSP has since many years been gathering smaller groups of customers to discuss the development of needs for logistics services. This has been valuable for both the LSPs and their customers in further the understanding of each other's business conditions and basically their differing business models. The same pattern occurred in the Swedish PostNord case, where different types of workshops were used to gather experience from, and spread PostNord information to the customers. However, these meetings very seldom address environmental issues. The pattern was however not identified in the Post Denmark case. This topic will be even further explained below, in relation to network externalities

When contrasting the findings from the LSP case studies with the Tollpost Logistikkbarometer data, which provides the shipper perspective on cooperation with LSPs, we observe an interesting pattern. Table 7 presents results for the three questions, and the responses are split on the different customer countries.

Table 8: Selected responses from the Logistikkbarometer survey 2013. Translation into English.

How often does your main transport provider connect you with its other clients, with regard to: Knowledge-sharing activities?				
	Country			
	Norway	Sweden	Denmark	Finland
Total number of responses	230	207	184	196
<*> Useful responses to this question	224	204	180	195
Very often	2%	6%	21%	13%
Often	10%	17%	19%	21%
Sometimes	31%	28%	23%	43%
Never	57%	50%	37%	24%

How often does your main transport provider connect you with its other clients, with regard to: Improvements of existing solutions?				
	Country			
	Norway	Sweden	Denmark	Finland
Total number of responses	230	207	184	196
<*> Useful responses to this question	224	204	181	194
Very often	2%	4%	22%	14%
Often	10%	23%	18%	32%
Sometimes	39%	32%	25%	34%
Never	49%	41%	35%	20%

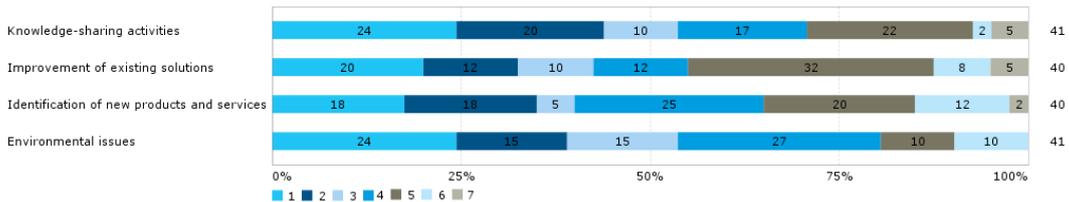
How often does your main transport provider connect you with its other clients, with regard to: Identification of new products and services?				
	Country			
	Norway	Sweden	Denmark	Finland
Total number of responses	230	207	184	196
<*> Useful responses to this question	221	202	179	194
Very often	2%	3%	13%	11%
Often	10%	21%	26%	32%
Sometimes	40%	34%	26%	37%
Never	48%	43%	36%	20%

All the responses align to the same observation: while Norwegian and Swedish customers seldom see themselves connected with other customers for the purpose of joint business development, Danish and also Finish shippers appear to have this experience more often. This picture was also confirmed by the preliminary results from the Danish survey as can be seen in Table 9. In relation to the first question, 29% of the respondents answered that they are often (answered 5 or 6) or very often (answered 7) connected with other clients of the logistics service provider regarding knowledge-sharing activities. Although this is lower than the 40% from the Logistikkbarometer survey, the answer is still rather high compared to the answers from the other countries. According to the Danish survey, the clients most often experience that they are connected to other clients of their logistics service provider with regard to improvement of existing solutions. Here, 45% of the respondents answer that this happens often or very often. Also regarding identification of new products and services, 34% of the clients answer that this happens often or very often. Although 20% of the clients answer that they are often or very often connected with other clients of the logistics service provider regarding environmental issues, this

is in fact the area where they are least often connected to other clients of the logistics service provider as compared to the other three areas.

Table 9: Selected responses from the Danish survey 2013. Translation into English: How often does your main transport provider connect you with its other clients, with regard to:

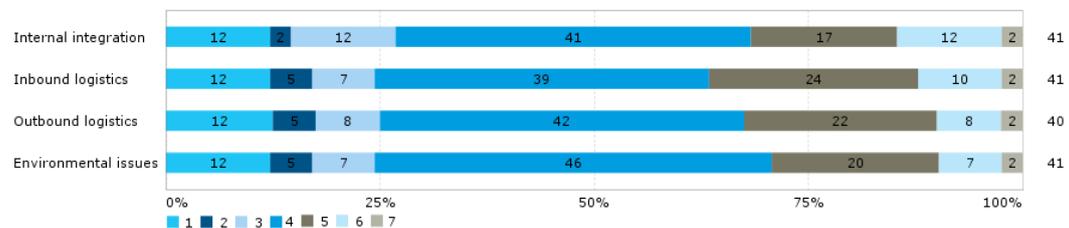
(1 = very seldom; 7 = Very often.)



The responses related to the clients willingness to share information with other clients of their main logistics service provider with regard to internal integration, inbound and outbound logistics as well as environmental issues can be seen in Table 10. Here, the preliminary results from the Danish survey indicate that clients are generally more willing than not willing to share information with other clients of their main logistics service provider in relation to all four areas. According to the answer, clients are most willing in relation to sharing information with regard to their inbound logistics. It is also interesting to see that clients are generally least willing to share information when it concerns environmental issues with only 29% of the respondents answering that they have willingness or high willingness to share information regarding environmental issues.

Table 10: Selected responses from the Danish survey 2013. Translation into English: Please rate your willingness to share information with other customers of your main LSP with regard to:

(1 = no willingness; 7 = high willingness)



There are a number of ways to understand this, however to reach firm explanations most of them require further analysis into the respondent data on the all-Nordic level, to which we are granted access after the project deadline. Also data are still being collected regarding the Danish survey. Therefore, some suggestions are presented below, that should be subject to further analysis.

- The findings indicate that Danish and Finnish LSPs are much more active in utilizing 'their' networks to create additional sources of value creation, in line with a mediation based strategic logic. It remains to be further analyzed to what extent and why Norwegian and Swedish clients experience such passive LSPs.
- The questions in the survey relates to "your main transport provider", which does not have to be the logistics service providers that we have investigated. The responses reflect the very specific relationships with one LSP, and only provide a preliminary and general conception of LSPs' attitude to sharing customer information among its customers. To come closer to an explanation

it would be useful to add data about the respondents' "average" view on LSPs, as one shipper often employs many LSPs in order to be able to negotiate costs.

- The judgement is based on the respondents' perceptions of "sometimes, often, very often", which is a vague measure that may also reflect the respondents' experiences of collaboration. In that sense, a shipper working according to a more collaborative tradition with LSPs would label a certain level of interaction as "sometimes", while the same actual level of interaction, in a less collaborative business tradition, would be labelled "often" or "very often". Given our understanding of the specific markets, as well as the case descriptions where the Danish case has started to adopt a more collaborative approach, we consider this a viable proposition for further research.
- A final suggestion, which has a substantial background, would be that the cases in Norway and Sweden that we have investigated are somewhat unique, in the way they collaborate closely and on a regular basis with selected important customers. The cases were selected partly based on their cooperative initiatives with customers. Therefore, if we measured the average collaboration rate among LSPs and their customers, it could be expected that our selected cases score high compared to the average level.

Above, the differences in business models between LSPs and shippers have been explored from a theoretical as well as an empirical perspective, and actions taken by LSPs to overcome the business model differences by closer collaboration with selected customers has been analysed. The next question to address is how the differences in business models can help us to explain the greening, or as it more and more appears, non-greening of logistics in LSP-shipper relationships.

5.2 Green business models? Network externalities from the interface perspective

To what extent do the prevalent business models of the LSPs and the shippers accommodate environmental efforts? A first step in this analysis is to identify the extent to which environmental issues are important to the LSPs' and the shippers' businesses in general.

The background for focusing on environmental issues in the logistics field can mainly be traced to an increase awareness of the negative externalities of transportation, and their relation to logistics (e.g. Aronsson & Hüge-Brodin 2006). Environmental aspects in the logistics system can be described both in terms of key aspects affecting the greening of transport and logistics (McKinnon, 2010) and as different ways of specifying green logistics offerings and requirements (Martinsen and Hüge-Brodin, 2010).

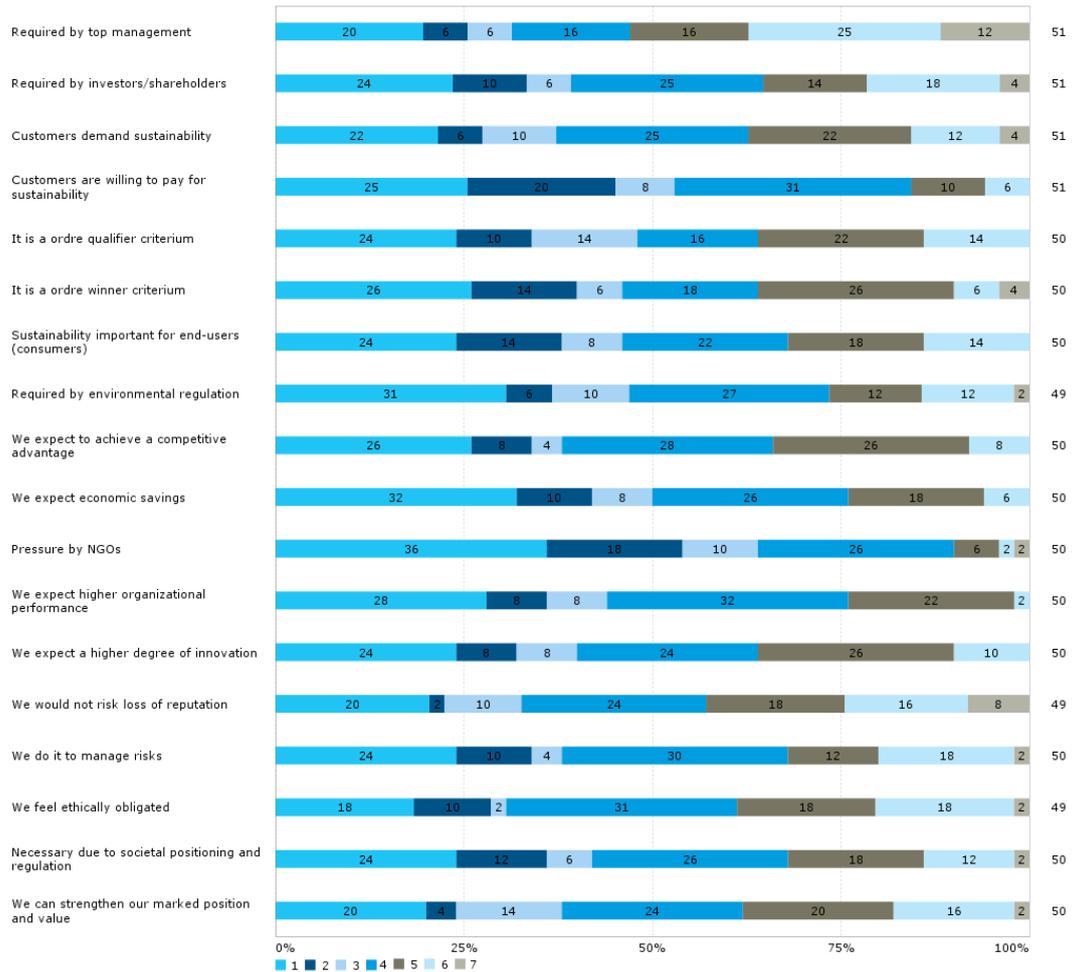
From a relationship perspective it has been stressed, that e.g. green supply chain management beside green aspects must also include improvement in productivity and profitability (Nikbakhsh, 2009), since no supply chain, however green it can be, would exist in the long-term without economic success (Seuring and Müller, 2008a, 2008b). This indicates, that environmental considerations must be considered as part of, and not opposed to, the normal business procedures. A way of saying this is to claim, that *environmental considerations need to be a part of a company's business model in order to be realised*. This claim is also supported by research into the connection between firm performance and environmental considerations. A recent meta-analysis of the relation between green supply chain management practices and firm performance confirms this proposition by demonstrating positive correlations between green supply chain management practices and firm performance when measured in terms of market-based, operational-based and accounting-based performance (Golicic and Smith, 2013).

From a logistics market perspective Martinsen and Björklund (2012) have analysed the differences in stated offerings and requirements, and also between perceptions of offerings and requirements "from the opposite sides". They suggest that LSPs in average overachieve in environmental efforts vis-à-vis the actual as well as the perceived requirements from their customers (the shippers). The authors suggest that a closer study of relationship parameters would clarify this situation, which in part contradicts previous research into the same topic. In general Seuring (2004) approves of the idea of studying relationships, as environmental effects are not confined to the single company. Cooperation within a rich cooperative context includes joint planning efforts and decision making in order to reduce the environmental impact, as well as an exchange of information. A precursor for a rich cooperative context is trust and a mutual willingness to learn and share information, thus allowing the companies to understand each other's responsibilities and capabilities and to set goals for environmental improvement (Vachon and Klassen, 2008; Hall and Howe, 2012).

The studied LSPs all expose quite similar patterns regarding the importance of environmental aspects. PostNord in Denmark, for instance, experiences green aspects as order qualifiers and not order winners, indicating that a certain degree of environmental awareness would be necessary for any logistics provider. However more ambitious efforts will not increase the success rate, and the main selection criteria among the Danish customers would be price. The typical customer demand is that LSPs should have some kind of environmental certification or show a similarly robust environmental management system.

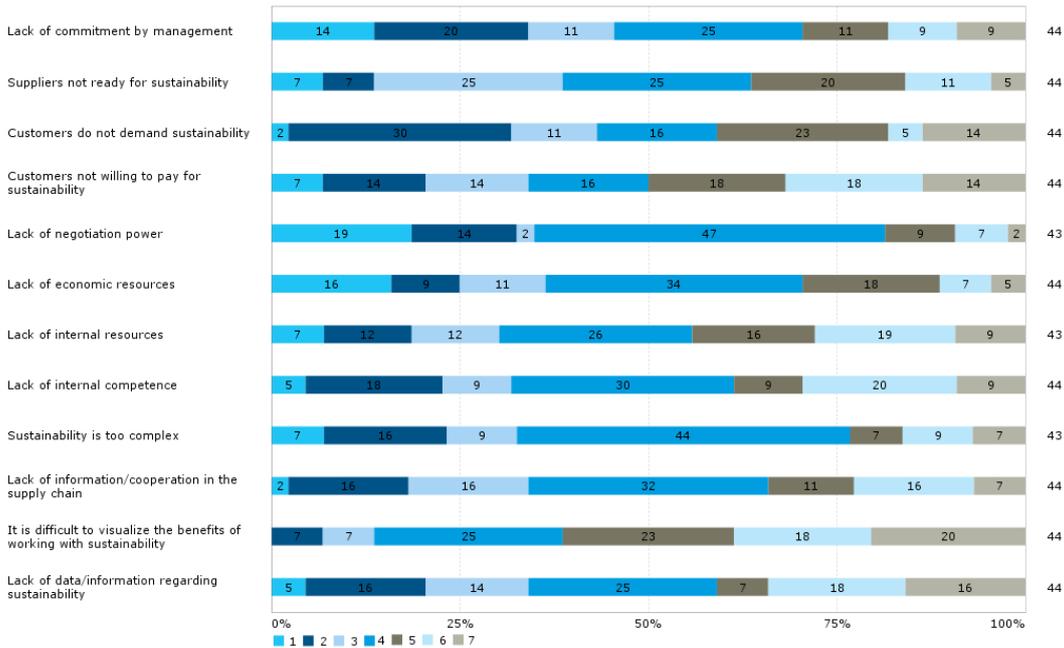
The preliminary results from the Danish survey indicate that most clients doesn't consider the drivers for sustainability to be that prominent according to the eighteen main drivers as identified through the literature review. This is evident by comparing the relatively high amount of clients that rate each driver as driving their work with sustainability to a very low degree (from 18% to 36%) compared to the amount of respondents answering that it to a high degree drive their work with sustainability (from 0% to 12%). This can be seen in Table 11. However, the results also indicate that some respondents have main drivers for their work with sustainability. The respondents indicate that the main driver for sustainability is that it is required by top management. Here, 53% of the respondents answered that top management to a high (answered 5 or 6) or very high degree (answered 7) is driving their work with sustainability. Risk of losing reputation is also rated relatively high compared to the other drivers with 42% answering that it drives their work with sustainability to a high or very high degree. On the other hand, it is interesting to notice that the least experienced drivers are customers' willingness to pay for sustainability as well as pressure by Non-governmental organizations (NGOs) with only 16% and 10%, respectively, answering that it drives their work with sustainability to a high or very high degree. When asked whether it is an order qualifier or winner criterion, the respondents do, however, indicate these to have a similarly weight, thereby indicating that it is to some degree considered both an order qualifier and winner criterion.

Table 11: Selected responses from the Danish survey 2013. Translation into English: Drivers for working with sustainability:
(1 = to a very low degree; 7 = to a very high degree)



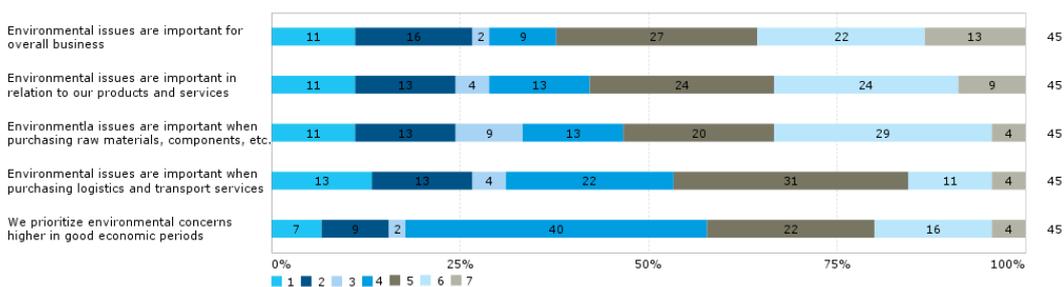
The clients were also asked to rate their experience of the main barriers for implementation of sustainability in their respective companies (Table 12). In accordance with the case studies, the Danish survey indicates that main one barrier of working with sustainability is the difficulty concerned with visualizing the benefits of the efforts. Here, 61% of the respondents answered that they to a high (answered 5 or 6) or very high degree (answered 7) experience this. Clients also experience that they cannot transfer additional costs incurred by sustainability efforts to customers given the relatively low degree of customers willing to pay for sustainability. Specifically, as it can be seen in Table 11, 50% of the respondents indicated that missing willingness among customers to pay for sustainability to a high degree or very high degree are considered as a barrier for implementing sustainability. It is also interesting to notice that the clients answer that they do not lack negotiation power and doesn't consider sustainability to be too complex to implement where only 18% and 23%, respectively, answer that it to a high or very high degree is a barrier for implementation of sustainability.

Table 12: Selected responses from the Danish survey 2013. Translation into English: Drivers for working with sustainability: (1 = to a very low degree; 7 = to a very high degree)



However, when asked to rate the importance of environmental issues with regard to different aspects of their business the clients tend to answer that it is rather important. For instance, when asked if environmental issues are important for their overall business, 62% of the respondents answer that environmental issues are of high (answered 5 or 6) or of very high importance (answered 7) which is considered rather high. In other words, most clients do believe sustainability to be important in relation to their overall business. Similarly, the Danish survey indicates that environmental issues are important for most of the clients' products and services. In fact, as answered by the respondents, these issues might have been prioritized even higher in good economic periods as compared to the current economic crisis. Environmental issues also gain some importance when purchasing raw materials as well as logistics and transport services. Here, it is interesting to notice that the respondents generally prioritize environmental issues slightly higher when purchasing raw materials and components, etc. than when purchasing logistics and transport services. The latter confirm the findings of Evangelista et al. (2012), who claim that despite overall high environmental ambitions, the same ambitions cannot be seen in purchasing, and even less is reflected in the purchasing of transports and logistics.

Table 13: Selected responses from the Danish survey 2013. Translation into English: Importance of environmental issues, with regard to: (1 =not important; 7 = very high importance)



The Swedish PostNord case reveals a similar pattern to the Danish case. Environmental issues are, with a quite low degree of ambition, a threshold for entering negotiations. Once at the table, environmental aspects only matters if all other criteria are equal – then environmental efforts are considered as adding value to the offer. The customers of PostNord Sweden prioritize, according to PostNord, flexibility and speed over price, however there are always discussions about the price!

In all, it can be concluded that environmental aspects are not prioritized in the business interaction between LSPs and shippers. From a shipper perspective this is interesting, as environmental improvements and increased efficiency in many instances go hand-in hand. Aronsson and Hüge-Brodin (2006), Kohn and Hüge-Brodin (2008) and Eng-Larsson and Kohn (2012) all emphasize the environmental benefits of different types of consolidation. Consolidation often results in less emissions and lower costs, and in the best cases it can be achieved without jeopardizing the delivery service dimensions. The prerequisites for a shipper to achieve a high level of consolidation in its own goods flows rely very much on high volumes and on concentrated markets. In that sense, this thinking resembles the logic of LSPs.

If we acknowledge that LSPs may have 'their own' business model in comparison with their customers, we get a clearer view of challenges and opportunities in their interactions. From a shipper perspective, the notion of strategic supply chain management informs about the necessity of making individual firms pull in the same direction in order for a supply chain to stay tight (cf. Narayanan and Raman 2004). From a client perspective, competition may no longer be firm against firm, but supply chain against supply chain. From an LSP viewpoint however, competition between LSPs occurs on a network level of analysis; between supply networks operated by different logistics service providers. Whereas manufacturers and retailers think about their physical products and 'their' supply chains, LSPs are in the business of detecting and exploiting supply chain interdependencies competitively, for common benefit of the entire network. Supply chain relationships are seldom independent from each other, but are embedded in networks (Gadde et al. 2010); a strategic task for LSPs is to detect and exploit supply chain interdependencies (Huemer 2006; 2012). LSPs consider a set of goods and decide on how to bundle these. To paraphrase Narayanan and Raman (2004), LSPs need also to integrate structures in which several chains pull in the same direction (in comparison with several firms within a chain). Whereas a manufacturer or retailer focuses on building trust within its chain, the LSP also concentrates on building trust between different chains.

When working with several clients the criteria for selecting them become accentuated, due to network externalities. This includes an evaluation of whether new clients are attractive relative to already existing clients. The LSP needs to assure that new clients will fit within the existing physical transportation network and that the client's presence positively affects value for existing clients (based on e.g. physical location, size, time of collection/delivery, type of goods and preferred distribution channels). Specific client requests, a desire for a unique outsourcing solution may be in conflict with standards which already are adjusted to best fit the network the LSP currently is operating. When integrating multiple chains LSPs need to consider that unique customer solutions may be in conflict with the network externalities that influence their overall mediation.

A key LSP task is therefore to carefully choose customers with needs that either can be met by a combination of standard procedures and infrastructures or can be the source of new service procedures that will increase the future offer of the LSP. An implication of the network externalities argument is the scope of leverage regarding the network. Value can be created by an LSP by the basic connection between senders and receivers, but mediators also acknowledge other sources of value creation (like Amazon.com using reading profiles of other members to provide recommendations). Similarly, it is of interest to study how LSPs use their networks to facilitate knowledge development and innovation, including sustainable and green developments.

Tollpost is one interesting case working explicitly with its strategic customer program; including frequent seminars and workshops where clients meet and share experiences and knowledge; all facilitated by the LSP. During such events it becomes visible that what is the best 'green' solution for one single company does not automatically translate in to the greenest supply chain. Moreover, interdependent supply chains further add to this complexity. An increased awareness of externalities also informs of the challenges in implementing more sustainable solutions; standards will be increasingly important in order to benefit from such sources of value creation.

The project's questionnaire has therefore been designed to account of such network leverage. Whereas most studies focus on levels of cooperation directly between the LSP and the client only, we contribute with client-client interfaces which are facilitated by the LSP. Interesting findings indicate significant differences between the Nordic countries with respect to how LSPs utilize their networks and initiate further cooperation. Whereas Danish and Finnish clients claim that their main LSP connects them with other clients in the LSP network (app. 40% claim very often or often regarding sharing of knowledge, improvement of existing solutions, and the development of new solutions), Norwegian and Swedish clients experience far less of such cooperative network leverage (app 12-20%) (see Table 7).

A conclusion drawn in the project is, that the actual business models in use by LSPs and their clients emphasize different aspects (physical products vs. relationships, chains vs. networks); this explains certain barriers to cooperation. Also the drivers of these business models differ. Whereas LSP clients are cost oriented in their emphasis on economies of scale (synergies in terms of high production of transportation volumes to cut costs), the LSPs awareness of network externalities is a value argument in itself; depending on product/customers characteristics in the LSP network the provider may leverage the network to create new and more sustainable offerings. Our findings indicate a significant leverage with respect to more cooperation, not only between LSPs and their clients but also between the clients of the LSP.

Environmental effects in logistics and transport systems are often referred to as *negative externalities* from the logistics or transport system. Externalities in general refer to costs or benefits that are experienced outside the direct interaction that causes them, and that can benefit or induce costs for other parties. Examples of positive externalities can be for instance synergies from educational systems that in the long term also provide good ground for prospering societies. In this project we can clearly identify the negative externalities in terms of emissions and other environmental problems, but closing in on the interface between logistics service providers and shipper a decrease of the negative externalities can also add value to not only the LSP-shippers involve but to their surrounding networks as well. *Positive externalities* created in LSPs' network that benefit the shippers can be value in terms of existing in the same network as other shippers; gaining from their knowledge and experience; or gaining from the overall pro-activeness of some shippers, which benefits the network and thereby all its customers. In the light of this, it becomes a bit of a riddle why many shippers fail to see not only the negative but also the positive network externalities of environmental aspects. However delving into that questions would require some deep-case research into shipper's strategies, which is not a part of this project.

Different transport modes and their role in greening Nordic logistics

The studied logistics service providers use road transport as their main transport mode. Rail transport is also used but not as much as they would like to. A main reason for this is, that rail transport lack in delivery service: their arrival is difficult to predict, which is harmful to the efficient system that is built up based on road traffic conditions. With such problems it would be difficult to meet the customer's

expectations of efficient and secure deliveries. But taking a look into the interface between LSPs and shippers, one way to overcome this would be to question if the customers always actually need the same delivery service, specifically in terms of delivery times. When such questions have been raised, especially in connection with larger seminars, most shippers agree that the "24-hours-rule" is more of a habit than a conscious consideration. "It is possible – it is fairly cheap – so let's buy it" – appears as the main way of reasoning among shippers.

A conclusion must then be, that shippers as well as LSPs have important roles to play in questioning the prevalent delivery times. In some instances they can very well be motivated, but based on discussions with a wide range of shipper representatives we claim that a larger proportion than can be expected could be allowed longer transport lead times, which in turn would enable LSPs (of the type in this research) to provide more efficient transports and also to a higher extent use rail transports.

Air transports are mainly used for express deliveries for the goods range studied in this project. According to previous research (Maack, 2012), the environmental focus in the express transport business is overall even lower than in the more "normal" settings. This was confirmed in the LSP studies in this project, where collaboration around a standardized tool for measuring emissions was identified among a range of LSPs. However one actor that changed focus of their operations into only express deliveries for this reason ceased their participation in the collaboration. Environmental efforts can be seen among express logistics firms as something, which may pay off in the future, but it is even less secure an investment to express firms than to ordinary LSPs. Many of their customers are recurring, and they tend to return to the express transport provider that appears as most secure, as the need for express and delivery safety is what drives the customer to turn from its ordinary LSP to the express provider. On the other hand, should a closer collaboration between LSPs and their customers result in more efficient and more environmentally friendly transport and logistics services, the need for express deliveries is suggested to decrease. And as express deliveries are often performed by air transport, their total portion of the transport work would be reduced, which would contribute to decrease the emissions generated by transport and logistics (cf. Kohn and Hüge-Brodin, 2008).

Water-borne transports have not been specifically studied in this project, which is a consequence of the selection of cases and more specifically the ambition among the researchers to target LSPs with innovative solutions to interacting with their customers. In the case search no LSP utilizing water-borne transports was identified as proactive in this respect.

5.3 Cooperation: different dimensions of interfaces among LSPs and shippers

The level of cooperation among LSPs and shippers can be described in three dimensions: a) between the LSPs and the shippers; b) between shippers that are customers to the same LSP and c) between LSPs. The three different types of cooperation can be seen singularly, but also occur together. While the main study object in the project is the LSP-shipper interface and interplay, the other types of interfaces and interplay also has their roles in greening transports and logistics.

LSP-shipper cooperation

Logistics service providers cooperate in different ways with their customers, and this has different effects on the extent to which green issues are treated in a pro-active manner or rather a reactive or even neglecting manner.

Previous research has illustrated that the level of greenness tend to increase in LSP-shipper dyads where the environmental ambition resembles and the degree of cooperation is high (Martinsen, 2011). More recent research further demonstrates that greening of logistics in LSP-shipper dyads is supported by a high degree of intra-organisational coordination (Martinsen, 2013), and further that a more even power position between the companies in the dyad tend to have a positive effect (Huge-Brodin and Martinsen, 2013).

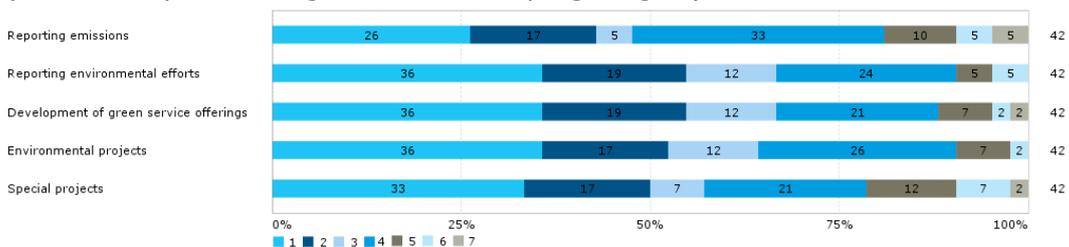
Overall, the perception among the studied logistics service providers is that the larger the customer is, the higher is its understanding for the LSPs business model and value logic, and the higher are also the green ambitions. In that sense, the SusInt project’s results are coherent with previous research performed with other logistics service providers in specific customer relationships.

The SusInt project has identified different forms of LSP-shipper co-operation, where the Swedish and in particular the Norwegian Tollpost case illustrate ways for LSPs to cooperate closer with their larger and more important customers. But, as described in the analysis above, the picture that emerges from the shipper side differ from the findings in the LSP studies. However, the most plausible explanation of the differences relies, in our analysis, on the selection of cases, which promoted high collaborative performance over being representative in this dimension.

In the Danish survey, clients were asked to rate to what extent they cooperate with their main logistics service provider with respect to reporting emissions, reporting their environmental efforts, development of green service offerings, environmental projects and other special projects. The answers can be seen in Table 14. The preliminary results indicate that clients only to a limited degree cooperate with their main logistics provider with regard to environmental reporting and projects. The cooperation most often concern reporting emissions and special projects where 20% and 21% of the respondents answer that they cooperate to a high (answer 5 and 6) or very high degree (answer 7). With regard to the five areas, environmental projects are indicated by the respondents as the area where the least cooperation is occurring with only 9% of the respondents answering that they to a high or very high degree cooperate with their main logistics provider. Hence, the results indicate that environmental issues are not highly rated in the cooperation with logistics service providers, although it is highly rated by some clients.

Table 14: Selected responses from the Danish survey 2013. Translation into English: To what extent do you cooperate with your main logistics service provider, with respect to:

(1 = to a very limited degree; 7 = to a very high degree)



Shipper-shipper cooperation

The LSP-shipper interface and interplay is closely related to the interplay, or cooperation between the different customers of an LSP. As has been discussed in the analysis above, the shipper-shipper interaction observed, that had been initiated by the LSPs, contributes to value creation in different ways. As different customers come together, new perspectives can be applied on “old” problems, and innovative solutions

can be generated. This increases the options for the LSP to create new services, but it also allows the shippers to benefit from each others' knowledge and experience. In this way, the customer "clubs" contribute to all the participating actors.

Value creation through co-opetition: co-operation among competing LSPs

Co-opetition is a term that captures the phenomenon where companies that are competitors on a market identify areas where they all can benefit from cooperation. Cooperation among competing LSPs can in different ways enhance the LSP-Shipper interplay, and can thus be part of an LSP's business model. In previous research it has been suggested that co-opetition among LSPs is occurring more commonly with regard to environmental efforts than for other purposes, and that an explanation would be that environmental efforts are still not strategically important for LSPs; that there is more to gain in knowledge sharing, than there is to lose from revealing how you do this side of business (Isaksson and Høge-Brodin 2013).

In this project, Tollpost Globe provides an example of co-opetition, where the tool for emission calculation was developed in collaboration with competing LSPs. The aim was to bring standardized solutions to the customers in general, which would benefit the customers in terms of ease-of-use and a possibility to compare offerings, and LSPs in terms of knowing about their own business in the same way as the competitors. As Tollpost Globe was the initiator and driver of this effort, it would also bring value to them in terms of first-mover advantages and the possibility to influence the development in a direction that was advantageous to themselves. In that sense, this project contributed to the explanations of why LSPs are prone to co-opetition when it comes to environmental efforts.

6 Conclusions

In this chapter the main conclusions from the project are presented in brief.

Among LSPs network size and network composition are **driving** value in networks, which was also confirmed in the LSP studies. Joint LSP and shipper gains can be traced to increased efficiency and decreased fuel consumption, leading to a decrease in emissions. However, the drive for shippers to demand higher environmental performance emanates mainly from their respective customers, and the priorities and requirements from those. And in essence, their priorities are not environmental considerations in the context of transport and logistics services.

Cooperative efforts depend on the LSP's understanding of network leverage but also on the cooperative attitude of its client base. Our initial findings regarding the level of cooperation between LSPs and their clients can depend on the initiatives of Danish and Finnish LSPs, but also on how willing/receptive their clients are towards such cooperative efforts.

Another driver often mentioned as prominent in research into environmental sustainability is increased legislation. The research presented here gives little support for legislation as a major driver, rather its role would be to set the lowest level for various environmental measures. However, already today LSPs are required by shippers to be one step more ambitious than legislation demands, in the form of environmental certificates or standardised environmental management systems. Nevertheless, the presence of such systems is required while the ambition of the LSP plays an inferior role.

While there is little customer demand for greener transport and logistics solutions, LSPs still strive to develop their business in a more environmentally friendly way. One of the main drivers for LSPs to actually work with environmental aspects in their LSP-shipper interfaces, is the expectation that in the future, the value of environmental efforts in logistics and transport will rise. This is supported by our findings and confirms previous research.

The most prominent **barrier** identified in this project is the mis-match between the LSPs' and the shippers' respective business models. This difference per se poses a barrier to greening transports and logistics, i.e. the shippers focus on products and supply chains, while the LSPs focus on relationships and networks. Thus, the different types of companies seek value and efficiency gains in different ways, which to some extent can be very difficult to unite.

As scale is important to make a network efficient, environmental solutions are seldom customised but rather built into the entire business of the LSPs. The strive to reach higher efficiency through economies of scale normally also makes a positive environmental contribution, as increased efficiency often equals decreases in fuel and energy consumption, which contributes to reduce the transport emissions. This would suggest ways to overcome the barriers above, however the scale- and efficiency analysis would be most relevant for large LSPs with high goods volumes. Smaller LSPs would need to identify other value gains, in order to overcome these barriers. But in essence, the Logistics service providers are rather well equipped to handle tougher demands from more of their customers. In fact, a more unified demand pattern would ease the process of increasing sustainability in terms of the environment AND in financial terms, due to the prevalent business models among the logistics service providers.

However, a focus on finding efficiency in every action may very well inhibit the options of supporting a more environmentally pro-active customer in finding new and innovative solutions. The recurring gathering of important customers into groups that

have been observed creates a counter movement, in which the customers inspire and encourage each other in identifying and designing new solutions for their logistics. We believe that this can be a prosperous path also for suggesting environmentally sounder solutions that can bring down negative environmental externalities without jeopardizing the efficiencies in the network. On the contrary, this form of shipper-shipper interaction has the potential to also bring more value to the network members, including the customers as well as the LSP.

The project mainly confirms previous research in that environmental issues in the exchange between LSPs and their customers play a small role, if any. Nevertheless, the studied LSPs conclude that they need to be prepared for future challenges in this area, which supposedly will include higher environmental demands than are put today. In that way, customers with high environmental demands contribute not only to their own business and to the LSP, but automatically increases the value of being in the network for the other customers. This is a positive network externality that can be used by LSPs to further attract environmentally conscious customers and thereby develop their business.

The project has covered a spectrum of aspects that capture the interaction between LSPs and shippers, as was the task for the project to handle. But researching these issues, other dimensions of interaction have been identified. Those are interaction between different clients, which have been facilitated by LSPs, as well as cooperation among competing LSPs around environmental issues, triggered by the will to present a more standardized interface towards the shippers. Such interactions and actor interplay will presumably also lead to an increase in the environmental ambition among the different actor, provided that there is an increased drive for promoting environmental improvement.

The project's results thus highlights the importance of researching greening of logistics and transports not from a single company perspective, not even from a single relationship perspective but rather from a network perspective which allows for increased understanding that in turn can generate more innovative solutions to the problem of greening transports and logistics. This does not exclude other paths for research, but the project's results stresses that this perspective makes an important contribution to the understanding of how transport and logistics take more environmentally friendly development. Some future paths for research, based on the findings from this project, are:

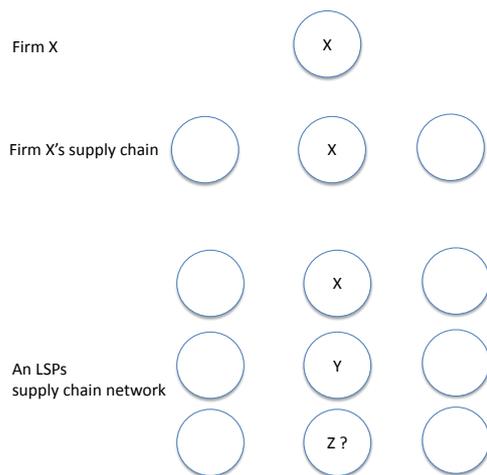
- Research into externalities, positive and negative, and the interaction between them, in order to understand the complex effects of greening transport and logistics in supply chains and networks.
- A combination of strategic management and logistics, in order to better understand how to make greening of logistics come true, as it demands strategic alignment and strategic efforts for the more operational activities that are understood as logistics.
- Value creation and appropriation, in specific between logistics service providers and their customers. Legislation is considered as lagging, and continent-wide, tough legislation is believed not to happen, why it is claimed that increased sustainability needs to rely on the creation and appropriation of value, in different dimensions.

7 Policy recommendations

This chapter corresponds to the third main objective of the SusInt project, as expressed in the project description. The content of this chapter will, upon project approval, be published on the participants web-sites, and also distributed among practitioners and authorities.

The chapter is divided in two sections, where the first section address practitioners while the second section addresses policy makers and authorities. The suggestions take off from a selection of the results, which suggest how improvements can be accomplished.

7.1 SusInt Practitioners' Road-map



The picture above shows the different business models (single firm, chain and network) that can be applied by different companies. When working with several clients the criteria for selecting them become accentuated, due to network externalities. This includes an evaluation of whether new clients are attractive relative to already existing clients (therefore the question mark for client Z). The LSP needs to assure that new clients will fit within the existing physical transportation network and that the client's presence positively affects value for existing clients (based on e.g. physical location, size, time of collection/delivery, type of goods and preferred distribution channels). In summary, what is the best 'green' solution for one single company does not automatically translate in to the greenest supply chain.

Rather than being passively integrated and selected by active clients, LSPs also think strategically and chose their clients. Correspondingly, one must turn Fisher's (1997) query around completely, from 'What is the right supply chain for your product' to 'What is the right product for your supply chain network?' or even to 'who is the right customer for your supply chain network?', when asking a LSP the equivalent question. Such reformulations are strategically relevant for LSPs and forms part of the network externalities argument; the addition of one more product (or client) that corresponds with the standardization and planning efforts already present in the network increase the potential for value creation.

In order not to de-green logistics, LSPs should in consequence with the above make deliberate selections of customers, in a way that they add value to their network. In terms of environmental effort this can mean:

- selecting customers that value and are prepared to pay for more environmentally ambitious technology

- selecting customers that share ambitions regarding reporting, in order to make the network more homogenous
- pick the customers that contribute to fill-rate efficiency

For the shippers: the selection of LSP today resides on service- and cost performance. In addition, and in order to support greening, shippers should also consider:

- the network of the LSP in terms of physical flows (in order to add, not decrease the value in terms of costs as well as emissions).
- The other customers of the LSP in terms of environmental ambitions overall, and in terms of willingness to pay for sustainable technology
- Customers with matching demands also regarding which environmental efforts should be undertaken

An innovative way for LSPs to identify new solutions, with or without environmental profile could be to organize customer clubs like the ones we have observed in this project. Depending on what you would achieve, different selection criteria could be used. By facilitating client-client interfaces, the LSP also brings value to its clients additional to that traditionally perceived within the frame of transport and logistics services.

In order to better understand the consequences of changes relating to environmental improvement, we would encourage shippers in particular to perform thorough analyses of the costs and benefits associated with environmental improvement. We suggest, that a comprehensive assessment, including positive as well as negative externalities, will provide a different picture than the analysis that are normally performed today and which mainly account for environmental gains vs. financial costs. By including the strategic dimensions of managing and being part of a network as well as a consideration of value creation, a more positive assessment will probably be the result. The study thus concludes, in alignment with the suggestion in literature, that projects aiming at improving the environmental performance are likely to become increasingly viable as corporations begin to take a more holistic view of both costs and value associated with these projects. The results from a more holistic and strategic assessment of the environmental projects are also expected to help companies visualize the benefits of environmental projects and thereby address the main barrier for implementation.

Increasing the proportion of rail transports while reducing the proportion of road transport would be a welcome development from an environmental perspective. The results of this project indicate that rail transports are considered to perform too poorly in the speed and delivery accuracy dimensions. At the same time, there is a surprisingly large agreement among shippers, that they often demand fast transports out of old habits rather than serious considerations. Therefore, based on the project's results, we would like to challenge the LSPs as well as their customers in questioning the need of fast transports. The identified co-operative initiatives would support such discussions among the customers in the LSPs network, which would support a change in value perception among the customers. By accepting longer transport lead times, the LSPs' networks would be possible to manage more efficiently, and thus reducing the negative externalities from transport and logistics. In addition, expanding the transport lead time would in some cases also allow for transferring road transports to rail transports, which would further inhibit the negative externalities.

7.2 SusInt Policy Implications

Policy makers and authorities are central for the development of greener logistics. Customer and client demands are 'too late' and 'too marginal'. A radical move to promote greener logistics would be to consider areas in the supply chain with

restrictions for competition. One such path would be to legally force product owners that are unable to reach satisfactory transport efficiency in their own transports to cooperate with others, even competitors.

Contrary to suggestions from literature, legislation is not found to be a prominent driver for increasing the environmental sustainability of transport and logistics in our project. This can be explained through noting that the existing environmental legislation is not considered as very tough, neither among logistics service providers or their customers. Therefore we suggest, that the transport and logistics market very well can be subject to more severe environmental legislation. One issue, though, is that legislation should be coherent over wider areas than single countries. While a more wide environmental legislation on EU- or even global level seem to lie in the far future, a more proactive environmental legislation for all transports within the Nordic countries could be a first step.

But not only more severe legislation and restrictions can support greening of transport and logistics. Released restrictions would support the greening of logistics through allowing for more collaboration among competing LSPs. Already, they present some collaboration regarding environmental aspects, as they are not seen as strategic. A further suggestion would be to find ways to support LSPs to coordinate between their networks, in order to increase the "network fill rate". While many LSP network maintain a satisfactory fill rate in relation to their financial frames, some of them are quite sparsely used which impedes the identification of more environmentally friendly solutions. Should such networks benefit from joining forces with other networks it would inevitably support a greener development.

Our research concludes that there is a need identified among LSPs for standards regarding environmental issues. While there are existing standards for the technical side of the logistics system (such as fuel standards and motor standards) there is still a need to develop comprehensible standards for assessing emissions in logistics system, both from the LSP and from the shipper sides. The problem relating to the shipper side is how the emissions of their LSP should be distributed among the different customers, and the available practices are perceived as rather blunt, sometimes misleading and overall unreliable. While different initiatives have been taken (e.g. our case the Tollpost Globe, and e.g. NTM in Sweden that is contributing to the development of an international standard) overall initiatives lack. Standards for assessing the environmental performance of logistics could also include a wider range of efforts than merely the emissions.

The public sector in Sweden is experienced as the one sector with the most developed green demands. It is also a sector that in its own capacity generates large amounts of transport work also compared to other traditional industry and trade sectors. Hence, this sector could take the role as a motor for driving green demands towards LSPs.

A challenge encountered during the research project, although not particularly addressed due to its present status as special project, is that of city logistics. Large city areas can suffer quite extensively from large emissions, congestions, noise and low traffic safety, while mid-sized cities mostly suffer from the emission-related problems associated with city logistics. The underlying problem is that of planning of a complex system of deliveries and pick-ups of goods. We suggest that authorities, mainly municipal, take the initiative to increase the efficiency in city logistics by taking charge of the goods transports in city areas. In most cities, passenger transports are organised by one single provider. How can a similar model be developed that could support more efficient and effective goods deliveries and pick-ups in urban areas?

8 Dissemination: Information activities and conferences

During the project, part results from the project have been shared with practitioner audiences of different types, of which the largest are:

600 minutes Supply Chain, September 2012. The annual forum gathers about 200 logistics service providers and shippers and includes presentations and scheduled meetings. Maria Hüge-Brodin as the official host of the event, gave an opening speech about greening logistics in the interface between LSPs and shippers, and facilitated the finalizing panel discussion on future issues in logistics and supply chain. Project issues were raised as questions, which were followed by numerous discussions with attendees from LSP companies as well as shipper companies.

Verdiskaping i logistikknettverk (Value creation in logistics networks), May 2013. Lars Huemer gave a presentation of part results from the project to the customers of Tollpost Globe, one of the case companies in the project.

Samarbeid eller maktkamp mellom forretningsstrategier (Cooperation or power struggle among companies), September 2013. Lars Huemer gave a presentation for the Norwegian professional organization Logistikkforeningen Norge, where preliminary results from the project were presented.

Scheduled activities:

- seminar with sales personnel at PostNord Sweden, the western region, presentation and discussion of the results. 14 October 2013.
- Webinar to Børsens Ledelsehåndbøger, Supply Chain Innovation, October 2013.
- Presentation at the conference Environment, Climate and Business development in freight transportation on 24 October 2013, arranged by "The transport innovation network"

Publication relating to the project:

Stentoft Arlbjörn, Jan and Stegmann Mikkelsen, Ole (2012) Arbejde med sustainability er primært drevet af økonomiske besparelser, in DILForienreing, December 2012, Volume 49, pp. 10-14.

Forthcoming:

- Three scientific articles based entirely on the project results. These will be aimed to highly rated research journals in the fields of Strategy, Logistics, Supply Chain Management and/or Sustainability. (submission early 2014)
- Article in a daily newspaper (SvD in Sweden) appendix, where the project leader is interviewed, and some of the project results are presented. (October)
- Trade-press article to SCM Magazine in Denmark.
- Article to Børsens Ledelsehåndbøger, Supply Chain Innovation

9 Work progress

Overall, the project execution has followed the process stipulated in the original application in large. What has been altered is the time schedule of the events, as the project has suffered some delays along the way. In turn, this has had the effect on the project that the time distributed among the different tasks has been shifted.

The initial time frame for the project was one year. As the start of the project was a bit up-held in the decision process of accepting the project, the concrete start-up of the project was postponed two months. Preparations were made according to plan, and based on these the project decided on the next level of details of the questions to be addressed according to the project descriptions and also on the principles of the practical execution of the project.

The preparation phase, including literature reviews, case selection and case studies, proved to be more time-consuming than was originally planned. Firstly, this made the project heavier on theory and theoretical analysis than planned, however we found this step necessary in order to perform a purposeful empirical research and be able to arrive at well-based conclusions in the end of the project. As the final construction of the survey instrument also relied on the theoretical work, this contributed to delaying the finalization of the survey to be sent to the LSPs shippers.

Secondly, the contacts with case companies proved not to be as straightforward as our original contacts with the companies had suggested. The main problems relate to our case-companies, on second thoughts, did not want to bother their client with too many surveys in fear of "survey fatigue", why different strategies were chosen to come around this:

- In the Swedish case, the case company person responsible for the contacts with the researchers came to the conclusion that another person should be the contact for the survey. The new contact has been very positive, but is also very busy, which in turn made it difficult to speed up the process in accordance with the project time-plan. Due to timing of other surveys to the customers, and avoiding sending the survey out during Holiday-times, the survey data collection was delayed and couldn't start until after summer holidays.
- In the Danish case, the contacts were established early, and support was granted for submitting the survey to a wide range of customers. However, as the survey instrument was not ready the execution was postponed, and when the survey was ready the case company thought that the timing would be bad due to other surveys, and they eventually declined to support in the posting of the surveys. A new procedure was designed and decided upon, but could not, for internal resource reasons, commence until September.
- In the Norwegian case, none of the case companies agreed to support in posting the project's own survey. The project was granted the opportunity to participate in a large survey sent to customers in Norway, Sweden, Denmark and also Finland. The survey was posted in May/June, and the SusInt project got access to the responses to some specific questions in August. However, in order to make more analyses, access to the remaining responses is needed, and this will not be possible until October.

In all, the project has in practice been going on for 18 months instead of the 12 months in the original project plan, and delays mainly relate to contacts with companies and internal resource shortages. The tasks have been performed, and the purpose and the objectives are all addressed, however the specific tasks have received different emphasis than the original plan. This is further reflected on in chapter 10.

10 Other comments: Experiences from the research project

Performing the SusInt project has brought a range of experiences to us as researchers and also as future participants in collaborative research projects. This chapter mainly reflects the experiences from the project management perspective.

The SusInt project illustrates very well the challenges of empirical research, specifically with the ambition of delving deep into case-companies and performing research that brings understanding, which is beyond the descriptive stage of knowledge development. In hindsight, performing the project with the aim to both cover a wide description and to bring a profound understanding of a complicated phenomenon in a novel context over the period of one year now appears as clearly over-ambitious. In future projects we will take stance for this.

The ambition with our joining forces was to be able to learn from each other as we represent different but connecting research fields. This ambition has been fulfilled, in that we have all learned a lot, and been brought new insights through our various approaches to the joint task. However we must also conclude that such a process takes time – more time than we initially perceived it would. The delays and the re-considerations in the project made it possible for us to take on this challenge in a serious way, and we believe that this has benefitted the project in terms of deeper insights and understanding.

Joining a joint Nordic project may also seem comfortable in the way that we believe that we are very much alike, think the same way and act accordingly. But a reflection from the SusInt project is that such similarities might be over-stressed. An example is the project management, where the Swedish project leader in the beginning of the project maintained a consensus-seeking attitude, whereas the Danish participants expected more of clear directives. This reflects that there are actually cultural differences between our closely located countries, and that future collaborative projects definitely should include the establishment of a project-internal communication policy, something easily overlooked in this type of “small and fast” projects, carried out presumably among actors that are alike.

The project has had three in-person meetings, compared to the original plan of two meetings. The meetings have really proved to be productive, discussions have been intense, and we were all given the opportunity to get well acquainted to each other’s fields of expertise. During the meetings some of the initial fuzziness in the project could be cleared out, which contributed to a more efficient process.

Finally, the physical proximity between Nordic countries would supposedly encourage more personal meetings. However, it turned out that our specific locations (Linköping in Sweden, Kolding in Denmark and Oslo, Norway) turned out to be a challenge for scheduling meetings and travel plans. Bearing in mind the value added through personal meetings, this experience brings new ideas to mind of how to organize collaborative research projects in the future.

11 Appendices

(presented in separate documents)

- 1 SusInt FoR-report
- 2 SusInt Interview Guide
- 3 SusInt Survey Questionnaire

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