Linköping Studies in Science and Technology, Thesis No. 1496 LiU-TEK-LIC 2011:35

Green Supply and Demand on the Logistics Market

Uni Martinsen



2011

Department of Management and Engineering Linköping University, SE-581 83 Linköping

© Uni Martinsen, 2011

Linköping studies in science and technology, Thesis No. 1496

LiU-TEK-Lic 2011:35

ISBN: 978-91-7393-137-3

ISSN: 0280-7971

Printed by: LiU-Tryck, Linköping

Distributed by:

Linköping University Department of Management and Engineering SE-581 83 Linköping, Sweden

Tel: +46 13 281000, fax: +46 13 28187

ABSTRACT

A well-known concept, both in practice and in literature is the logistics market. This market is a place where shippers' demand for logistics services meets Logistics Service Providers' (LSPs') supply of such services. Although this market has been given much attention in previous research, focus has been on shippers, while the LSP perspective has to a large extent been neglected. Several logistics related trends indicate that there is an increasing need for strong relationships between LSPs and supply chains, and one such trend is the "greening" of companies and supply chains. Although it is widely recognised that transports and logistics are a major cause of greenhouse gas emissions, environmental logistics literature has only focused on the interaction between LSPs and their customers to a very limited extent. This is despite the fact that LSPs could include so-called green categories in their offerings, just as shippers could include green categories in their demands and that this interaction could in turn contribute to a decrease of greenhouse gas emissions.

The purpose of this thesis is to describe the extent to which green categories are taken into account in the logistics market and suggest explanations. This includes identifying those green categories that are relevant for the logistics market, as well as a description of matches and mismatches with regard to these green categories. The matches and mismatches are studied from both a general market perspective and a relationship perspective. Initial explanations for the matches and mismatches in the relationship perspective contribute to the final part of the purpose.

There are two basic theoretical starting-points in this thesis. Firstly, it is recognised that the logistics market is important to the purpose and different ways to view this market are therefore discussed. Secondly, general environmental logistics literature provides a basis for the research into green categories that can be offered or demanded on the logistics market. In the exploratory research conducted for the thesis, the insights from literature are combined with empirical data from a survey, a homepage scan and four case studies of buyer-supplier relationships.

One main contribution of this thesis is the large number of green categories that are identified as relevant for LSPs and shippers on the logistics market. These green categories range from environmental management systems, vehicle technologies and CO₂ reports, to reviews of sustainability reports, relationship specific green projects and general desires among shippers to decrease CO₂ emissions.

A comparison of the supply of and demand for the green categories indicates that from a general market perspective, there appear to be clear mismatches between green supply and green demand. The same comparison made from a relationship perspective also indicates several mismatches between green supply and green demand, but the buyer-supplier relationships studied show matches between green offerings and green demands to a greater extent than the market perspective does. Interestingly, the LSPs seem to include more in their offerings than the

shippers appear to include in their demands for almost all mismatches in both the market perspective and the relationship perspective.

Seven propositions are made to account for the matches and mismatches between green categories in buyer-supplier relationships. Three of these propositions are related to the characteristics of those green categories that are found in the relationships. It is suggested that the tangibility level of green categories influences the occurrence of matches and mismatches in the relationships and the more tangible a green category is, the higher is the likelihood of a match between supply and demand in that relationship. The opposite is also suggested, as well as the idea that the more relationship specific green categories are, the fewer the mismatches that appear in that relationship.

The remaining four propositions relate to the potential connection between the type of relationship between LSPs and shippers and green matches and mismatches in their relationships. It is suggested that the closer a business relationship is, 1) the greater the number of green categories it has 2) the better green categories are communicated 3) the greater the number of matches compared to mismatches of green categories and 4) the higher the level of green category collaboration is.

ACKNOWLEDGEMENTS

Two and a half years have gone by surprisingly fast and even though there have been ups and downs, I've so far very much enjoyed being a PhD student at the logistics division at Linköping University. I owe a great deal of thanks to the people who have supported and inspired me during the last two and a half years.

I want to thank my supervisors who have encouraged and supported me since day one of my PhD process. Maria Huge-Brodin and Maria Björklund, thank you for always taking the time to help me when needed and for all your valuable comments.

Another "Thank you!" goes to Magnus Berglund, who read an earlier draft of this thesis and contributed with many valuable comments that have positively influenced the finished version of the thesis. Mats Abrahamsson, thanks for inspiring me with new perspectives on my research. Kristina Dalberg, thank you for helping me with the late versions of my thesis and for being so understanding when I constantly reschedule our meetings.

I would also like to thank VINNOVA, who has financed my research, and the respondents at the case companies for sharing their thoughts with me. Special thanks go to Linda Bergsten at DHL and Ella Trueman at Alltransport for helping me to identify shipper companies to study.

A whole bunch of "Thanks!" is sent out to all my co-workers who contribute to such a fun and inspiring working environment at the logistics division. A special thanks to the three logistics girls; Christina, what would work be without you? Quieter, maybe, but definitely more boring! Karin, our morning tea/coffee breaks are always a great way to start the day. Malin, thanks for making sure that I eat my vegetables and for your observant comments that can brighten the most average day.

Finally, thanks to my family and my friends for encouraging me and reminding me that there is a world outside of A-huset. And Petter, thanks for your encouragement and for your understanding during the last intensive months.

Linköping, May 2011

Uni Martinsen

CONTENTS

1	I	NTR	ODUCTION	1
	1.1	Тне	NEED FOR GREENER LOGISTICS	1
	1.2	THE	LOGISTICS MARKET WITH AN ENVIRONMENTAL FOCUS	3
	1.3	REL	EVANCE OF RESEARCH	4
	1.4	Pur	POSE AND RESEARCH QUESTIONS	8
	1.5	CEN	TRAL CONCEPTS AND TERMS IN THE THESIS	0
	1.6	STR	UCTURE OF THE DISSERTATION	1
2	F	RAN	TE OF REFERENCE 1	3
	2.1	Тне	LOGISTICS MARKET	3
	2.	.1.1	The General Logistics Market	5
	2.	.1.2	The Swedish Logistics Market	7
	2.	.1.3	Relationships on the Logistics Market	8
	2.	.1.4	Logistics as Services	1
	2.2	Asp	ECTS OF GREEN LOGISTICS SUPPLY AND DEMAND	4
	2.	.2.1	Modal Split	7
	2.	.2.2	Design of Logistics System	8
	2.	.2.3	Vehicle Utilisation	9
	2.	.2.4	Energy Efficiency	9
	2.	.2.5	Carbon Intensity of Fuel	0
	2.	.2.6	CO ₂ Measurements	0
	2.	.2.7	Additional Factors	1
3	F	URT	THER DEVELOPMENT OF THE RESEARCH QUESTIONS 3	3
	3.	.1.1	Research Question One: Desribing Green Categories on the Logistics Market 3	3

	3.1.2 Marke	Research Question Two: Describing Matches and Mismatches on the Logistics	34
		Research Question Three: Exploring Matches and Mismatches on the Logistics	36
4	RESE	ARCH APPROACH	41
	4.1 RES	EARCH DESIGN	41
	4.1.1	Research Design for Research Question One	42
	4.1.2	Research Design for Research Question Two	43
	4.1.3	Research Design for Research Question Three	44
	4.2 Uni	T OF ANALYSIS	44
	4.3 RES	EARCH METHODS	45
	4.4 The	LITERATURE REVIEWS	46
	4.4.1	Selection of Literature	46
	4.4.2	Analysis of Literature	47
	4.4.3	Research Quality of the Literature Reviews	48
	4.5 THE	HOMEPAGE SCAN	48
	4.5.1	Selection of Homepages	48
	4.5.2	Analysis of the Homepages	49
	4.5.3	Research Quality of the Homepage Scan	49
	4.6 The	Survey	49
	4.6.1	Selection of the Respondents	50
	4.6.2	Analysis of the Survey	50
	4.6.3	Research Quality of the Survey	51
	4.7 THE	CASE STUDIES	51
	4.7.1	Selection of the Cases	52
	4.7.2	Analysis of the Case Data	54

	4.	.7.3	Research Quality of the Cases	56
	4.8	Ana	LYSIS OF THE LOGISTICS MARKET FROM A GREEN PERSPECTIVE	58
	4.	.8.1	Analysis of Green Categories on the Logistics Market	58
	4.	.8.2	Analysis of Green Matches and Mismatches on the Logistics Market	58
	4.	.8.3	Analysis of Reasons for the Matches and Mismatches on the Logistics Market	59
	4.	.8.4	Research Quality of the Logistics-Market analysis	60
	4.9	THE	RESEARCH PROCESS	60
	4.	.9.1	Identifying a Research Problem	60
	4.	.9.2	My Parts of the Papers	61
5	C	OME	PANY PRESENTATIONS	63
	5.1	THE	LOGISTICS SERVICE PROVIDERS	63
	5.	1.1	Alltransport	63
	5.	.1.2	DHL	64
	5.2	THE	SHIPPERS	66
	5.	.2.1	Holmen	66
	5.	.2.2	Onninen	69
	5.	.2.3	SECO Tools	71
	5.	.2.4	Ericsson	73
6	C	ASE	DESCRIPTIONS AND SINGLE-CASE ANALYSIS	77
	6.1	THE	ALLTRANSPORT-HOLMEN CASE	77
	6.	1.1	The Green Relationship	80
	6.	1.2	Analysis of the Alltransport-Holmen Relationship	82
	6.2	THE	ALLTRANSPORT-ONNINEN CASE	85
	6.	.2.1	The Green Relationship	89
	6.	.2.2	Analysis of the Alltransport-Onninen Case	91

	6.3	3	Гне	DHL-SECO Tools Case	. 94
		6.3	2.1	The Green Relationship	. 96
		6.3	2.2	Analysis of the DHL-SECO Tools Case	101
	6.4	4 7	Гне	DHL-ERICSSON CASE	104
		6.4	1.1	The Green Relationship	106
		6.4	1.2	Analysis of the DHL-Ericsson Case	111
	6.5	5 \$	Sum	MARY OF THE SINGLE-CASE ANALYSES	114
7		SU	MM	1ARY OF APPENDED PAPERS	117
	7.1	1]	Pape	ER 1 – GREENING THE OFFERINGS OF LOGISTICS SERVICE PROVIDERS	117
	7.2	2]	Pape	er 2 – Matches and Gaps in the Green Logistics market	118
	7.3	3]	Pape	er 3 – Performance Mearurements in the Greening of Supply Chains	120
8		ΑN	IAL	YSIS OF THE LOGISTICS MARKET FROM A GREEN PERSPECTIVE.	121
	8.1	1]	DESC	CRIBING GREEN CATEGORIES ON THE LOGISTICS MARKET	121
	8.2	2]	DESC	CRIBING GREEN MATCHES AND MISMATCHES ON THE LOGISTICS MARKET	127
		8.2	2.1	Matches and Mismatches for Gap 1	127
		8.2	2.2	Matches and Mismatches for Gap 2	130
		8.2	2.3	Matches and Mismatches for Gap 3	132
		8.2	2.4	Matches and Mismatches for Gap 4	134
		8.2	2.5	Matches and Mismatches for Gap 5	136
		8.2	2.6	Conclusions from the Analysis of Matches and Mismatches	138
	8.3	3]	Ехрі	LORING GREEN MATCHES AND MISMATCHES ON THE LOGISTICS MARKET	140
		8.3	2.1	Matches and Mismatches in relation to Green-Category Characteristics	141
		8.3	2.2	Analysis of Matches and Mismatches in Relation to Relationship Characteristics	145
9		CC	ONC	LUSIONS	151
	9.1	1 (Grei	EN CATEGORIES ON THE LOGISTICS MARKET	151

9.2	MATCHES ANI	O MISMATCHES ON THE LOGISTICS MARKET
9.3	POSSIBLE REA	SONS FOR THE MATCHES AND MISMATCHES ON THE LOGISTICS MARKET 153
9.4	CONTRIBUTIO	NS
9.5	THE RESEARCE	H PROCESS IN RETROSPECT
9.6	Suggestions	FOR FURTHER RESEARCH
REFE	RENCES	
APPE	NDIX 1:	LIST OF RESPONDENTS
APPE	NDIX 2:	INTERVIEW GUIDE
APPE	NDIX 3:	PAPER 1: GREENING THE OFFERINGS OF LOGISTICS SERVICE PROVIDERS
APPE	NDIX 4:	PAPER 2: MATCHES AND GAPS IN THE GREEN LOGISTICS MARKET
APPE	NDIX 5:	PAPER 3: PERFORMANCE MEASUREMENTS IN THE GREENING OF SUPPLY CHAINS

LIST OF FIGURES

FIGURE 1.1 – THE FOCUS OF THIS LIC	CENTIATE THESIS (ADAPTED FROM WANDEL ET AL.,	1992) 9
FIGURE 2.1 – THE THREE LAYER MO	DEL (WANDEL ET AL., 1992)	14
FIGURE 2.2 – THE PARTNERSHIP CO	NTINUUM (WEBSTER, 1992)	19
FIGURE 2.3 – SUPPLY CHAIN RELATI	IONSHIP CLASSIFICATION (ADAPTED FROM BOWERSO	OX ET AL.,
2010)		20
FIGURE 2.4 – CLASSIFICATION OF L	SPs-shipper relationships (adapted from KPM	[G, 2000) 20
FIGURE 2.5 – THE TANGIBLE V/S INT	TANGIBLE FRAMEWORK (SHOSTACK, 1977)	22
FIGURE 2.6 – SERVICE QUALITY MO	ODEL (PARASURAMAN ET AL., 1985)	23
FIGURE 2.7 – RELATIONSHIP BETWE	EEN WEIGHT OF GOODS PRODUCED/CONSUMED AND (CO_2
EMISSIONS FROM ROAD FREIGHT	т (McKinnon, 2010в)	25
FIGURE 2.8 – LOGISTICS DECISIONS	THAT AFFECT THE ENVIRONMENT (WU AND DUNN,	1995) 26
FIGURE 3.1 – THE LSP-SHIPPER REL	ATIONSHIP CONTINUUM (ADAPTED FROM BOWERSO	X ET AL.,
2010; KPMG, 2000)		38
FIGURE 4.1 – UNIT OF ANALYSIS (IL	LUSTRATED BY THE BROKEN LINE)	44
FIGURE 4.2 – UNIT OF ANALYSIS IN	RELATION TO THE PAPERS AND THE THESIS FRAME	45
FIGURE 4.3 – RESEARCH METHODS I	USED FOR PAPERS 1-3 AND THE THESIS FRAME	46
FIGURE 4.4 – THE GAP MODEL		51
FIGURE 4.5 – THE GENERAL IDEA OF	F THE CASES	52
FIGURE 4.6 – QUESTIONS RELEVANT	T FOR THE SINGLE-CASE ANALYSIS IN RELATION TO T	THE
RESEARCH QUESTIONS		54
FIGURE 4.7 – THE GAP MODEL ADAI	PTED TO THE SINGLE-CASE ANALYSIS	56
FIGURE 6.1 – OUTLINE OF CHAPTER	. 6	77
FIGURE 6.2 – MATCHES AND MISMA	TCHES IN THE ALLTRANSPORT-HOLMEN RELATIONS	SHIР 84
FIGURE 6.3 – MATCHES AND MISMA	TCHES IN THE ALLTRANSPORT-ONNINEN RELATIONS	SHIP 93
FIGURE 6.4 – MATCHES AND MISMA	TCHES IN THE DHL-SECO TOOLS RELATIONSHIP	103
FIGURE 6.5 – MATCHES AND MISMA	TCHES IN THE DHL-ERICSSON RELATIONSHIP	113
FIGURE 7.1 – THE LSP-SHIPPER GA	P MODEL	119
FIGURE 8.1 – THE GREEN CATEGORI	ES IN RELATION TO TANGIBLE/INTANGIBLE SHOSTAGE	ск'ѕ (1977)
CLASSIFICATION		141
FIGURE 8.2 – THE CASES IN RELATION	ON TO THE RELATIONSHIP CONTINUUM	147
FIGURE 8.3 – AN AGGREGATED VER	SUS A DETAILED VIEW OF GAP 1	149
FIGURE 9.1 – KRALJIC'S MATRIX (A	DAPTED BY VAN WEELE, 2010)	159

LIST OF TABLES

Table 1.1 – Relationship between Papers 1 -3, Thesis Frame and Research question	۱S 11
Table $2.1-Q$ uantity of freight and freight transport performance per transpor	₹Т
MODE IN SWEDEN 2003, (ADAPTED FROM SIKA, 2005)	18
TABLE 2.2 – STATISTICS FOR SWEDISH LSPS WITH REGARD TO ROAD TRANSPORTS (SIKA, 20	009) 18
TABLE 2.3 – CATEGORIES AND CORRESPONDING GREEN MEASURES	26
Table 2.4 – Carbon intensity for different modes (Adapted from McKinnon, 2008) 27
TABLE 2.5 – CHARACTERISTICS OF DIFFERENT TRANSPORT MODES (KOHN AND HUGE-BRODI	IN,
2008)	28
Table 4.1 – Research Questions and corresponding research methods	42
TABLE 4.2 – GENERAL FACTS ABOUT THE SELECTED CASE COMPANIES	54
Table 5.1 – General information about the LSPs	63
TABLE 5.2 – GENERAL INFORMATION ABOUT THE SHIPPERS	66
Table $6.1-G$ reen categories in the Alltransport – Holmen Paper relationship	83
Table 6.2 – Relationship characteristics of the Alltransport-Holmen case	85
TABLE 6.3 – GREEN CATEGORIES IN THE ALLTRANSPORT – ONNINEN RELATIONSHIP	92
Table $6.4-Relationship$ characteristics of the Alltransport-Onninen case	94
TABLE 6.5 – GREEN CATEGORIES IN THE DHL – SECO TOOLS RELATIONSHIP	102
TABLE 6.6 – RELATIONSHIP CHARACTERISTICS OF THE DHL-SECO TOOLS CASE	104
Table 6.7 – Green categories in the DHL – Ericsson relationship	112
TABLE 6.8 – RELATIONSHIP CHARACTERISTICS OF THE DHL-ERICSSON CASE	114
TABLE 6.9 – LIST OF GREEN CATEGORIES IN RELATION THE FOUR CASES	114
TABLE 6.10 – MATCHES/MISMATCHES FOR EACH CASE AND GAP	115
TABLE 6.11 – RELATIONSHIP CHARACTERISTICS FOR EACH CASE	115
TABLE 7.1 – GREEN CATEGORIES FOUND IN PAPER 1	118
TABLE 8.1 – RELATIONSHIP BETWEEN PAPERS 1-3, THESIS FRAME AND RESEARCH QUESTION	ns. 121
TABLE 8.2 – THE GREEN CATEGORIES FOUND IN THE LITERATURE	123
Table 8.3 – The green categories found and according research methods for Res	SEARCH
QUESTION 1	125
TABLE 8.4 – MEAN VALUES FOR GAP 1 ACCORDING TO THE SURVEY	128
TABLE 8.5 – MATCHES AND MISMATCHES FOR THE FOUR CASES IN RELATION TO GAP 1	129
TABLE 8.6 – MEAN VALUES FOR GAP 2 ACCORDING TO THE SURVEY	130
TABLE 8.7 – MATCHES AND MISMATCHES FOR THE FOUR CASES IN RELATION TO GAP 2	131
TABLE 8.8 – MEAN VALUES FOR GAP 3 ACCORDING TO THE SURVEY	132
TABLE 8.9 – MATCHES AND MISMATCHES FOR THE FOUR CASES IN RELATION TO GAP 3	
TABLE 8.10 – MEAN VALUES FOR GAP 4 ACCORDING TO THE SURVEY	
TABLE 8.11 – MATCHES AND MISMATCHES FOR THE FOUR CASES IN RELATION TO GAP 4	135
TABLE 8.12 – MEAN VALUES FOR GAP 5 ACCORDING TO THE SURVEY	
TABLE 8.13 – MATCHES AND MISMATCHES FOR THE FOUR CASES IN RELATION TO GAP 5	

TABLE 8.14 – MATCHES/MISMATCHES FOR EACH CASE AND GAP	138
TABLE 8.15 – THE TANGIBLE/INTANGIBLE GROUPS AND CORRESPONDING GREEN CATEGORIES	143
TABLE 8.16 – NUMBER OF MISMATCHES FOR EACH GREEN CATEGORY AND GAP	144
TABLE 8.17 – RELATIONSHIP CHARACTERISTICS FOR THE FOUR CASES	145
TABLE 9.1 – Green Categories relevant for the logistics market	152

1 INTRODUCTION

The concept of a transport or logistics market is well recognised amongst researchers within the logistics field (see for example Lumsden, 2006; Naula and Ojala, 2002; Sheffi, 1986; Stefansson, 2006; Wandel et al., 1992). This market is a place where Logistics Service Providers (LSPs) offer transport and additional services to shippers, who in turn have a demand for these services (Sheffi, 1986). On this market, various kinds of interactions take place between LSPs and shippers. The relationships between LSPs and shippers can for example range from a single purchase of transport services to longer contract periods in which additional services related to transports might be bought (KPMG, 2000). Such services could for example include carrier selection, freight consolidation, warehousing and product assembly and kitting, to name a few (Selviaridis and Spring, 2007; Yu et al., 2010).

Considering the fact that the logistics market is a well-known concept within logistics research, there seems to be a lack of balance between the attentions given to the two types of actors involved in the market. More specifically, even though LSPs are an important part of logistics. there has been notably little focus on logistics service providers in supply chain literature. Shippers, on the other hand, are more commonly researched, but the focus is often on the interaction between shippers and receivers of goods (Stefansson, 2006). Similarly, within the field if third-party logistics, the literature also focuses on the demand side, as opposed to the supply side where LSPs are found (Selviaridis and Spring, 2007). There are several reasons as to why LSPs might have had a secondary place in the literature. For example, Fabbe-Costes et al. (2009) suggest that LSPs are the forgotten actors of supply chain integrations. Spens and Bask (2002) note that LSPs are often merely seen as actors that support other members of the supply chain, providing resources, knowledge, utilities or assets for primary members and Lemoine and Skjoett-Larsen (2004) state that LSPs are the least integrated link in supply chains. However, several logistics related trends, such as the shift towards outsourcing and increased globalisation, increase the need for strong relationships between LSPs and supply chains (Seth et al., 2006). Another current trend that could have an effect on LSPs is the "greening" of companies and supply chains (see for example Beamon, 1999; Rao and Holt, 2005; Simpson et al., 2007). However, just as with research into interfaces in general, LSPs are given very little attention in green supply chain literature (Björklund, 2011; Maack and Huge-Brodin, 2010).

1.1 THE NEED FOR GREENER LOGISTICS

It is widely recognised that logistics and transport operations have a large negative impact on the natural environment (EEA, 2007; Murphy and Poist, 1995; Ribeiro et al., 2007; Roth and Kåberger, 2002; Wu and Dunn, 1995) and that they effect things such as local air quality, noise

and vibration, accidents and global warming (McKinnon, 2010a). Because of a growing concern about climate change in the world today, CO₂ emissions have become increasingly important within the field of environmental logistics (McKinnon, 2010a). As a result, the focus of this thesis will be on CO₂ emissions. Of the 50 000 mega-tonnes CO₂ equivalents that human activity generates every year, around 5.5% are caused by the transport and logistics sector (World Economic Forum and Accenture, 2009). Moreover, it seems as if the single most environmentally damaging operation within logistics is transport (World Economic Forum and Accenture, 2009; Wu and Dunn, 1995). Over the past decade, transport's greenhouse gas emissions have increased at a faster rate than any other energy using sector, and unless there is a change from current patterns of energy use, transport energy and CO2 emission levels are expected to hit levels 80% higher than current levels by 2030 (Ribeiro et al., 2007). In Sweden, the total CO₂ emissions in 2009 were 60 million tons of CO₂ equivalents, of which the transport sector, including both passenger and freight transports, emits one third and is the largest contributor to the emissions (Ekonomifakta, 2011b). Of the 20 million tons of CO₂ that the transport sector emits, over 90% come from road transports. Moreover, there has been a trend that freight transport has grown even more rapidly than passenger transport and this is something that is expected to continue in the future (Ribeiro et al., 2007).

The EU has set a target to reduce greenhouse gas emissions by 20% (against 1990 levels) by the year 2020 (European Commission, 2010) and it is possible that the target level will be raised to 30% (European Commission, 2010). One report even states that the European countries would benefit from such a raise of target levels since it would give jobs, growth, energy and climate security (CAN Europe, 2011). In addition, individual countries have set different target levels to reduce CO_2 emissions; Sweden for example has an aim to reduce greenhouse gas emission by 40% by the year 2020 (Miljödepartementet, 2011) and the UK has proposed an 80% reduction by the year 2050 (both against 1990 levels) (Department of Energy & Climate Change, 2009).

In order to achieve the goals set, a lot of different actors will have to make a serious effort and most people will probably be affected in some way. For example, companies of many different kinds are likely to be affected by the different targets described above. McKinnon (2010c) even states that:

"Climate change is likely to become a major business driver over the next few decades as companies come under intense pressure to decarbonise their activities." (p. 1)

For companies, pressure to engage in environmental work can come from many different sources. As implied by the reduction targets above, governments want companies to become greener but as noted by Roth and Kåberger (2002), it is not easy to translate general environmental targets to specific requirements for a single company. However, companies that

are involved in transports in some way, whether they are buying the service or performing it, are likely to be affected by various restrictions set on a governmental level. From an LSP perspective, DHL (2009) notes that:

"Climate change and its consequences will have a far-reaching effect on logistics. As one of the largest producers of CO_2 emissions, the logistics industry will find itself in a particularly difficult position – and under close scrutiny." (p. 52)

1.2 THE LOGISTICS MARKET WITH AN ENVIRONMENTAL FOCUS

Just as it can be relevant to talk about a transport or logistics market in general, because of the growing concern of logistics' environmental impact it should be of interest to discuss *green categories* on the logistics market. In such a view of the market, there is a focus on green services that LSPs can offer to shippers, and shippers can demand from the LSPs. For example, The World Economic Forum and Accenture (2009) give suggestions as to what LSPs as well as shippers and stakeholder need to do in order to lower the environmental impact from logistics. Some of the suggestions for shippers, such as a change to slower modes and an increase in shared loadings, require the involvement of an LSP to be accomplished. In that way, both LSPs and shippers can be a part of the work to make supply chains to greener.

One example of a restriction that will inevitably affect LSPs is a recent decision by the European Union, which set new restriction levels for emission from trucks (Miljö och Utveckling, 2011). Likewise, customer pressure is likely to encourage LSPs to enhance environmental work (Wolf and Seuring, 2010) and, as noted by Lieb and Lieb (2010), customers play an important role as drivers for sustainability programs for LSPs. This is both because they pressure the LSPs, but also because the LSPs want to attract so-called *green customers*.

The fact that logistics and transports are a growing part of the problem that involves greenhouse gas emissions does not only affect logistics service providers (LSPs). Despite the fact that they do not perform transport services, shippers are inevitably a major reason for why transports need to be performed and also need to step up and take responsibility. The role of logistics managers in environmental work in shipper firms is emphasised for example by Wu and Dunn (1995) and Murphy and Poist (1995). Murphy and Poist (p. 18) write:

"...logistics is in a strategic position to assume greater leadership in corporate environmental matters. This argument is largely based on logistics managers' role as custodians of supply chain flows and the fact they are in an ideal position to have insight regarding every link of that chain."

Looking merely at the previously mentioned pressure on companies to lower their environmental impact, it is easy to believe that environmental efforts are purely a burden to companies. They, however, provide business opportunities as well, and according to DHL (2009, p. 53),

"The demand for 'green' supply chains will also open up an enormous growth market".

For example, it has been noted that sustainability efforts can increase businesses with customers and also lead to new customers for LSPs (Lieb and Lieb, 2010). Logically, this should require that customers want to purchase from sustainably sound companies, and also that customers are aware of the LSPs' efforts. In fact, a correspondence between customer needs and the service offerings is essential in order to succeed with the service concept (Edvardsson, 1997). This should apply to services in general as well as to logistics services, with or without the inclusion of green factors. Murphy and Posit (2000) note that there appears to be a mismatch between the 3PL services offered and used in general, and Wolf and Seuring (2010) find the same indications with regard to supply and demand of green services on the logistics market.

Judging from the content of the sections above, it seems as though both LSPs and shippers have a possibility, and perhaps a responsibility, to engage in the environmental challenge that the world is facing. The logistics market can serve as a platform for this work. It is likely that the two types of actors can benefit from working together to try to accomplish green solutions. The research in this thesis aims to obtain a deeper insight into the interface between LSPs and shippers with regard to green categories on a logistics market.

1.3 RELEVANCE OF RESEARCH

In general logistics literature much has been written about logistics service providers (see for example Berglund, 1997; Fabbe-Costes et al., 2009; Makukha and Gray, 2004; Murphy and Poist, 2000; Rajesh et al., 2011; Stefansson, 2006) and two recent literature reviews go through a large part of this literature (with a focus on 3PLs) (Marasco, 2008; Selviaridis and Spring, 2007). In both of these papers, the service offerings of LSPs are mentioned but neither of them comments on the green parts of these offerings or on environmental work in any other context. Taking a closer look at papers that deal more explicitly with service offering within logistics, there are several that have categorised the service offering into smaller components. For example, Berglund (1997) suggests a list of services required by customers to LSPs (3PLs), where warehousing, distribution and transportation are those services most frequently ordered by customers. Through a literature review, Yu et al. (2010) find numerous aspects of a service offering for LSPs:

"Beyond traditional logistics functions like transportation and warehousing, customer-oriented 3PLs may also extend service offerings to include a variety of value-added services such as inventory management, logistics coordination, carrier selection, reverse logistics, supply chain management integration, freight forwarding, rate negotiation, electronic funds transfer, fleet management/operation, product assembly and kitting, spare parts fulfillment, marketing services, security services, project management, logistics information and IT solutions, contract manufacturing, and management of call centers." (p. 360)

Likewise, Rajesh et al. (2011) develop an extensive list of 31 different aspects of the offering of LSPs and categorise them into three groups; functional service offering, value chain service offering and strategic service offering. Carrier selection, warehousing (both in the functional category), decrease of logistics costs and improved process lead time (value chain category) and reputation and flexibility (strategic category) are examples of the offerings of LSPs. Although some of the aspects of an LSP offering that were discussed by Berglund (1997), Yu et al. (2010) and Rajesh et al. (2011) could be linked to environmental consideration, none of them mention this aspect of the offering. However, judging for example from Wolf and Seuring (2010) and Lieb and Lieb (2010), the green aspects of LSPs' service offerings seem to be of relevance in recent literature, and bearing in mind that the papers by both Yu et al. (2010) and Rajesh et al. (2011) have been published recently, it is surprising that no green consideration is taken into account.

Looking at service offerings from another side of research, namely that of environmental logistics, it seems clear that literature within this field barely mentions things like the logistics market, offerings from LSPs or demands from shippers. McKinnon (2010a) has categorised green logistics research into five different fields; 1) reducing freight transport externalities 2) city logistics 3) reverse logistics 4) logistics in corporate environmental strategies and 5) green supply chain management. These five fields will now be briefly presented and related to the logistics market.

The research area of *reduction of freight transport externalities* deals with decreasing transports' effects on the environment. Research focusing on improving vehicle technology has been expanded to include logistics systems of companies, since these are considered to be closely linked to the growth of transport growth (McKinnon, 2010a). Studies that consider the design of companies' logistics systems have been conducted by Aronsson and Huge-Brodin (2006) for example, who notice a complicated relationship between companies' logistics decisions and environmental impact from logistics, and Kohn (2008), who investigates centralisation and its effect on environmental impact from logistics. Moreover, choice of transport mode is closely related to the reduction of freight transport externalities since it is recognised that road, air, rail

and water-borne modes have different impacts on the environment (McKinnon, 2008). Within this field of research, there appears to be little connection to the interface between LSPs and shippers and how this interface can provide opportunities, as well as barriers, for the reduction of freight transport externalities.

The second research area mentioned by McKinnon (2010a) is the field of *city logistics*, in which there is a focus on freight transports in urban areas. In such areas, there has traditionally been a problem with low fill-rates in trucks, causing both high financial costs as well as environmental impact. McKinnon (2010a) recognises that a recent development within this field is the increase of home-deliveries as a part of companies' service offerings, and this naturally changes the conditions for city logistics. As implied above, service offerings from both shippers and LSPs can have an effect on the research field of city logistics

Reverse logistics is concerned with the return of waste product and packaging for reuse, recycling and disposal (McKinnon, 2010a). Within this field, Sarkis et al. (2004) implicitly mention the service offering of LSPs when they write that e-commerce gives LSPs a business opportunity. Products sold via the internet will inevitably cause product returns, and the LSPs can offer to pick up these returns and thus increase efficiency in their transport and distribution systems. Thus, even though the focus within the field of reverse logistics may not be on the logistics market's green supply and demand, there are aspects of the field that can be of interest in such a market.

The field of *corporate environmental strategies* deals with how companies address environmental impact that their logistics operations may cause, and this work is often linked to strategic business considerations (McKinnon, 2010a). One such practice is environmental management systems, such as ISO 14 001, which can be applied to shippers, as well as to LSPs. Nawrocka et al. (2009) investigate the role of ISO 14 001 in supply chains practises and note that companies commonly use ISO 14 001 as a requirement for suppliers. Moreover, it is noted that environmental adjustments within logistics often is interconnected with cost savings (Aronsson and Huge-Brodin, 2006; Wu and Dunn, 1995) and this is inevitably an incentive for companies to put a green focus on their logistics operations. Rao and Holt (2005) even state that:

"[if companies] green their supply chains not only would firms achieve substantial cost savings, but they would also enhance sales, market share, and exploit new market opportunities to lead to greater profit margins, all of which contribute to the economic performance of the firm." (p. 912)

Finally, green supply chain management recognises that a company's environmental impact is not limited to the corporate boundaries, but is instead affected by several factors outside these borders (McKinnon, 2010a). Companies can for example influence environmental impact by choosing who to partner with or which technology to introduce in the supply chain (Sarkis,

2003). The greening of purchasing activities is also included in this field of research (McKinnon, 2010a).

As can be noted from the green logistics review presented above, green service offerings from LSPs or green demands from shippers can be a part of all of the research fields within green logistics. However, an environmental focus of the logistics market can be said to belong mainly to two of the fields discussed. Since LSPs can use their green offerings as a means to increase business opportunities and to decrease their own as well as their customers' environmental impact, corporate environmental strategies seem to be the field of research that corresponds to this. This same logic is valid for shippers, who can include considerations of choice and collaboration with LSPs as a part of their corporate environmental strategy. This is also closely linked to green supply chain management, where suppliers, for example LSPs, are chosen because of their environmental focus.

However, as implied above, the relationship between shippers and LSPs has been very poorly investigated within the green logistics field with very few exceptions. Wolf and Seuring (2010) take the view of the LSP-shipper dyad and find that LSPs seem to be ahead of their customers with regard to environmental issues. They write:

"The interviewees on the transport buyers' side all stated that procurement was integrated into their environmental strategy, contributes to the environmental friendliness of their companies and is partly even measured against this contribution. It is still puzzling on how this fits with the statements of the 3PLs, who likewise unanimously said that there are no real minimum requirements on the side of the customers in this area and that customers were satisfied if they just fulfilled the legal requirements." (Wolf and Seuring, 2010, p. 96)

The citation above gives indications that there is a mismatch between the green offerings and the green demands of LSPs and shippers respectively. However, although Wolf and Seuring (2010) study how the environment is taken into account when logistical services are purchased, they do not go into much detail about the specific issues. Instead, terms like "most environmentally advanced" and "all relevant environmental aspects" are used.

Moreover, Lieb and Lieb (2010) in part study both LSPs' service offerings and shipper's demands from the LSPs' perspective. CEOs of American, European and Asian LSPs were asked to identify any steps taken by their companies to support their sustainability goals as well as what they perceived that customers asked for in terms of sustainability issues. A wide variety of steps taken by the LSPs were found, such as diverse development of specific sustainability goals for individual operating units, the development of a formal sustainability statement for a company, control of a company's service providers through the use of environmental checklists, comparison of a company's carbon footprint against other 3PL, experimenting with alternative

fuels, change of modes, reduction of printed materials and use windmills at distribution centres for electric power generation. On the other hand, a much smaller number of factors were asked for by customers. These demands could be to support customer efforts to reduce their carbon footprints, reduce fuel, water, and electricity consumption, dispose of hazardous materials and develop recycling programs. Interestingly, Lieb and Lieb do not conduct any further analysis as to how the offering and demands match, even though it seems relatively clear that the green offerings well outnumber the green demands.

The actual logistics market also appears to be confused with regard to green offerings and demands. In a recent report, DHL (2009) states that customers will become more and more demanding with regard to the transparency of "the ecological footprint" of goods and services. Even though price will still be of great importance, companies are believed to be willing to pay a little extra for "green" products and services. However, according to the DHL report, the concept of "green" is, somewhat fuzzy and it is difficult to know what customers really want in their potential hunt for green products and services. If shippers are going to demand certain green services from LSPs, it is vital that they know what to ask for. Similarly, the LSPs need to understand the demands in order to be able to provide them. There seems to be a confusion in the LSP industry as to who it is that should lead the green development in the interaction between LSP and shippers. It is also possible that it is not one of the actors that should drive the development, but instead collaboration between the two (Nilsson, 2011). A study of green offerings and demands could help clarify the current situation and help LSPs and shippers to better understand their own industries as well as those of other actors.

1.4 PURPOSE AND RESEARCH QUESTIONS

The previous discussion reveals that the inclusion of LSP and shipper interactions into the greening of logistics has largely been neglected. The research in this licentiate thesis aims to shed light on the logistics market's green supply and demand and learn more about the interactions between LSPs and shippers active on this market. As noted above, general LSP literature does not seem to include green categories that can be a part of LSPs' service offerings or shippers' demands. Green logistics literature, on the other hand, naturally has much focus on the environmental considerations of logistics, but has surprisingly little focus on the importance of the interaction between LSPs and shippers in the environmental challenge.

Therefore, the purpose of this licentiate thesis is to:

Describe how green categories are taken into account in the logistics market and suggest explanations for this.

The purpose will be studied from the perspective of the logistics market, which is marked inbetween LSPs' supply and shippers' demand, as shown in Figure 1.1. Both LSP and shipper perspectives are of interest to the logistics market and both perspectives will therefore be studied in order to get a clear picture of this market.



Figure 1.1 – The focus of this licentiate thesis (adapted from Wandel et al., 1992)

Even if studies of service offerings on the logistics market have been conducted within the field of general logistics, these studies barely take any green categories into account. Moreover, environmental logistics literature very seldom takes a market perspective and, as a result green categories with regard to offerings and demands are not discussed. There is thus very limited knowledge about what LSPs' offerings and shippers' demands can include with regard to green categories. An increased understanding of this could help LSPs to strengthen and better specify their green service offerings. The first research question is:

RO1. Which green categories could be taken into account in the logistics market?

Despite the fact that environmental logistics literature seldom discusses offerings and demands, there are studies that have touched upon this subject. Two such studies indicate that there are mismatches between LSPs' green offerings and shippers' green demands, but they do not go into any details in the matter. An increased understanding of the situation could provide useful information for LSPs and shippers in their understanding of green supply and demand on the logistics market. The second research question is:

RQ2. To what extent are the green categories taken into account by LSPs and shippers respectively?

Given that some kinds of mismatches are found as a result of Research Question 2, it is of interest to understand the reasons for these mismatches. Insight into these reasons could, if

desirable, help to decrease the number of mismatches between LSPs and shippers on the logistics market. The third research question is:

RQ3. Why are there matches and mismatches on the logistics market with regard to green categories?

The three research questions will developed further in Chapter 3.

1.5 CENTRAL CONCEPTS AND TERMS IN THE THESIS

Environment: The use of the word environment is extensive, as it can mean a variety of different things. There are business environments, competitive environments, organisational environments, to name a few. In this licentiate thesis, the word environment refers to the natural environment and will in this thesis be used interchangeably with the word "green".

Green category: Green supply/offerings of LSPs and demand/demands of shippers include various aspects of environmental categories, such as offerings or demands of specific vehicles or specifications about transport planning. The common word for these aspects of offerings and demands will in this thesis be *green categories*. The green categories discussed have a large focus on transport related services of LSPs, even though it is recognised that services such as warehousing and packaging also can be a part of LSPs' offerings and shippers' demands.

Green supply v/s green offerings and green demand v/s green demands: Green supply and demand refers to general supply and demand on a (logistics) market and these in turn include many different green offerings and demands. These terms are used interchangeably throughout the thesis.

Logistics market: A place where shippers' demand for logistics services meets LSPs' supply of such services. Interactions between LSPs and shippers result in flow of material, vehicles moving and additional logistics related services.

Logistics Service Providers (LSPs): As has been done in previous research (see for example Fabbe-Costes et al., 2009; Forslund, 2010), the term LSP will in this thesis include actors such as carriers, forwarding companies, transport(ation) companies, third party logistics providers/partners and logistics service companies/providers/suppliers. Differences between these types of companies will in this thesis possibly contribute to a wider range of results than if similar LSPs would have been studied. No major analysis of these differences is, however, conducted in this thesis.

Shippers: Those actors who buy transport and logistics services from LSPs are called shippers. In this thesis, it is recognised that there are differences between shippers in terms of for example

industry, size and market. These differences will illustrate some of the differences in the logistics market, but no major analysis of them will be conducted.

1.6 STRUCTURE OF THE DISSERTATION

The main parts of this licentiate thesis are the so-called "Kappa" (chapters 1-0), in this thesis referred to as the *Thesis Frame* and three appended papers which are referred to as Paper 1, Paper 2 and Paper 3. It is possible to read the Thesis Frame without having read the three papers, but in many of the sections the papers play an important role. Important to note is that the Thesis Frame not only provides a summary of the three appended papers, but also provides additional empirical data to the analysis. This additional data is collected through case studies of four LSP-shipper relationships.

Instead of a categorisation of this thesis according to the Thesis Frame and the three papers as discussed above, it is possible to categorise it with according to the three research questions. These two different ways to view this research are closely related, if not to say intertwined. Table 1.1 provides an overview of how the Papers, Thesis Frame and Research Questions correlate. Simply put, Research Question 1 is mainly addressed by Paper 1, Research Question 2 by Paper 2 and Research Question 3 by the Thesis Frame. However, aspects of the research questions are in most cases researched in more than one of the papers. As mentioned above, the Thesis Frame is written in order for a reader to understand the logic without detailed knowledge from the papers.

Table 1.1 – Relationship between Papers 1-3, Thesis Frame and Research questions

RQ				
1	X	(X)	(X)	(X)
2	(X)	X	(X)	(X)
3		(X)		X
Paper	1	2	3	TF

In the next chapter of this thesis the frame of reference is presented. In Chapter 3, the three research questions are discussed in more detail than what has been done so far in this thesis. The research approach applied in the Thesis Frame as well as the three papers is then explained in Chapter 4. Next, company presentations in Chapter 5 represent the start of the case studies and they are followed by case descriptions and single-case analysis in Chapter 6. Chapter 7 provides summations of the three appended papers. The papers give input to Chapter 8, in which an analysis of the logistics market with a focus on green categories and matches and mismatches is conducted. This analysis is structured according to the three research questions. Finally, conclusions for the three research questions as well as contributions, reflections regarding the research process and suggestions for further research are presented in Chapter 9.

2 FRAME OF REFERENCE

This chapter will present the frame of reference for the research conducted in this licentiate thesis. First, however, the logic of the chapter will be described. There are two main sections in the chapter; The Logistics Market and Aspects of Green Logistics Supply and Demand. The first one of these starts with a section on definitions of the transport and logistics market. Next, an overview of the general logistics market is presented and because of the Swedish focus of this thesis, it is followed by a more detailed description of the Swedish logistics market. Due to the interactions that take place in the logistics market between LSPs and shippers, examples of different types of relationships on the logistics market are then presented. This section will also provide useful input to the analysis of the logistics market towards the end of this thesis.

The relationship literature is followed by a brief presentation of service literature because of the fact that transports and logistics are seen as services and are therefore a part of supply and demand on the logistics market. A discussion about services characteristics is included and these will serve as useful input to the analysis later in the thesis. In addition, a review of the concept of service quality is presented, since it is an important part of the gap analysis conducted especially in Paper 2, but also in the Thesis Frame.

The second main section of the frame of reference will provide a description of different green categories that can be a part of green supply or green demand on the logistics market. Since this in an area given little attention in previous research, the review takes its starting point in general green logistics literature, which provides information about measures that can be taken in order to decrease environmental impact from logistics. These measures can in turn be linked to possible green offerings and green demands on the logistics market.

2.1 THE LOGISTICS MARKET

The transports market as a concept is described by a number of different authors. Wandel et al. (1992) present one model in which two different markets are included; the transport market and the traffic market. The model consists of three layers: material flow, transport flow and infrastructure (see Figure 2.1). This model, with its initial three layers as well as extended versions, has been successfully used to analyse many different types of transport systems as diverse as passenger, water, sewage and electricity transport systems (Skjoett-Larsen et al., 2003).

The top layer of the initial model by Wandel et al. (1992) is the material flow where products are moved between different nodes such as production, assembly and storage. The middle layer shows the transport system where there is a flow of load units (for example boxes, pallets and containers) and vehicles between the nodes in the system. The nodes in this layer can include

activities such as modal change, sorting, consolidation and deconsolidation. In between the top two layers is the transport market, which is where shippers' need for material flows and demand for logistics services meet LSPs' systems for transport flow and supply of logistics services. The transport market, or transportation market as he calls it, is described in a similar way by Sheffi (1986, p. 2), who states:

"Interactions between carriers and shippers can be considered supply and demand actions in a freight transportation 'market'. In the transportation market, carriers 'supply' and shippers 'consume' the transportation services."

The bottom layer of Figure 2.1 represents infrastructure which provides opportunities for the layers above. The traffic market appears where demand for traffic systems from the transport flow and supply from infrastructure meet.

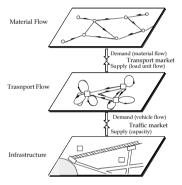


Figure 2.1 – The three layer model (Wandel et al., 1992)

The three layer model by Wandel et al. (1992) has been extended several times in order to show additional important parts of logistics systems (Stefansson, 2006). One extended model includes an additional layer of logistics concepts at the very top (Naula and Ojala, 2002). In that model, a market for advanced logistics services appears in-between the logistics concepts and the material flow.

In order to analyse logistics systems and the impact informatics has on them, another extension that includes informatics in the model was made and two layers were added; one informatics operations, and one telecommunications (Road Transport Research, 1996). Additionally, another five layer model has been developed, in which one article layer is positioned over the material flow layer and a financial layer is placed at the very top, over the article layer (Lumsden, 2006). The financial layer provides customers with resources to buy different functions, which in turn are translated into articles in the next layer. Finally, a modification of the material flow layer has been made, where it has been separated into a logistics layer and a production/value added layer,

that are linked to a logistics market, in order to facilitate analyses of the expanding 3PL industry (Skjoett-Larsen et al., 2003). A logistics market is also mentioned by Sheffi (1986), although not in relation to the layer-model, and seems to use the two terms transportation market and the logistics market interchangeably, without distinguishing between the two.

The transport(ation) or logistics market described above is central to this licentiate thesis. For some authors the transport market and the logistics market seem to be thought of as two separate markets, where the transport market provides opportunities for the (advanced) logistics (services) market. Sheffi (1986), on the other hand, appears to use the transportation and the logistic market interchangeably. However, most authors mentioned above use the term "transport(ation) market" when they describe the meeting point for the demand from the material flow layer and supply from the transport flow layer. An advanced logistics service market is presented by Naula and Ojala (2002), and is regarded as higher than the transport market in the hierarchy. Given that the description of Skjoett-Larsen et al. (2003) is correctly interpreted, they mention a similar model, where a logistics layer is linked to a production/value added layer through a logistics market. In this thesis, the material flow layer is considered to be combined with a layer for other logistics services. The link between this layer and the transport flow is the *logistics market*, which is the term that will be used throughout the thesis. The definition of the logistics market will in this thesis be: A place where shippers' demand for logistics services meets LSPs' supply of such services. Interactions between LSPs and shippers result in flow of material, vehicles moving and additional logistics related services. The difference between the logistics market compared to the transports market is that on the logistics market, supply and demand can, but does not have to, include other services than transports. The transport market, on the other hand, is limited to merely transport services.

2.1.1 THE GENERAL LOGISTICS MARKET

On the logistics market, as defined above, both transports and additional services are sold and bought. On the one side of the logistics market are the logistics service providers (LSPs) that offer a range of different services. On the other side of the market are the shippers, who have a demand for a variety of logistics services. Even though the focus of this thesis mainly is within the transport function, it is of relevance to understand what type of offerings and demands that can occur on a logistics market.

There are different types of LSPs that belong to the supply side of the logistics market. They range from companies that offer basic transport services to so-called "one stop shopping" logistics companies that offer all transport and logistics needs a shipper might want (Sheffi, 1990). Furthermore, LSPs can be divided into two different categories; those who own transportation assets and those who do not (Sheffi, 1990). The majority of LSPs on the European

logistics market have a small number of vehicles and offers a limited range of transport services (Sweeney and Envangelista, 2005).

Similarly to the supply side, the demand side of the logistics market consists of a large variety of shippers that buy logistics services. These buyers can for example be divided according to type of products, where a few examples are: agriculture products and live animals; pulp wood, round timber and wood; solid mineral fuels; petroleum products; ores and metal waste and metal products (SIKA, 2006). The characteristics of products affect how they can or should be transported, for example if they can be transported on pallets or in containers or need more specific treatment (Lumsden, 2006).

In order to know what types of services that are present on the logistics market, third-party logistics literature will be of guidance. Third-party logistics providers go beyond the offering of single functions, such as transports, and often include some managerial responsibility (Lieb and Randall, 1996). In line with this, Berglund (1997) states that in order to be a true third-party logistics provider, the logistics company must offer bundled services that contain physical flow, storage, information handling and management. Thus, the third-party logistics literature should potentially be able to mention many of the services that are a part of supply and demand on the logistics market, even though far from all LSPs supply third-party logistics.

In two recently published papers on third-party logistics, the service offering of the logistics providers is discussed. In one of them, Rajesh et al. (2011) categorise the service offering of third-party logistics providers into three different categories; functional service offerings, value-chain service offerings and strategic service offerings. Yu et al. (2010) also mention the service offering of third-party logistics providers, but do not divide the offering into any specific categories in the same way as Rajesh et al. (2011). They do, however, appear to centre on functional service offerings. Several authors have described the functional service offering of third-party logistics providers (see for example Berglund, 1997; Leahy et al., 1995; Lieb and Randall, 1996; Murphy and Poist, 2000). In this brief overview of the service offerings of LSPs, the functional service offering will be in focus, but value-chain service offerings and strategic service offerings will be briefly commented on at the end of this section.

The literature reviews of Rajesh et al. (2011) and Yu et al. (2010) will here provide the examples of functional service offerings. Even though not all of the service offerings are mentioned, the following list gives an idea of the various categories that a logistics service offering can include:

- Transportation
- Carrier selection
- Freight forwarding
- Freight consolidation
- Multimodal transportation
- Full truck load transportation
- Distribution
- Reverse logistics
- Logistics coordination
- Warehousing
- Inventory management

- Product assembly and kitting
- Customs clearing
- Packaging / Labelling
- Import / export management
- Order processing
- Vendor management
- Rate negotiation
- Marketing services
- Logistics information and IT solutions

Value-chain service can be said to go beyond specific functions and can include offerings such as improved process responsiveness, increased supply chain flexibility, reduction of logistics costs and improvement of customer service (Rajesh et al., 2011). Finally, strategic service offerings can include things such as costs, reputation, delivery performance and flexibility.

2.1.2 THE SWEDISH LOGISTICS MARKET

Within Sweden approximately 1.5 million tons of goods are transported every day (Transportgruppen, 2006) as a result of supply and demand on the logistics market. With regard to the supply side, one possible way to categorise the Swedish transport sector is into six different business types; goods transports by road, transports by sea, air, rail, public transport and taxi transports (SIKA, 2009). In total, the Swedish transport sector represent approximately 6% of Gross Domestic Product (GDP) (Transportgruppen, 2006), which can be compared to the EUlevel where the transport sector generates 10% of the total GDP for the whole European Union (Europa, 2011). For the transport sector in Sweden, goods transports by road are the most dominating out of the six different business types (SIKA, 2009). Accordingly, road is the dominating mode in Sweden and in 2003 about 60% of all goods was transported by road, whereas sea stands for about half as much (SIKA, 2005). The fact that road is the most dominating mode is mostly true for distances shorter than 300 kilometres, whereas transports by sea dominate for longer distances (SIKA, 2005). The other modes available are rail and air, and thus, the supply on the logistics market can be said to include different types of actors that offer goods transports by road, rail, sea, air or combinations of these four. In the next two paragraphs, the four general types of actors will be briefly described from a Swedish perspective.

Table 2.1 – Quantity of freight and freight transport performance per transport mode in Sweden 2003, (adapted from SIKA, 2005)

	Million Tonnes	Share	Tonne- km	Share
Road	309	60%	36 500	40%
Railway	58	11%	20 100	22%
Sea	150	29%	34 300	38%
Total	517	100%	90 900	100%

Most of the LSPs that act on the section of the logistics market that supply road transports are relatively small. More specifically, 80% of the LSPs had four or fewer employees whereas only 1% has 50 or more people employed (SIKA, 2009). As Table 2.2 shows, most vehicles are owned by haulers and relatively few are owned by logistics companies and trucking companies. This is explained by the fact that haulers are connected to logistics companies as well as trucking companies and perform a large portion of their actual transports. As many as 97% of the logistics companies are affiliates to larger international companies (SIKA, 2009).

Table 2.2 – Statistics for Swedish LSPs with regard to road transports (SIKA, 2009)

Type of LSP	No. Of employees	Turnover (MSEK)	No. Of trucks
Haulers	52 202	64 684	41 779
Trucking companies	1 508	16 618	169
Logistics companies	8 886	27 870	998
Total	62 596	109 172	42 946

The Swedish sea transport business is the most concentrated out of the four different modes, meaning that a few large actors dominate the business. Also for air and rail a few large companies represent most of the transport within those specific modes.

2.1.3 RELATIONSHIPS ON THE LOGISTICS MARKET

Companies that interact, for example LSPs and shippers, inevitably have relations of some sort. These relations can be of different types and include various degrees of commitment between the interacting companies. Webster (1992) presents seven different types of partnerships between companies in general, ranging from a low level of commitment to a very high level. Figure 2.2 illustrates these partnerships and the more to the right in the figure the relationship is located, the less market control and the more administrative and bureaucratic control there is. Pure transactions and repeated transactions are both strongly affected by market control. This is also true for the increased collaboration that occurs during long-term relationships, whereas buyer-seller partnerships involve total dependence between the two actors and this is subject to some

market pressures. A strategic alliance means that two collaborating actors form a new common entity, such as a product development team or a research project, which serves strategic purposes for both actors. Network organisations are a result of multiple relationships, partnerships and strategic alliances.

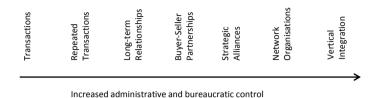


Figure 2.2 – The partnership continuum (Webster, 1992)

Just like companies in general, shippers that are in need of logistics services can have different types of business arrangements in mind when they contact LSPs (Tarkowski et al., 1995). Categorisations of logistics relationships can have similarities with the general partnership groups shown above, and range from traditional transactions to acquisitions of vendors (La Londe and Cooper, 1989). Another example of a logistical business classification, presented by Bowersox et al. (2010), is shown in Figure 2.3. The degree of acknowledged dependency and of information sharing increases as relationships move further to the right according to the classification. As the figure shows, the most basic types of relationship in a supply chain are those of contract and outsource. For both of these types of collaboration, there is a time limit on the contracts and price, service and performance expectations are predetermined. An important difference between the two is according to Bowersox et al. that contracting involves the buying and selling of products, whereas outsourcing involves buying and selling of services. In administrative relationships, a dominant company takes the lead and seeks collaboration with partners. These relationships are characterised by the sharing of both operative and some strategic information as well as for the fact that no time-limit is set for the collaboration. Alliances, or in its extreme form enterprise extensions, are true collaborative relationships according to Bowersox et al. (2010). In these relationships, the partners have common policies and integrate resources and operations in order to increase efficiency. The partnerships are often meant to last for a long time. In enterprise extension relationships the partners can basically be viewed as one single entity.



Increased acknowledged dependency and information sharing

Figure 2.3 - Supply chain relationship classification (adapted from Bowersox et al., 2010)

With regard to relationship classification that are adapted to a logistics context, the one by Bowersox et al. (2010) appears to be valid for general supply chain relationships, whereas one by KPMG (2000) is more specifically valid for LSP-shipper relationships. This latter classification includes three different types of logistical partnerships: purchasing of transport services, outsourcing and third party logistics. The first of the three constitutes the most basic relationship between a buyer and a seller and merely involves the purchase of transport services. Contracts are rare in this type of transaction and there is a low level of trust. Typically, the shipper is interested in the lowest cost in this type of relationship. Outsourcing, on the other hand, means that a shipper outsources a few logistics activities to an LSP. The contracts typically have a duration period of one year. The highest level of partnership in KPMG's categorisation is third party logistics, where shippers outsource a large number of logistics operations. The duration periods of the contracts are longer than for the outsourcing relationship and there is a high level of trust between the partners. If cost was an important parameter in pure purchasing of transports, the third-party logistics relationship is characterised by joint optimisations of a large number of operational activities. Figure 2.4 illustrates the three types of logistical partnerships.

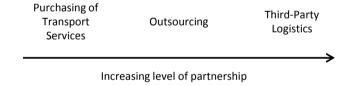


Figure 2.4 - Classification of LSPs-shipper relationships (adapted from KPMG, 2000)

Based on the categorisations of relationships presented above, it seems evident that there are various ways to categorise relationships both in general and in a logistical setting. The categorisation of Bowersox et al. (2010) has large similarities with the one by Webster (1992), and both range from simple transactions to enterprise extensions. Even though the relationships presented by Bowersox et al. (2010) are in a logistics, or more specifically a supply chain, context, it is unclear whether LSPs are included in the categorisation or if it is merely thought of as a shipper-relationship categorisation. The KPMG-categorisation (2000), that has been explicitly developed for LSPs, does not go as far as alliances and enterprise extensions as

Bowersox et al. (2010) do, but instead, recognises third-party logistics as the most integrated relationship between shippers and LSPs.

On a general note, there appears to be some relationships characteristics that change the more integrated the relationship is between two companies. For example, it is suggested that in order to be to the right in the figures above, it is likely that the relationship has lasted for some time (Selviaridis and Spring, 2007). Moreover, the length of contracts increases the more integrated a relationship is and trust appears become increasingly important in more integrated relationships (KPMG, 2000). As relationships develop, the involved companies generally go from a stage of not knowing much about the other actor to stages of adaption to each other as well as increased mutual learning (Ford et al., 1998).

2.1.4 LOGISTICS AS SERVICES

Services are often seen to be different from products, with other characteristics (see for example Levitt, 1972; Shostack, 1977; Zeithaml et al., 1985). Even though recent literature has debated whether or not it is important to separate services from products (see for example Gadrey, 2000; Vargo and Lusch, 2004; 2008), logistics and transports are generally considered mainly as services, as opposed to products (Andersson and Norrman, 2002). One example of this is that the transport industry is categorised as part of the service sector and stands for approximately 13% of total "service production" in Sweden (Ekonomifakta, 2011a). Services are considered to be different from products because of four main characteristics (Zeithaml et al., 1985):

- *Intangibility:* Services cannot be seen, felt, tasted or touched in the same way as products can be.
- Heterogeneity: High variety in the performance of services.
- Inseparability: Production and consumption of services are simultaneous.
- *Perishability:* It is not possible to store services.

The *intangible* characteristic is the most widely cited difference between products and services (Lovelock and Gummesson, 2004). One of the authors that give a lot of attention to this difference is Shostack (1977), who suggests ideas for how to market intangible services as opposed to tangible goods, because of the lack of guidelines for the marketing of services:

"...marketing offers no guidance, terminology, or practical rules that are clearly relevant to services." (Shostack, 1977, p. 73)

Shostack's (1977) thoughts will serve as an example for why and how services should be treated differently to products. Shostack discusses *image* and *evidence* in the marketing of products and services (see Figure 2.5). Image is explained as "a method of differentiating and representing an entity to its target market" (p. 77) and abstract images are often linked to physical items.

Services, on the other hand, are already abstract and therefore need to be linked to more tangible evidence so that a customer understands the service better. Thus, tangible evidence of products is generally the product itself, and therefore marketers should be focused on abstract associations to the product in order to create a desirable image. Services, on the other hand, are abstract themselves and should therefore be marketed with the help of tangible clues in order for them to become more "real".

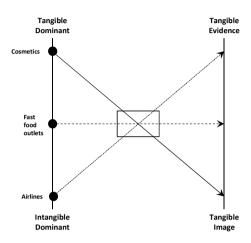


Figure 2.5 – The tangible v/s intangible framework (Shostack, 1977)

Shostack's (1977) reasoning could also be of interest to the logistics market, where different green categories are offered and demanded by LSPs and shippers. By definition, logistics service providers provide *services*, but there may be aspects of their green service offering that are more "tangible dominant" than others.

The fact that services are seen as different from products has implications for the selling company, as well as for buyers of the services. Even for products it may be difficult to know if the customer gets what it has paid for, at least if the offering includes factors such as the tangible images that Shostack (1977) describes. When services are sold and bought, the problem is potentially greater, since it is more difficult for companies to define what they offer, and similarly it is more problematic for customers to define exactly what they demand. Closely related to characteristics of services therefore, is the concept of service quality and gap models. Parasuraman et al. (1985) belong to those who note differences between products and services and they state that *service quality* is more difficult for consumers to understand than *product quality*. Relating back to the logistics market, Wandel et al. (1992) suggest that service quality is one way to measure effectiveness and efficiency on the logistics market. Moreover, Hopkins et al. (1993) state that:

"The importance of service quality in any service industry cannot be disputed." (p.145)

Parasuraman et al. (1985) develop a conceptual service quality model that contrasts the views of suppliers and customers. As Figure 2.6 shows, there are possible gaps both internally, as well as externally when expectations and perceptions are compared between the two types of actors. The most central service gap is gap number five, which shows the difference between consumers' expectations and perceptions of services (Large and König, 2009; Skålén and Fougère, 2007). The service quality model from 1985 was enriched in 1988 by a service quality measurement scale called SERVQUAL, which included five different dimensions; tangibles, reliability, responsiveness, assurance and empathy (Parasuraman et al., 1988). The work of Parasuraman et al. (1985; 1988) has been the most widely used measurement tool for service quality (Mukherjee and Nath, 2005) and is seen as a tool that can be used in order to understand customer demands and desires (Skålén and Fougère, 2007).

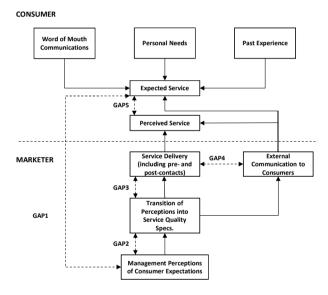


Figure 2.6 – Service Quality Model (Parasuraman et al., 1985)

Gap models, both directly adapted from the model by Parasuraman et al. (1985; 1988) (see for example Hopkins et al., 1993; Large and König, 2009), and also more novel approaches (see for example Giannakis, 2007; Kumar and Kumar, 2004), have been widely used to study service quality. In the service industry of logistics, several researchers have developed and applied gap models for different purposes. For example, Seth et al. (2006) developed an extensive gap model with the aim to measure service quality in different interfaces of supply chains, with a focus on

LSPs. Moreover, Giannakis (2007) developed a gap model that focuses on performance measurements of supplier relationships, while Forslund (2006) used a gap model in order to study logistics performance gaps in the dyadic order fulfilment process. Hopkins et al. (1993) studied the interface between LSPs and shippers and found, amongst other things, that shipper expectations of service quality are not met.

According to Kumar and Kumar (2004), successful service providers are those who manage to have a non-existent gap between required services and delivered services. Positive gaps suggest that the service level is too high, resulting in "service overkill" (Lings and Brooks, 1998), which can imply a waste of resources that could be better spent on something else (Large and König, 2009). Negative gaps on the other hand, are more common and indicate that customer demands are not met (Lings and Brooks, 1998). With regard to the logistics market, several mismatches have been noted for example between supply and demand in the third-party logistics industry (Murphy and Poist, 2000). Thus, service quality is a matter of importance for LSPs that act on the logistics market and neither a positive nor a negative gap is recommended.

2.2 ASPECTS OF GREEN LOGISTICS SUPPLY AND DEMAND

The logistics market is not well researched with regard to the environmental perspective, and details about green offerings and demands are difficult to find. However, general logistics literature provides information about measures that can be taken in order to lower the environmental impact from transports and logistics. Many of these measures can in turn, be said to be relevant for the logistics market in the shape of green offerings and demands and they are therefore discussed below. One framework that includes many of the measures discussed in green logistics literature is that by McKinnon (2010b).

The framework, which is shown in Figure 2.7, illustrates the relationship between the weight of goods produced or consumed and CO_2 emissions from road freight transport operations. As the upper right box in Figure 2.7 indicates, the framework can be adjusted to other modes as well. Seven key parameters, marked with light grey in the figure, can be related to measures that can be taken in order to lower environmental impact from transports. Most of them can also be transformed to be included in green offerings or green demands on the logistics market.

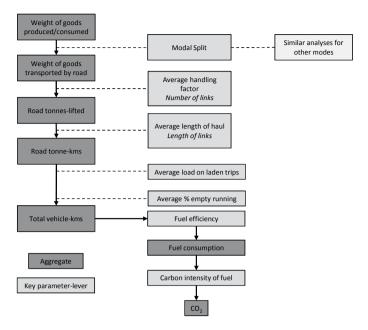


Figure 2.7 – Relationship between weight of goods produced/consumed and CO₂ emissions from road freight (McKinnon, 2010b)

Wu and Dunn (1995) developed a framework that shows which logistics decisions made by a company impact the environment. They state that there are six different steps in a company's logistics decision making where environmental concern can be included in the decisions, see Figure 2.8. The framework is from a shipper perspective and not all six steps are relevant in the interaction with LSPs. The two steps most related to the logistics market are inbound logistics and outbound logistics. For these, several measures that are said to lower environmental impact are suggested and most of them are relevant for the logistics market where LSPs and shippers interact. In comparison to the framework by McKinnon (2010b), which focuses on CO₂ emissions, Wu and Dunn (1995) discuss environmental impact in a broad sense.

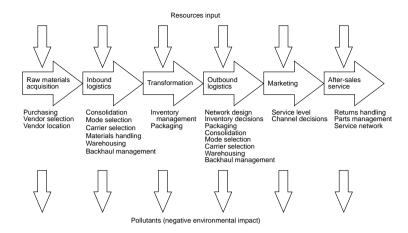


Figure 2.8 - Logistics decisions that affect the environment (Wu and Dunn, 1995)

As can be seen from the two frameworks, both Wu and Dunn (1995) and McKinnon (2008) suggest a wide variety of measures that can be taken in order to lower the environmental impact from transports and logistics. The key parameters in McKinnon's (2010b) framework can be grouped into five main categories; modal split, logistics system design, vehicle utilisation, energy efficiency and carbon intensity of fuel. Most of the measures for inbound and outbound logistics in the framework of Wu and Dunn (1995) also fit into these categories. See Table 2.3 for further details. As noted by Aronsson and Huge-Brodin (2006), many measures that can be taken in order to lower environmental impact from logistics are interrelated and therefore influence each other. Hence, the five categories should be seen as one way to group green logistics measures and not as an absolute truth. The five categories will be presented in further detail below. One of the measures suggested by Wu and Dunn (1995) that does not fit into the five categories is warehousing. This measure and a few others will be described in "Additional Factors", which is the final section of this chapter.

Table 2.3 - Categories and corresponding green measures

Category	McKinnon (2010)	Wu and Dunn (1995)
Modal Split	Modal Split	Mode selection
Design of Logistics System	Average handling factor Network design	
	Average length of haul	
Vehicle Utilisation	Average load on laden trips	Consolidation
	Average % empty running	Backhaul management
Energy Efficiency	Fuel efficiency	Carrier selection
Carbon Intensity of Fuel	Carbon intensity of fuel	

2.2.1 MODAL SPLIT

Modal split refers to the proportion of freight carried by different transport modes (McKinnon, 2008). It is well recognised that the choice of transport mode affects environmental impact and is a parameter that if changed, can lead to decreased environmental impact (Aronsson and Huge-Brodin, 2006; McKinnon, 2003; 2008; Ribeiro et al., 2007; Wu and Dunn, 1995). More specifically, carbon intensity, which is measured as CO₂ per tonne-km, is relatively high for road and air operations, whereas for rail and water-borne services carbon intensity is lower. As indicated by Table 2.4, there are no unanimous estimations of the carbon intensity (McKinnon, 2008). The table does, however, give an indication of the difference in carbon intensity among the different modes of transport. Despite the fact that the carbon intensity of air and road modes is relatively high, their share of freight movement has increased in recent years, while rail and water-borne freight's share has decreased (Ribeiro et al., 2007). Today, most goods within the EU are transported by road (44%), closely followed by short-sea shipping (39%) (Europa, 2011). Rail accounts for 10% and inland waterways for 3% of the goods flows.

Table 2.4 - Carbon intensity for different modes (Adapted from McKinnon, 2008)

Mode	g CO2/ton-km
Air (Short haul)	1 420-1 925
Air (Medium haul)	673-867
Air (Long haul)	570-633
Inland waterway	10-40
Sea (Short sea)	13-35
Sea (Ocean ship)	10-15
Road (>35 t)	51-100
Rail (Diesel)	17-69
Rail (Electric)	19-40

At the same time as there is pressure on companies to lower environmental impact, there are more practical aspects of the different modes that companies must take into account. Table 2.5 presents different characteristics that relate to financial and service issues. One of the characteristics mentioned in the table is speed, and it is well recognised that there often are requirements for fast deliveries within specific time frames. In such cases, transports by road and air have an advantage due to their speed (Kohn, 2008; McKinnon, 2008; Ribeiro et al., 2007). Ohnell and Woxenius (2003) explain it in the following way:

"Rail has not yet successfully offered services 'faster than road but cheaper than air'." (Ohnell and Woxenius, 2003, p. 735)

Table 2.5 - Characteristics of different transport modes (Kohn and Huge-Brodin, 2008)

Financial characteristics	Road	Rail	Water	Air
Cost level	Moderate	Low	Low	High
Balance fixed/variable costs	High level of variable costs; low level of fixed costs	High portion of fixed costs	High level of variable costs; low level of fixed costs (inland, USA)	High variable costs, low fixed costs
Market coverage	Point to point	Terminal to terminal	Terminal to terminal	Terminal to terminal
Predominant traffic/goods	All types	Low-mod value; mod-high density	Low value; high density, large load sizes	High value; low-mod density; small shipments
Length of haul	Short to long	Medium to long	Medium to long	Medium to long
Service characteristics				
Speed (time in transit)	Moderate	Slow	Slow	Fast (major advantage)
Availability	High (distinct advantage)	Moderate	Low	Moderate
Delivery accuracy (on time delivery)	High	Moderate	Low	High
Loss and damage	Low	Moderate-high	Low-moderate	Low
Flexibility (adjustment to shipper's needs)	High	Moderate	Low	Low-moderate

Instead of a complete switch from one mode to another, there is also the possibility of using intermodal transports, in which different modes of transports are combined (Lammgård, 2007). In a solution where for example both road and rail are used, the strengths of both modes can be utilised. Intermodal transports can, if managed in an appropriate manner, contribute to decreased environmental impact (Rondinelli and Berry, 2000).

2.2.2 DESIGN OF LOGISTICS SYSTEM

In design of the logistics system, the average handling factor and the average length of haul are of relevance (McKinnon, 2008). The average handling factor is determined by the average weight of goods that are handled as the goods pass though the supply chain, and is in other words a result of the number of links in a supply chain. The average length of haul is determined by the mean length of each link in the supply chain, and combined with the average handling factor these two factors result in average of tonne-kilometres. Thus, a change in supply chain structure can have a positive effect on environmental impact from transports, measured in tonne-kilometres, and is something that is noted by several other authors. Wu and Dunn (1995) state that traditionally, design of logistics systems has not considered environmental issues such as environmental costs and benefits, and they emphasise the importance of decisions including these types of issues. Furthermore, Aronsson and Huge-Brodin (2006) note that changes in the design of the logistics system, more specifically a change towards centralisation, can have positive effects on environmental impact. This finding contradicts earlier beliefs that

centralisation inevitably results in a higher environmental impact than decentralised logistics systems (see e.g. McKinnon, 2003). This matter is further studied by Kohn and Huge-Brodin (2008), who conclude that centralisation can in fact be beneficial from an environmental perspective, since it reduces the need for emergency deliveries and enables the consolidation of goods and switch of transport mode.

2.2.3 VEHICLE UTILISATION

The average load on laden trips, which is the weight or volumes transported, and the average proportion of kilometres run empty are two factors that are related to vehicle utilisation (McKinnon, 2008). These are directly influenced by the success of transport planning, in which vehicle routes, vehicles and the utilisation of vehicles can be decided upon. The routing decision for a given set of origins and destinations can differ, and that means that average length of haul is affected and thus also CO₂ emissions.

With regard to vehicle utilisation, freight consolidation is noted by several authors as an approach that can be used in order to lower environmental impact. This is due to the fact that it enables a reduction of trips necessary, and vehicle efficiency is thus increased (McIntyre et al., 1998; McKinnon, 2003; Wu and Dunn, 1995). This also means that costs are lowered, since the same transport overhead is shared by fewer vehicles (Wu and Dunn, 1995). Another factor that influences vehicle utilisation is the problem of backhaul, which is when a truck needs to go back empty after delivery (McKinnon, 2008; Wu and Dunn, 1995). In Sweden, approximately 25% of truck-kilometres are run empty (McKinnon, 2010b; SIKA, 2005), and even though a lower percentage would be beneficial for the environment, the issue of backhaul aggravates the efforts made to decrease this (McKinnon, 2010b).

2.2.4 ENERGY EFFICIENCY

Increased fuel efficiency, defined as distance travelled in relation to energy consumed, is another measure that can lead to decreased environmental impact (McKinnon, 2008; Wu and Dunn, 1995). Fuel efficiency is dependent on vehicle characteristics, driving behaviour and traffic conditions. With regard to the first of these factors, vehicle characteristics can be changed through vehicle design (EEA, 2007; McKinnon, 2008). This can be accomplished through engine and exhaust systems, which are expected to account for two thirds of energy efficiency gains for trucks (McKinnon et al., 2010), aerodynamic profiling, reduction in vehicle tare weight and improved tyre performance (McKinnon, 2008) and a raise of legal limits on vehicle weights and sizes (McKinnon, 2003). Results from a survey study in 2005 showed that technology was an important factor when shippers investigated LSPs environmental work (Björklund, 2005). The importance of technological solutions, however, is soft-pedalled by Aronsson and Huge-Brodin

(2006), who state that more energy efficient technology has so far proven to be insufficient to decrease environmental impact from transports.

As mentioned above, fuel efficiency can also be affected by driving behaviour. In fact, for a given vehicle fleet, driving behaviour is the single most important influence on this parameter (McKinnon, 2010d; McKinnon, 2008). The last factor that affects fuel efficiency is traffic conditions. Fuel efficiency for example is significantly higher at 70 kilometres per hour for certain trucks than for the same trucks at 20 kilometres per hour. (McKinnon, 2008)

2.2.5 CARBON INTENSITY OF FUEL

The final key parameter illustrated in the framework by McKinnon (2008) is the carbon intensity of fuel which can be either the amount of CO_2 emissions per unit of energy consumed directly by the vehicle or indirectly at the primary source of energy for electrically-powered vehicles. Wu and Dunn (1995) mention the possibility of changing to alternative fuels that cause less pollution. Moreover, McKinnon (2008) discusses bio fuels as a potential alternative to fossil fuels, but recognises that there are uncertainties about whether bio fuels are in fact a more environmentally sound option.

2.2.6 CO2 MEASUREMENTS

The last box, at the bottom of McKinnon's (2008) framework, shows CO₂ emissions which are affected by all parameters discussed above. The relationship between the different parameters is not an easy one, and problems arise when actual CO₂ emissions are to be measured. CO₂ emissions are commonly mentioned when the measurement of environmental performance of logistics is discussed (see for example Aronsson and Huge-Brodin, 2006; McKinnon and Piecyk, 2009; Wolf and Seuring, 2010; Wu and Dunn, 1995), but there are numerous other examples of measurements on a more general environmental logistics level. These can be directly related to transports, such as fuel consumption (Hervani et al., 2005), air pollution and noise costs (Bickel et al., 2006), or related to a higher level of green of supply chains, ranging from revenues from green products (Hervani et al., 2005), aspects of water use (Azzone and Noci, 1998; Hervani et al., 2005) to the percentage of total energy use from renewable energy sources (Veleva et al., 2003). However, today CO₂ emissions are the one indicator that is given the most attention (Wolf and Seuring, 2010) and yet there is no standard as to how it should be measured. For instance, McKinnon and Piecyk (2009) note that there are there are differing measurement systems for CO₂ emissions in the UK and this results in a lack of credibility for the calculations. Moreover, Wolf and Seuring (2010) give an example where the measurement of CO₂ emissions in a business relation between an LSP and a shipper becomes so complex that costs increase while none of the actors are willing to pay for these costs.

2.2.7 ADDITIONAL FACTORS

In addition to the previously presented measures which all are directly related to transport activities, there are other green factors that can be of importance in the logistics market, even though these are not directly related to transport. As noted by Wu and Dunn (1995), warehouses belong to one such factor. Warehouses generate large amounts of packaging waste in supply chains, and environmentally sound operations in a warehouse can decrease both waste and transport movements.

Additionally, Björklund (2005) found that environmental management systems play an important role for shippers when they purchase transport services from LSPs. The most common environmental management system is ISO 14 001 (Nawrocka et al., 2009), but EMAS is another system that is well recognised (Starkey, 1998). One reason for the importance of environmental management systems in the purchase of transport services could be that companies that are certified according to ISO 14001 for example may be associated with lower environmental risk as opposed to non-certified companies (Sarkis, 2003). Similarly, Rondinelly and Berry (2000) state that LSPs that fail to comply with international standards, such as ISO 14001 or EMAS, risk a loss of competitive advantage and the authors thereby imply that shippers require compliance in order to buy transport services. Nawrocka et al. (2009) suggest that an environmental management system plays a role as a facilitator of environmental work between a customer and a supplier because it creates confidence and brings the companies closer together.

3 FURTHER DEVELOPMENT OF THE RESEARCH QUESTIONS

In this chapter, the three research questions developed in Chapter 1 are further elaborated on and sub-questions that will help to answer them are developed.

3.1.1 RESEARCH QUESTION ONE: DESRIBING GREEN CATEGORIES ON THE LOGISTICS MARKET

The transport or logistics market is often discussed in logistics literature, even though more often implicitly than explicitly. Amongst those that explicitly deal with the logistics market are Wandel (1992) and Sheffi (1986) who both define it as shippers on one side, having demands for transport and logistics services, and logistics service providers (LSPs) on the other side, supplying shippers with such services. Details of logistics service offerings have been thoroughly described in literature (see for example Berglund, 1997; Rajesh et al., 2011; Yu et al., 2010). None of these, however, explicitly mention environmental aspects of the logistics service offering. In fact, studies on exactly what a "green offering" of logistics service providers include are rare, if not to say non-existent. The same is true for "green demands" from shippers. It is unclear which so-called *green categories* LSPs offer, and which *green categories* shippers desire. As briefly described in Chapter 1, the first research objective of this thesis is therefore to understand:

RQ1. Which green categories could be taken into account in the logistics market?

As mentioned above, research about green supply and green demand on the logistics market is rare, and in those examples that do exist they are implicitly discussed. Is it perhaps possible to understand more about green categories by putting the market perspective aside, and focus on studies that take either the supply or the demand perspective? Moreover, is it possible that general green logistics literature also offers insight into green categories that can be a part of green supply or demand? These questions lead to the first sub-question, which is:

- Which green categories can be found in the literature? Of these, which are mentioned in literature with the perspective of:
 - The logistics market?
 - Logistics Service Providers?
 - *Shippers?*
 - *General green logistics?*

In order to answer Research Question 1 and obtain an overall picture of green categories on the logistics market, the literature might not give all the answers. More specifically, given that literature reviews provide a number of suggestions for green categories, it is interesting to learn if the same categories are relevant in companies' reality. Is the literature for example up to date

with regard to green categories that are found important on the logistics market or are some categories perhaps relevant for companies but not mentioned in literature? Moreover, are the green categories found in literature relevant for companies as well? In order to obtain answers to these questions, it is necessary to investigate companies' use of green categories. From a logistics market perspective, LSPs can offer various green categories, while shippers can include these, or other, green categories in their demands. The next sub-question is:

 Which green categories are mentioned by companies when green supply and demand is discussed?

When the above questions are answered, the last step is to summarise green categories mentioned in literature and the ones mentioned by companies. Even though the goal of Research Question 1 is to gain an overall picture of green categories present on the logistics market, it is interesting to learn if there are any similarities or differences between these two different views. As mentioned above, one question of interest is whether the literature is up to date with regard to green categories. If it is not, which other green categories are in that case mentioned by companies? Or is it perhaps the other way around, meaning that literature is more up to date than companies on the logistics market? The comparison also aims to understand if green categories found in the literature are relevant on the actual logistics market.

3.1.2 RESEARCH QUESTION TWO: DESCRIBING MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

Even though green supply and demand on the logistics market is only discussed to a limited extent in previous research, some studies do touch upon this subject. Lieb and Lieb (2010) have asked CEOs of American LSPs about their sustainability work, what they offer to shippers and what they perceive that the shippers want. The paper is mostly a presentation of a survey and the authors do not analyse the results to a large extent, although there are several interesting findings. For example, their survey results appear to indicate that the sustainable offerings from the LSPs contain considerably more than what the shippers actually ask for. A similar result was found in a case study by Wolf and Seuring (2010), who, even though they do not go into detail about the green offering or green demand, find that LSPs seem to be ahead of their customers with regard to environmental issues.

One difference between the studies of Lieb and Lieb (2010) and Wolf and Seuring (2010) is that Lieb and Lieb have studied the supply side of the logistics market, while Wolf and Seuring have studied both the supply and the demand side. However, the unit of analysis in Wolf and Seuring's paper is still the focal company, meaning that they study supply and demand separately and not as a logistics market. It has been noted that there is a lack of measuring across the supply chain in general (see for example Fabbe-Costes and Jahre, 2008) as well as within the

more specific field of environmental measuring, and expanding the scope so that it measures outside company borders is promoted by several authors (Hervani et al., 2005; Markley and Davis, 2007; Veleva et al., 2003; Wolf and Seuring, 2010).

Thus, there is a lack of detailed comparison between LSPs and shipper with regard to their environmental work and there appears to be a need to widen the scope of research outside focal company borders. The second research objective is therefore to find an answer to:

RQ2. To what extent are the green categories taken into account by LSPs and shippers respectively?

By taking a logistics market perspective, both green supply and green demand are taken into account and the focus of a focal company decreases. Moreover, in order for the results to give indications to how green categories are taken into account in the logistics market, it is of interest to compare the supply and demand side with each other. More specifically, a study of how well the green supply and green demand matches is of importance. One question that potentially can be answered by this perspective is if LSPs actually are ahead of their customers in terms of environmental issues, as Wolf and Seuring (2010) suggest. Moreover, this relates to the industry concern that has to do with who it is that should drive the environmental development when transports are considered (Nilsson, 2011). The development of the 3PL industry, for example, was driven by both the supply and the demand side of the logistics market (Berglund, 1997). Is the situation the same with regard to the new environmental challenges for the LSP industry?

There are various alternatives with regard to how to investigate to what extent green categories are taken into account in the logistics market. One way to study this is to take a market perspective and thereby study many companies on both the supply and the demand side. This is a way to get a general view of the logistics market, and to see which patterns emerge when many companies are taken into account. Therefore, the first sub-question for Research Question 2 is:

- What matches and mismatches appear when a market perspective is taken?

In order to better understand if there in fact are green mismatches on the logistics market as suggested by Wolf and Seuring (2010), the balance between matches and mismatches is important. Wolf and Seuring's results might be strengthened if there are a majority of mismatches for the studied green categories, while the opposite is true for a result that suggests a majority of matches. There is thus a need to learn:

- Are there both matches and mismatches in the market perspective and what is the balance between them?

Given that mismatches are found, it is of interest to know if LSPs or shippers represent the "greenest" side of the logistics market. If the mismatch is positive, then LSPs include more in

their offerings than what shippers demand, in accordance with the terminology of Lings and Brooks (1998). On the other hand, the opposite would suggest that shippers' demands are not fulfilled. Thus, an additional question is:

- Are the mismatches that are found in the market perspective positive or negative mismatches?

Additional views of the logistics market have the potential to either confirm or contradict results from the previous sub-question. One such approach would be to study specific buyer-supplier relationships on the logistics market. Is it possible that such relationships have similarities with the view that was given by many different companies in the market perspective above? Do the same matches and mismatches appear in specific relationships as in a market perspective? Is the same type of actor (LSP or shipper) ahead in the environmental work? Another question of interest is if the matches and mismatches in different relationships are similar to each other or if they differ to a large extent. These inquiries lead to the next sub-question:

What matches and mismatches appear when a relationship perspective is taken?

In order to be able to compare results from the two different perspectives, the same two questions that needed an answer for the market perspective also need an answer for the specific relationships. Thus, the following two questions are relevant once more:

- Are there both matches and mismatches in the relationship perspective and what is the balance between them?
- Are the mismatches that are found in the in the relationship perspective positive or negative mismatches?

Finally, these two perspectives of green matches and mismatches on the logistics market need to be compared in order to see if the views are alike or differ. A comparison of matches and mismatches for the green categories makes it possible to learn if the two different perspectives give corresponding views with regard to the balance of matches and mismatches as well as to positive or negative mismatches.

3.1.3 RESEARCH QUESTION THREE: EXPLORING MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

The results from Research Question 2 either reveal matches or mismatches between green supply and demand on the logistics market. Preferably, however, there should not be a mismatch between supply and demand (Kumar and Kumar, 2004). If service providers offer more than what customers want, a positive mismatch occurs, while demands that include more than the service offerings result in a negative mismatch (Lings and Brooks, 1998). The best case scenario would therefore be that only matches are found so that LSPs offer just enough to satisfy

shippers' demands and that shippers do not have more demands than those that can be satisfied by the LSPs. It does, however, seem unlikely that merely matches are found. For example, the results of Wolf and Seuring (2010) indicated mismatches with regard to environmental aspects of the logistics market and Murphy and Poist (2000) found similar results with regard to supply and demand for third-party logistics.

Given that not merely matches are found as a result of Research Question 2, the question "why?" is of interest. What are the reasons for positive or negative mismatches when none of these two are considered to be desirable? A better understanding of this situation could help LSPs to improve their offerings and as a result avoid a waste of resources on things the shippers do not want (see Large and König, 2009). Similarly, an explanation for the matches and mismatches would possibly offer guidance for shippers with regard to how they should develop their demands in order to decrease the mismatches. The third research question is therefore to explore:

RQ3. Why are there matches and mismatches on the logistics market with regard to green categories?

Specific buyer-supplier relationships on the logistics market can potentially offer a variety of possible explanation candidates as to why the green matches and mismatches appear. One way to better understand these matches and mismatches could be to study characteristics of the green categories. Given that a mix of matches and mismatches are found for different green categories as a result of Research Question 2, is it for example possible that different green categories represented by a match have things in common? Similarly, do the green categories represented by mismatches have any characteristics in common? The next question of interest is therefore:

- Which characteristics of green categories appear to influence the matches and mismatches in specific buyer-supplier relationships on the logistics market?

One possible way to categorise products and services is offered by Shostack (1977), who has developed a framework that takes tangibility into account. The framework was shown in Chapter 2.1.4 and gives the possibility to place products and services on a scale between tangible dominant and intangible dominant. Is it for example possible that tangible dominant green categories are represented by fewer mismatches? In order to find an answer, it is necessary to classify the green categories according to estimated tangibility. The most important aspect of such a classification is not the absolute position along the tangibility line; instead, it is the green categories' relative position in relation to each other that is important.

The possibly tangible dominant aspects of green logistics services should preferably be associated with abstract associations, while intangible dominant services should be marketed with the help of tangible clues. It would therefore also be interesting to learn if there are any indications of these abstract associations and tangible clues for green categories.

In addition to characteristics of the green categories, there are several characteristics of business relationships that potentially could have an effect on the occurrence of and type of matches and mismatches. For example, does the type of relationship give any clues to why matches and mismatches appear? Are there perhaps more matches in third-party logistics relationships than in pure purchases of transport services (see for example Bowersox et al., 2010; KPMG, 2000)? Does the length of an LSP-shipper relationship influence the extent to which green categories are taken into account (see Selviaridis and Spring, 2007)? In a new relationship, there might not yet have been time for environmental concern to be given, since there could be more urgent problems to solve. In order to understand more about the potential role of relationship characteristics and if they have an effect on green matches and mismatches, one question of interest is:

- Which types of relationships appear to influence the green matches and mismatches in specific relationships on the logistics market?

With regard to different types of relationships on the logistics market, Bowersox et al. (2010) and KPMG (2000) offer two different types of classifications. A comparison between these classifications indicates that there are similarities between the most basic types of relationships in the supply chain context (Bowersox et al., 2010) and the three types of LSP-shipper relationships presented by KPMG. Even though Bowersox et al. state that the contract relationship deals with products and not services, in an LSP-shipper context this could be equal to the first step of the KPMG-classification. Moreover, outsource or outsourcing can be considered to be the same in the two classifications, which in this case means that they involve the outsourcing of a few logistics activities and that there is a time limit on the contracts and price, service and performance expectations are predetermined. Third-party logistics, as described by KPMG, appears to be similar to the administered relationships that Bowersox et al. describe. These relationships do not have any time limits set for their collaboration. Thus, the classification of Bowersox et al. (2010) appears to be valid for LSP-shipper relationships and not only the more general supply chain relationships that are described by the authors. A relationship continuum that combines the ideas of Bowersox et al. and KPMG is shown in Figure 3.1.



Figure 3.1 - The LSP-shipper relationship continuum (adapted from Bowersox et al., 2010; KPMG, 2000)

In order to know which type each specific relationship is, there is a need to understand which relationship characteristics that decide the type of relationship. Even though the most important aspect of a classification perhaps not is the absolute position on the continuum, the relationships' positions in relation to each other are of interest.

There are a number of relationship characteristics that help to determine where on the relationship continuum a business relationship can be placed. For example, the further to the right on the continuum, the more logistics activities are outsourced to the LSP (KPMG, 2000). Moreover, the further to the right, the more likely it is that the relationship has lasted for a long period of time (Selviaridis and Spring, 2007). Generally, the length of contracts also increases the further to the right on the relationship continuum a relationship is (KPMG, 2000). Finally, it is suggested that trust becomes more and more important the further to the right on the continuum a relationship is (KPMG, 2000).

4 RESEARCH APPROACH

This chapter aims to describe how the research in this licentiate thesis has been conducted. Starting with the three research questions, an overview of the research design and the applied methods will be presented. After that, the unit of analysis is discussed, followed by an explanation of the four different methods used; literature reviews, homepage scans, a survey and case studies. These explanations include a presentation of how the analysis for each method has been conducted as well as research-quality considerations. Next, the analysis of the logistics market is described which means that the analysis of the three research questions is presented. Research quality of the licentiate thesis as a whole is then discussed and the chapter ends with an explanation of the researcher's path from the start of the PhD process up till now.

4.1 RESEARCH DESIGN

For a researcher it is important to choose appropriate methods for his or her studies. One thing that has an influence on which type of data collection method that is suitable is the type of research that is to be conducted, meaning for example if it is exploratory or explanatory research (Yin, 2009). The research of this licentiate thesis is exploratory to its nature. The reason for this is, as previously described and as indicated by Chapter 1, that not much is known about green supply and demand in the logistics market. Arbnor and Bjerke (1997) for example write that in many business areas, the knowledge amongst researchers is limited and exploratory studies must be undertaken before hypothesis can be formulated. This appears to be the case for the environmental perspective of the logistics market and there is a need for research that aims to get an understanding of the current situation. Moreover, because of the exploratory nature of the research conducted for this thesis, the research approach have to a large extent been abductive (Kovács and Spens, 2005), meaning that although initial insights were gained from literature and guided the way for the empirical data collection, the empirical findings often called for additional literature reviews. There have thus been many leaps between literature and empirical data during the research process.

Closely linked to the type of research, in this case exploratory to its nature, are the type of research questions that are formulated in order to learn more about a subject (Merriam, 1994; Yin, 2009). As described in Chapter 1.4, three research questions are of interest in this licentiate thesis. These are:

RQ1. Which green categories could be taken into account in the logistics market?

RQ2. To what extent are the green categories taken into account by LSPs and shippers respectively?

RQ3. Why are there matches and mismatches on the logistics market with regard to green categories?

The three research questions were in turn further detailed into a number of sub-questions in Chapter 3. In the following sections, the research design for each research question will be described. Note that only those sub-questions that demand a choice of research method will be commented on. Table 4.1 gives an overview of the three research questions and research methods used for each one of them.

Table 4.1 - Research Questions and corresponding research methods

	Literature review	Survey	Homepage scan	Case
RQ1	X	X	X	X
RQ2	X	X		X
RQ3	X			X

4.1.1 RESEARCH DESIGN FOR RESEARCH QUESTION ONE

The aim of the first research question is to obtain an overall picture of the green categories relevant for the logistics market. The research question was further detailed into three subquestions in Chapter 1.4. The first one of these sub-questions is:

- Which green categories can be found in the literature?

With regard to literature reviews, these are noted to be necessary in order for a researcher to know what has been previously done and to get good results (Andersen, 1998). For example, literature reviews are necessary in order to be able to claim that very little research has been conducted in the area of research that this licentiate thesis has a focus on. Both general and structured literature reviews were conducted in the research for this thesis; for more information on these, see Chapter 4.4.

Not only literature is of interest with regard to green categories, something that is recognised by the following question:

- Which green categories are mentioned by companies when green supply and demand is discussed?

There are several ways to get input from companies about green categories used in the industry. Three different methods are used here. First, a survey with categories based on the literature reviews was used as a way to understand if green categories found in literature were relevant for companies on the logistics market. A homepage scan made it possible to understand which green categories companies mention in a public description that can be read by anybody. In such a

place, companies are likely to promote things they want customers and stakeholders to know. With regard to environmental work it is therefore possible that companies mention all those green categories that they want others to know about and in a research perspective it is likely that a wide variety of green categories are found.

The last input from companies with regard to green categories is information from case studies. Another approach was taken for these studies as the cases were specific relationships between LSPs and shippers. Therefore, the green categories mentioned are those that are relevant for the specific studied cases. The case studies give a narrower, but more detailed, perspective of green categories taken into account on the logistics market than the survey and the homepage scan.

4.1.2 RESEARCH DESIGN FOR RESEARCH QUESTION TWO

Research Question 2 aims to understand to what extent green categories are taken into account by LSPs and shippers respectively. As described in Chapter 3, the question boils down to the occurrence of matches or mismatches of green categories on the logistics market. Literature studies were therefore initially conducted in order to learn more about how similarities and differences between supply and demand are dealt with in the literature. The knowledge obtained from literature was used as a starting-point when the three sub-questions were answered. The first one of them is:

- What matches and mismatches appear when a market perspective is taken?

A market perspective implies that many actors on both the supply and the demand side of the market are studied. For "what?" questions of exploratory nature, as this thesis is, Yin (2009) states that several different research methods are available and amongst these are surveys and case studies. According to Andersen (1998), survey studies are a suitable method to choose if a) the number of units is high, and b) the number of variables is low. Since the objective is to get a market perspective of the environmental situation on the logistics market, the aim is to have a high number of units, in this case respondents. The number of variables is limited to some of the green categories found in the literature for Research Question 1. Hence, the market perspective of matches and mismatches will be addressed by a survey, in accordance with both Yin (2009) and Andersen (1998).

In addition to the market perspective, a relationship perspective of the logistics market was discussed in Chapter 3 and the next question of interest is:

- What matches and mismatches appear when a relationship perspective is taken?

The scope of this question is narrow in comparison with the previous question as it aims to get a detailed understanding of specific relationships. As previously stated, another approach to

"What?" questions is case study research (Yin, 2009). Compared to a survey, case studies do not require that the researcher to know of all variables beforehand (Merriam, 1994). As stated above, the study of the market perspective is limited to the categories found in literature studies, whereas case studies open up for the possibility that other green categories occur.

4.1.3 RESEARCH DESIGN FOR RESEARCH QUESTION THREE

The last research question is concerned with "Why?" and the objective is to explore possible explanations for the matches and mismatches that were found as a result of Research Question 2. Thus, there is a need to understand the meaning of certain phenomena, which calls for qualitative studies (Merriam, 1994). Moreover, three research methods are possible for Why-questions according to Yin (2009); experiments, history or case studies. Experiments require control of behavioural events and history deals with historical events, whereas Research Question 3 has an aim to study, not control, contemporary events. Thus, in accordance with Yin, case studies were applied to Research Question 3.

4.2 UNIT OF ANALYSIS

Several researchers emphasise the importance of a clear unit of analysis when case study research is conducted (see for example Merriam, 1994; Yin, 2009) Thus, it is important to know what should be studied in order to answer the question asked. It is not difficult to think that a distinct unit of analysis applies to other research methods that merely case data. As described in Chapter 1.4, the purpose of this licentiate thesis is to describe how green categories are taken into account in the logistics market and suggest explanations for this. In order to understand the logistics market, a dyadic view has been applied, meaning that both LSPs and shippers are taken into account. The broken line in Figure 4.1 illustrates the unit of analysis in a logistics system context.



Figure 4.1 – Unit of analysis (illustrated by the broken line)

The three appended papers as well as the Thesis Frame fit into this unit of analysis in different ways. Figure 4.2 illustrates how the papers correlate to different parts of the unit of analysis and indicates that Paper 2 and the Thesis Frame explicitly deal with the logistics market, while Paper 1 and 3 focus on supply and demand on the logistics market. More specifically, Paper 1 aims to describe green logistics offerings and considers views of both LSPs and shippers. Paper 3 explicitly deals with measurements within the field of green logistics and does not have a clear logistics market focus. However, it provides information about measurements which mainly apply to the research conducted for Paper 1. The matches and mismatches in relation to green categories in the logistics market, which is the focus in Paper 2, are analysed on the basis of information on green supply and green demand. The same is true for research for the Thesis Frame, which deals with why these matches and mismatches appear in the logistics market.

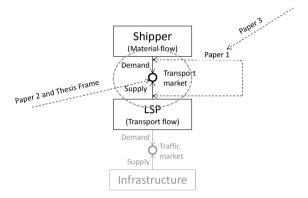


Figure 4.2 - Unit of analysis in relation to the papers and the Thesis Frame

4.3 RESEARCH METHODS

As described briefly in section 4.1, four different research methods were used in this licentiate thesis; literature reviews, a homepage scan, a survey and case studies. All four are more thoroughly described in the next sections. For each research method, an introduction, the relevant selection and the analysis will be described. The different research methods for the three different papers and the Thesis Frame will also be commented on. Figure 4.3 shows a summary of this information.

Figure 4.3 - Research methods used for Papers 1-3 and the Thesis Frame

	Literature review	Survey	Homepage scan	Case studies
P1	X	X	X	
P2	X	X		
P3	X			
TF	X	X	(X)	X

4.4 THE LITERATURE REVIEWS

According to Andersen (1998), literature studies are important both when a purpose of a study is formulated and in the research that follows. More specifically, Andersen states that thorough and systematic literature reviews are essential in order for the results to be good. Indeed, different types of literature studies have been an important and on-going process during large parts of the PhD process so far. They have been one part of the research process for all three research questions as well as for all three papers. Furthermore, they have contributed to knowledge about different areas within logistics in general, green logistics in particular, as well as other related research areas, such as marketing.

Two different approaches to the collection of relevant literature have been used. Structured and systematic literature reviews, where search terms were carefully selected and the number of hits and relevant hits were carefully documented, were conducted for Paper 1 and Paper 3. The purpose of the structured literature reviews was to learn what had been published in very specific areas of research. In the other type of literature reviews, which will be referred to as general literature reviews, an iterative process was conducted, in which for example literature from PhD courses, advice from supervisors and colleagues as well as inspiration from other academic papers were used. General literature reviews were a part of the work for Paper 1, Paper 2 and the Thesis Frame. In the following sections, some aspects of the literature reviews will be presented, but for further detail the papers themselves are recommended, especially in the case of the structured literature reviews in Paper 1 and Paper 3.

4.4.1 SELECTION OF LITERATURE

As described above, two different types of literature reviews have been conducted for this licentiate thesis. For the structured literature reviews, it is important to note that "selection of literature", as this section is called, is not the adequate expression, since the aim of these reviews is to *find* papers that fit into predefined criteria more than to actually *select* papers. With that in mind, twelve searches were conducted for the structured literature review for Paper 3 and search terms were combined to cover three different areas; logistics, environment and measurements.

Initially, over 1100 papers were found, but the vast majority of the papers did in fact not fit into the predefined criteria. In the end, 17 papers were singled out as the only ones that could be said to include measurements related to the environment and logistics.

The aim of the structured literature review for Paper 1 was to find papers that explicitly concerned green offerings or green demands, and the search terms were selected accordingly. After eighteen different searches, as few as three papers proved to include useful information in relation to the purpose of Paper 1.

With regard to the general literature reviews for Paper 1 and Paper 2, these were a result of an iterative process that has included several sources of inspiration. Advice from supervisors was important when literature was selected, as well as course material from various PhD courses. Furthermore, references that appeared to be of importance in relevant literature were looked for and read and these in turn sometimes led to additional literature. As for the Thesis Frame, the literature in Chapter 2 has similarities with the literature used in the three appended papers. However, as my knowledge about the different areas of literature increased, additional references have been added and the structure has been changed.

4.4.2 ANALYSIS OF LITERATURE

For the structured literature reviews in Paper 1 and Paper 3, the selection of papers as described above, and the analyses of the papers went hand in hand, and were to some extent performed simultaneously. The reason for this was that in order to know which papers were relevant and should be selected, it was important to know what was to be analysed. However, the analysis was done more thoroughly after the selection of the papers had been made. In some cases, the initial analysis even proved to be inaccurate, which led to the removal of papers previously selected. The papers found in the literature review for Paper 3 were analysed according to five dimensions in which measures and measurements could be categorised. The seventeen papers were read with the five dimensions in mind, and as a first step, relevant sections of the texts were labelled according to the corresponding dimension. The papers were read more than once in order to ensure that all relevant information was found. After that part of the analysis, the next step was to compare the different papers and check for similarities and differences within the five dimensions in order to make a synthesis of the content that the purpose of the paper required.

As for Paper 1, the general literature review resulted in green categories relevant for the logistics market. When the structured literature review was conducted, papers were initially chosen if they seemed to have anything to do with green supply and/or green demand on the logistics market. Those papers that were chosen in the first round were then read from two different perspectives. First, they were read with the green categories that were found in general green logistics literature in mind. This was in order to see what had been published about supply and/or demand

and any of the categories. Second, the papers were read with a more open mind in order to find additional categories that had not been found in the general literature review.

4.4.3 RESEARCH QUALITY OF THE LITERATURE REVIEWS

Both structured literature reviews were based on predefined search terms, and the result of each search was thoroughly documented throughout the search process. The literature reviews were mainly conducted personally, but in some instances, discussions with the co-author of Paper 1 and Paper 3 were initiated in order to get a second opinion, which also leads to an increase in research quality.

4.5 THE HOMEPAGE SCAN

Two different sets of homepage scans were conducted in relation to this licentiate thesis. One was conducted for Research Question 1, whose goal was to find green categories that could be offered or required by LSPs and shippers in the logistics market. The literature studies conducted in order to answer Research Question 1 have been described above. However, the homepage scan was also an important part of the data collection for this research question. The reason was both to learn if the green categories in the literature were in accordance with what different companies stated as important green categories and, more importantly, to study if there were additional green categories that the literature did not take into account. The homepage scan did in fact shed light on different aspects of the green categories and thus widened the overall picture.

The second set of homepage scans was conducted as a part of the case studies, in order to find a) general company information and b) to ensure that the case companies chosen mentioned environmental ambitions in general, and within logistics in particular. This homepage scan was conducted for the case companies chosen and will not be described further. The homepage scan for Research Question 1, however, is briefly presented below, but Paper 2 is recommended for further information about it.

4.5.1 SELECTION OF HOMEPAGES

The selection of companies whose homepages were suitable to study can be compared to the selection of case companies in case study research. Patton (2002) states that:

"the logic and power purposeful sampling lie in selecting information-rich cases" (p. 230).

The most important aim of the homepage scan was to possibly widen the scope of the green offering that had resulted from the general literature review. Therefore there was a need to

choose companies that to some extent were recognised for their environmental work. Guided by lists such as Global 100, Global 500 Carbon disclosure project and DJSI Super-sector leaders, seven LSPs and nine shippers were selected for the homepage scan. This strategy for selecting companies can be compared to what Patton (2002) calls *intensity sampling*, in which the cases intensely demonstrate the area of interest.

4.5.2 ANALYSIS OF THE HOMEPAGES

For the first set of homepage scans, the homepages were merely searched for information related to green offerings and green demands, depending on whether they were LSPs or shippers. During the process of checking the homepages for information on green offerings and demands, the green categories were kept in mind as well as the possibility of finding additional categories. All relevant information about green offerings or demands were then documented and categorised, as aspects of each of the green categories if possible, or as aspects of an "other-category" if none of the green categories were suitable. Starting with the main homepage of each company, the scan often led to specific environmental web-pages or to sustainability reports, which were all scanned for relevant environmental information.

4.5.3 RESEARCH QUALITY OF THE HOMEPAGE SCAN

The homepage scan itself was conducted by my co-author for Paper 1, but the research approach was determined during mutual discussions. Moreover, the findings from the home-page scan were analysed by both authors involved in Paper 1 and this is believed to have increased the research quality.

4.6 THE SURVEY

The survey analysed for this licentiate thesis has played an important role in increasing the understanding of green categories and matches and mismatches on the logistics market. It was first a way of validating that the green categories found in Paper 1 were satisfactory. Respondents involved in an early stage of the survey development process were asked to test the questions by answering the alternatives and commenting on readability. Second, the survey enabled an analysis of the logistics market that gave a general view of matches and mismatches that seem to appear on the market in relation to green categories.

The aim of Research Question 2 is to gain knowledge about the situation on the logistics market with regard to the green categories found for Research Question 1. As described previously, a survey was developed and sent out to potential respondents in order to get an answer to Research Question 2. However, the survey was not sent out merely for the purpose of this licentiate thesis. More specifically, the survey was a part of a green logistics project, in which I am one of several

participants. The theme of the survey was to get a broad view of the state of different green logistics issues amongst companies at the time, and it included a large number of questions not relevant for the research presented in this thesis.

The survey was designed so that it could be sent to both LSPs and shippers. It included eight sections, of which six had the same questions for LSPs and shippers, while one section was aimed at LSPs only and one at shippers only.

4.6.1 SELECTION OF THE RESPONDENTS

The survey was sent out to both LSPs and shippers in order for both the supply and the demand side of the logics market to be covered by the study. It was not necessary to decide exactly which companies should be targeted, since the aim was to get a market perspective of the environmental situation on the logistics market. Because of this aim, it was possible to approach organisations that already had contact details for groups of LSPs and shippers. The LSPs were reached via an interest organisation called Transportgruppen, whereas the shippers were reached with the help of another interest organisation called SILF (Sveriges Inköps och Logistikförbund).

4.6.2 ANALYSIS OF THE SURVEY

Ten different green categories were included in the four survey questions. The questions were answered according to a five-degree likert scale. In the analysis of the survey, the answers were converted so that the response "Totally disagree" corresponded to 1 and "Fully agree" corresponded to 5. Since it was a five-degree likert scale, 2, 3 and 4 were also possible outcomes of the converted responses. For each of the ten green categories, five Gaps were analysed. These are shown in Figure 4.4. For example, for Gap 1, the mean values of LSPs' stated offering were compared to the mean values of the shippers' stated demand and these could result in matches as well as mismatches between the green offerings and green demands.

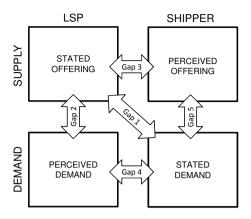


Figure 4.4 - The Gap Model

4.6.3 RESEARCH QUALITY OF THE SURVEY

In order to understand the validity of the mismatches found in the survey, confidence intervals were used. These confidence intervals provided information about whether the intervals for green-category mismatches overlapped. If the confidence intervals overlapped, that decreased the robustness of the mismatch and therefore had implications for the conclusions. More details of measures taken to increase the research quality of the survey can be found in Paper 2.

4.7 THE CASE STUDIES

The survey previously described indicated that there were in fact mismatches between LSPs' green offerings and shippers' green demands. However, in order to understand *why* such matches and mismatches in the logistics market appear, the survey was not sufficient and thus, there was a need for additional data collection. As previously discussed, case studies were chosen as the most suitable approach to answer Research Question 3. Case studies can include both qualitative and quantitative data (Eisenhardt, 1989; Yin, 2009) and usually a combination of different data collection methods, such as archives, interviews, observations, questionnaires and time series, is used (Dubé and Paré, 2003; Eisenhardt, 1989). The case studies conducted for this licentiate thesis mainly comprise qualitative data collected from interviews. Additional information has been gathered from the case companies' web pages, as well as from their annual reports and sustainability reports.

4.7.1 SELECTION OF THE CASES

As described by Yin (2009), case study researchers can choose between conducting single or multiple-case studies, depending on the aim of the research. Even though there are some circumstances when single-case studies may be preferable, Yin (2009) recommends multiple-case studies. Eisenhardt (1989) only describes case study research that includes more than one case and suggests four to ten as the appropriate number. According to Eisenhardt, adding new cases ideally stops when phenomena that have already been observed occur. However, time and money are also factors to consider and often researchers plan the number of cases in advance (Eisenhardt, 1989).

For Research Question 3 to be answered, four cases were chosen for inclusion in the study. There were two main reasons for this choice. First, a multiple-case study that includes two or more cases *enables* direct replication to occur (Yin, 2009), although it is important to note that it cannot be *assumed* to occur. In the event of replication, that would mean that the found explanation was found for more than one company, making the results more powerful (Yin, 2009). Second, four cases were considered enough to find *some* possible explanations for the matches and mismatches, which is the aim of Research Question 3. However, there is naturally no guarantee that *all* potential explanations are found. In addition, time is as always a limiting factor, and in order for the cases to be studied properly, four cases were considered to be a reasonable number that would not result in a decrease in the quality of the case studies.

Figure 4.5 illustrates the general idea behind the four cases. The companies were chosen because it was believed that they were interested in and worked with environmental issues. This follows the intensity sampling logic that Patton (2002) describes. Two LSPs were first selected as one part in two buyer-supplier relationships each, and after that, four shippers were chosen. The LSPs were selected based on theoretical sampling, in accordance with Eisenhardt and Graebner (2007) and they were chosen for two different reasons. First, they were chosen because of the above mentioned environmental criterion, which increases the likeliness that they contribute to theoretical insight within the field of environmental logistics. Secondly, the two LSPs were chosen because of their differences in size and market focus, and these differences were believed to offer contrary results that could shed light on why matches and mismatches appear.

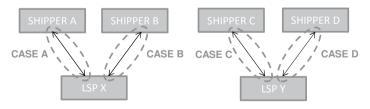


Figure 4.5 – The general idea of the cases

The LSP that is labelled LSP X in Figure 4.5 is an LSP called Alltransport i Östergötland AB (Alltransport). It had previously been a part of a case study conducted by myself and a fellow PhD student earlier in the PhD process and was willing to participate in additional research. It was also interested in environmental issues and was thought of as an example of "good-practice" (Patton, 2002). They were for example given an award for their sustainability report in 2008 (Svensk Åkeritidning, 2008). Alltransport is a regional and relatively small company active on the logistics market in Norrköping and its surroundings. The second LSP was selected for both heterogeneous and homogenous reasons (Patton, 2002). The LSP, DHL Global Forwarding (DHL), is considerably larger than Alltransport and active on a global market, which makes the two cases heterogeneous. It is also a company that recognises the environmental impacts that their activities cause and tries to make up for these impacts in different ways. DHL has for example won an IT-award in the category "the sustainable project of the year" for its emission simulation tool. Thus, the environmental criterion is fulfilled by both LSPs, although the two companies differ in turnover and market focus. As with Alltransport, an additional reason for the choice of DHL was access, since the environmental manager cooperates with the department in which I work.

When the decision was made about which LSPs to study, a list of criteria was set up for the selection of the shippers and included both homogenous and heterogeneous criteria. With the help of the quality and environmental manager at Alltransport and the environmental manager at DHL, potential shipper participants were identified and asked to take part in the study. The process of finding and choosing suitable shippers took longer than expected; some suggested shippers did not show any environmental concerns on their homepages, some were too similar and some did not want to participate. Eventually, four companies were chosen. Alltransport's two customers were Holmen Paper AB and Onninen, while the two customers selected for DHL were SECO Tools AB and Ericsson. All four companies' homepages were checked to make sure that some attention to environmental issues was given there. The following four cases are thus a part of the research for this thesis:

- Alltransport-Holmen
- Alltransport-Onninen
- DHL-SECO Tools
- DHL-Ericsson

Table 4.2 shows some key facts about the four cases and illustrates similarities and difference between the cases. More detailed information about the companies and the four relationships is found in Chapter 5 and Chapter 6.

Table 4.2 – General facts about the selected case companies

	Size (LSP/shipper)	Industry	Type of business	Market (LSP/Shipper)
Alltransport- Holmen	Small/Medium-Large	Paper	Producer	Regional/Europe
Alltransport- Onninen	Small/Small	HVAC & electric power products	Wholesaler	Regional/Sweden
DHL-SECO Tools	Large/Medium	Cutting tools	Producer	Global/Global
DHL- Ericsson	Large/Large	Telecom	Producer	Global/Global

4.7.2 ANALYSIS OF THE CASE DATA

In order to understand why the green matches and mismatches appear in the logistics market, the cases are analysed. However, even though Research Question 3 is the main reason for the case studies, they are also input to Research Questions 1 and 2. This is described in Chapter 4.1. As indicated in that chapter, four issues are addressed completely or in part by the cases. The cases contribute to Research Question 1 with the green categories that are mentioned in each case. Furthermore, matches and mismatches that are found in the cases contribute to Research Question 2. As described in Chapter 3, reasons for the matches and mismatches (Research Question 3) are explored with regard to tangibility as well as to relationship characteristics. The analyses of tangibility levels for green categories is conducted for all four cases at the same time and is therefore described in Chapter 4.8 where the cross-case analyses are described. The analysis of relationship characteristics is, however, conducted in the single-case analysis.

There are thus three parts of the single-case analysis, and these are shown in Figure 4.6. The single-case analyses then provide input to the analysis of the logistic market in Chapter 8, where results from a cross-case analysis are combined with findings from the literature, the homepages and the survey. The approach for the cross-case analysis is described in Chapter 4.8, where the analysis of the logistics market is presented.

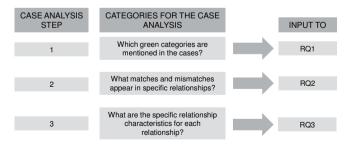


Figure 4.6 - Questions relevant for the single-case analysis in relation to the research questions

CASE ANALYSIS: STEP ONE

The literature reviews, homepage scan, survey and cases all provide input to Research Question 1, which aims to understand which green categories can be taken into account in the logistics market. As a part of the analysis for this research question, information from the case studies is used in order to find which green categories are mentioned when company representatives from the specific buyer-supplier relationships are interviewed. This analysis is based on the respondents' answers to the questions about the specific green relationships. See the Interview Guide in Appendix 2 for more information about the questions. Even though the respondents were not asked to list green categories explicitly, they were asked about green offerings and demands in their specific relationships. These offerings and demands include different green categories which are singled out in the first step of the case analysis. This is done for all four cases in a single-case analysis in Chapter 6.

CASE ANALYSIS: STEP TWO

The second question that the case studies will answer aims to learn what matches and mismatches appear in a relationship perspective of the logistics market. It is thus important to analyse whether the four relationships studied seem to correspond to a match between green supply and green demand or if there is a mismatch between these two. Therefore, a single-case gap analysis is initially conducted for each of the four cases.

The Gap model developed in Paper 2 is used as a tool for the analyses. Some minor changes have been made in order to adapt the model to specific buyer-supplier relationships instead of the survey results for which it was originally developed. Specifically, the boxes called "stated offering" and "stated demand" have been changed to "offerings" and "demands". The reason for this is that "stated offering" can be of a general type that applies to many different shippers, whereas here, the aim is to analyse the specific relationship. The model is shown in Figure 4.7. The input for the analysis is the green categories that were found in Step 1 described above. For example, if the LSP in one of the relationships is under the impression that the shipper wants a certain green category, this is put into the box "perceived demands". If the LSP also offers this green category, the category is put into the box "offering". The matches and mismatches are located through an analysis for each of the five Gaps in the filled-in Gap model. In the example, the gap analysis indicates that for this particular green category, there is a match when Gap 2 is analysed.

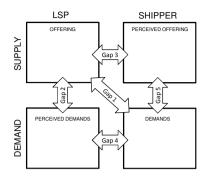


Figure 4.7 - The Gap model adapted to the single-case analysis

CASE ANALYSIS: STEP THREE

Step three aims to find relationship characteristics that could influence green matches and mismatches on the logistics market. In Chapter 3.1.3, it was recognised that different characteristics in a business relationship can determine the type of relationship between an LSP and a shipper. In the single-case analysis, the specific set of relationship characteristics that were found to be important in Chapter 3.1.3 are analysed for each case. This information will provide input for the cross-case analysis in Chapter 8, where the four cases are compared and placed on a relationship continuum. As described in Chapter 3.1.3, relationship details for each case are analysed with regard to:

- Length of relationship
- Length of contracts
- Outsourced activities
- Trust in the relationship

4.7.3 RESEARCH QUALITY OF THE CASES

According to Yin (2009), there are generally four tests that establish the quality of any empirical social research; construct validity, internal validity, external validity and reliability.

Construct validity tests whether what is supposed to get measured actually gets measured. In order to strengthen construct validity, Yin (2009) suggests three different measures that can be taken by the researcher. First, he suggests multiple sources of evidence in the collection of material for a case study. This is also called data triangulation (Patton, 2002) and both Yin (2009) and Merriam (1994) mean that the possibility to use different data sources is a major strength of case studies. The case study data for this thesis mainly comes from interviews, but

additional data from homepages, annual reports, sustainability reports and presentation material have been considered in order to obtain a general understanding of the companies.

Next, Yin (2009) suggests that the researcher establishes a chain of evidence in order to increase construct validity and this implies that a reader of the case study should be able to follow the evidence from the case study questions to the case study conclusions. This recommendation has to a large extent been followed for the research of this thesis and the purpose and research questions have guided literature reviews and case studies. The case descriptions provided in this thesis and the single- as well as cross-case analyses conducted and presented are of help to those who want to follow the path of the case studies. Because of the exploratory nature of the research conducted, the path has been somewhat winding and sometimes it has been necessary to expand the literature studies due to unexpected, or lack of, results from the case studies. The additional literature findings then guided additional analyses of the cases.

Finally, Yin (2009) recommends that key informants review a draft of the case study report in order to strengthen construct validity, and this is something that has been done for the cases in the research for this thesis as well.

Internal validity aims to ensure that causal relationships between events have been established in a trustworthy way, and that no possible causes have been overlooked (Yin, 2009). Most of the research for this thesis is descriptive and/or exploratory, which decreases the need for internal validity. The analysis of Research Question 3, however, explores connections between relationship types or characteristics of green categories and matches and mismatches in the relationships. The suggestions made are a first step towards an understanding of green categories in business relationships on the logistics market, and it is not claimed that all possible connections have been researched.

External validity deals with how the results from a case study can be generalised beyond the case study itself. The case study research conducted for this thesis gives a view of two LSPs that to a large extent were chosen because of their differences. The study thus shows results from two different types of contexts and although it in some instances might be possible to find patterns for all cases, generalisation of the results to all LSP-shipper relationships has never been an important aspect of this research.

Reliability has to do with whether the same data collection conducted again would yield the same results. One recommended strategy in order to increase reliability for case studies is to document the different steps in the data collection (Yin, 2009). In line with this, an interview guide (see Appendix 2) was followed during all interviews and initial company descriptions were checked by the respondents, who in some cases made minor changes.

4.8 ANALYSIS OF THE LOGISTICS MARKET FROM A GREEN PERSPECTIVE

The logistics market is analysed based on the three research questions that were presented in Chapter 3. That means that each research question is analysed based on those papers that can contribute to the answer to that research question. Further details about the analyses are described in the next sections.

4.8.1 ANALYSIS OF GREEN CATEGORIES ON THE LOGISTICS MARKET

Research Question 1 is concerned with which green categories that could be taken into account in the logistics market. As indicated in Chapter 3, the first step of the analysis is to learn which green categories that are found in literature. For this, Papers 1, 2 and 3 provide input and are the categories there are summarised and categorised according to if they are mentioned in a market, LSP, shipper or general green logistics context. The second step of the analysis is to learn which green categories that are mentioned by companies when green supply and demand is discussed. Results from the survey, homepage scan and cases are summarised. The analysis then aims to compare literature findings with findings from the companies to see if the literature is up to date with regard to green categories, and if the green categories mentioned in literature are relevant for companies on the logistics market.

4.8.2 ANALYSIS OF GREEN MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

Research Question 2 aims to understand to what extent green categories are taken into account in the logistics market. Two perspectives are studied; the market perspective, to which the survey gives input, and the relationship perspective, to which the cases give input. For both perspectives, matches and mismatches are analysed according to the Gap model's five different Gaps. The balance between matches and mismatches is commented on and the analyses also set out to understand if the offerings or demands differ between LSPs and shippers. If the service providers, in this case the LSPs, have the highest mean values according to the market perspective, this indicates a positive mismatch according to Lings and Brooks (1998). A negative mismatch, on the other hand, implies that customers' demands include more that the service providers offer. In addition to the steps mentioned, the cases are also compared in a cross-case analysis to identify if some matches or mismatches are mutual for several cases. For Research Question 2 the next step is to compare the findings from the market perspective to the findings from the relationship perspective with regard to the balance between matches and mismatches and whether the mismatches are positive or negative. The results from the analysis of the survey and the cross-case analysis of the cases are thus compared and similarities and differences are

emphasised. Note that the term *mismatch* is applied for differences that appear within the five general Gaps of the gap model. Thus, while a Gap can refer to both matches and mismatches between LSP and shipper perceptions in general, the term mismatch refers to specific green categories within this Gap.

The green categories analysed in the survey are basically those that are found as relevant in the literature studies of Paper 1. Note, however, that a few minor changes are made in the way the categories are formulated in the survey. The green categories analysed for the cases are naturally those that are mentioned by the case companies as relevant in the specific relationships.

4.8.3 ANALYSIS OF REASONS FOR THE MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

The aim of Research Question 3 is to explore why there are matches and mismatches for green categories on the logistics market. In accordance with the details in Chapter 3, two different analyses are conducted. The first of them sets out to learn which characteristics of green categories that might influence the occurrence of matches and mismatches in specific buyer-supplier relationships on the logistics market. In the analysis, the green categories are classified with regard to their level of tangibility with an emphasis on the relative position between them, and thus not their exact position in Shostack's (1977) framework. After the classification is conducted, the results are compared to matches and mismatches in the Gap model's five Gaps. The aim is to find patterns that enable the development of propositions about connections between matches, mismatches and green-category characteristics.

The second analysis for Research Question 3 aims to understand which relationship characteristics influence the occurrence of matches and mismatches in the specific relationships. In accordance with the details in Chapter 3, the four relationships studied in the cases are categorised according to a relationship continuum. After that, the Gap models of the four cases are compared and analysed to see if any patterns are found. For those patterns that are found, these are compared to placement of the four cases on the relationship continuum to see if their positions there can offer an explanation to them. Propositions are suggested in those cases where patterns in the Gap models are believed to be connected to the cases' placements on the relationship continuum.

Although the two steps described above are the ones presented in this thesis, it could be of interest to note that more possible explanations candidates were considered prior to the conduction of the analyses. Analyses of the tangibility levels of the green categories and the different types of relationships were, however, considered to be the two most interesting ones to proceed with.

4.8.4 RESEARCH QUALITY OF THE LOGISTICS-MARKET ANALYSIS

Triangulation is commonly mentioned as a method used to increase the quality of a study (Gummesson, 1991; Jacobsen, 2002; Merriam, 1994; Patton, 2002; Yin, 2009). As described by Patton (2002), "Triangulation strengthens a study by combining methods" (p. 247). Two different types of triangulation have primarily contributed to an increase in research quality of this licentiate thesis; investigator triangulation and methodological triangulation (Patton, 2002).

Investigator triangulation is achieved when several different researchers are included in one study. This has been applied to the research for this thesis and all three appended papers have been written together with one or two of my supervisors. This investigator triangulation has enabled both corresponding and conflicting arguments to be discussed and further elaborated, and has undoubtedly helped increase the quality of the research in this licentiate thesis.

Methodological triangulation refers to the use of multiple methods to study one single problem. As described previously in this, four main data collection methods (literature reviews, a homepage scan, a survey and case studies) have been used in order to answer the main purpose of this thesis. The combination of these different data collection methods have without doubt contributed to a higher research quality than what the methods would have done separately.

4.9 THE RESEARCH PROCESS

The following sections will explain the path I took that directed me towards the three papers and the results presented in this licentiate thesis.

4.9.1 IDENTIFYING A RESEARCH PROBLEM

When I started as a PhD student I knew I was a part of a green logistics project with a wide aim to study business models and their correlation to sustainable logistics systems. What I did not know, however, was the exact topic of my own research, nor was I sure what I found interesting in the area of green logistics. Nonetheless, I was almost immediately involved in writing a conference paper (which later was turned into Paper 3). The purpose of the paper was initially to do a literature review with the aim to find papers related to measurements, the environment and logistics. The literature review conducted for the conference paper resulted in a categorisation consisting of five different dimensions of green measuring in logistics. The conference paper was a first step towards an area of interest for me and it also helped me with the necessary kick-off for my research. However, I did not find a distinct area of interest although several areas for further research were discussed in Paper 3. From this point, there was a lot of thinking about which way I should go with my research. One source of inspiration came from a case study of a logistics service provider – Alltransport – which I now in hindsight choose to regard as a pilot

study in my research process. Another source of inspiration came from think-tanks that were organised within the green logistics project at my department and included participants both from LSPs and shippers. The think-tanks, as well as numerous discussions with my supervisors, led me in the direction of studying LSPs and their customers and their interactions with each other. LSPs and shippers could not seem to agree on which actor should take the lead in environmental development between the actors. Moreover, it was difficult to know exactly what they meant by the environmental work that was discussed. It seemed important to me to understand the different actors' view on environmental work and somewhere around there the idea to the study of green matches and mismatches in the logistics market was born. The area was somewhat linked to one of the dimensions discussed in Paper 3, that is *Measuring across the* supply chain. The importance of integrated measurement systems between supply chain actors was noted in several of the papers found in the literature review, but few of the papers discussed the matter in detail. In addition, most of the papers had a focal company perspective, which was surprising when the vast majority highlighted the importance of integration between companies. Another surprising finding from the literature was that the identified papers focused on shippers, while none included LSPs.

After I found a relatively clear focus area, the research became easier because I could see a clear path that I would go. Of course, the plan did not work out exactly as I thought, but the outcome was close enough. I made a plan of how the research was going to be conducted. In order to learn more about the green matches and mismatches on the logistics market, I found it necessary to do some research to study what type of environmental issues that could be offered by LSPs and demanded by shippers. Without knowledge about such issues, it would be impossible to know what to ask companies in a search for the potential mismatches. Because of this, Paper 1 was written and green categories for the logistics market were found. Next step was Paper 2, in which a survey, closely related to the categories Paper 1, was the input to a gap analysis. The final step was to explain the matches and mismatches in some way and for this case studies seemed like a natural data collection method to use. Said and done, the research was conducted, not always without difficulties, and the results are presented in this thesis.

4.9.2 MY PARTS OF THE PAPERS

All three appended papers have been written together with one or two of my supervisors. Although all authors involved essentially have had a say about all parts of the papers, the work was divided between the authors. The next sections will describe which parts of the papers that were my main responsibilities.

Methods wise, Paper 1 includes two literature reviews (one frame of reference and one structured literature review), one homepage scan and an initial survey analysis. With initial guidance from my co-author Maria Huge-Brodin, I wrote the frame of reference in that paper and I also

conducted the structured literature search. Further, the survey results were put together by me. The decisions about which companies' homepages to study were taken after discussions between Maria Huge-Brodin and me, but she was the one that conducted the actual homepage scan. The analysis and conclusions were a result of collaboration between Maria Huge-Brodin and me.

With regard to Paper 2, I have been a part of the work for all sections of the paper. However, there are sections to which I have contributed more than to others. For the survey analysis, and therefore also the research approach, and the conclusions, I conducted most of the writing. The introduction and the literature review of the logistics market were a result of collaboration between co-author Maria Björklund and me, whereas Maria had the main responsibility for the literature review on gap models.

Paper 3 includes both a structured literature review and a case study of ReturPack Svenska AB and my main contribution to P1 is the structured literature review. The key words used in the search derived from discussions with my co-author Maria Björklund, but the search itself was conducted by me. I also wrote the main parts of the synthesis of the papers found, but was guided by Maria Björklund during this process.

5 COMPANY PRESENTATIONS

This chapter introduces the companies that are part of the four buyer-supplier relationship cases studied in this thesis. Each such relationship consists of two companies. In total, six companies are involved in the cases, of which two are LSPs and four are shippers. The LSPs thus belong to two cases each. In order not to have to repeat general company information for the LSPs in the case descriptions, this chapter will provide company information for all six case companies. A general overview of each participating company will be given as well as a description of the general environmental work within the company. Chapter 6 will then describe the four different business relationships.

The information in this chapter has mainly been obtained from interviews with company representatives (see Appendix 1); information from other sources is clearly marked in the text.

5.1 THE LOGISTICS SERVICE PROVIDERS

This chapter presents the two LSPs. A brief general description of Alltransport is followed by information about the company's environmental work. This is then followed by corresponding sections about DHL. Table 5.1 shows general information about the two LSPs.

Table 5.1 - General information about the LSPs

	Alltransport	DHL Global Forwarding, Sweden
Turnover (MSEK)	642	3 200
No. of employees	95	325
Market focus	Regional	Global

5.1.1 ALLTRANSPORT

Alltransport is a logistics service provider (LSP) that was founded in 1937. The company's head office is located in Norrköping, which is in the Östergötland region of Sweden. Alltransport is a private corporation in which the stocks are owned by the drivers and their companies. Basically, every vehicle is equal to one stock share. On a practical level, this means that Alltransport's owners are also their suppliers. In total, 143 haulers and construction equipment companies comprise the ownership of Alltransport. In 2009, Alltransport had a turnover of 642 million SEK and 95 people were employed at the company. (Alltransport, 2009)

Alltransport is divided into three business areas: "Fjärr och Distribution", "Bygg och Anläggning" and "Tank och Miljö" (Alltransport, 2009). The business area of "Fjärr och Distribution", or *Long-distance and Distribution*, is responsible for long-distance transports and

distribution of goods. They can offer transports throughout Sweden, but the focus is Östergötland and surrounding areas. "Bygg och Anläggning" mainly leases out contract vehicles and contract machines, whereas "Tank och Miljö" focuses on the transportation of waste and recycling material from companies, households and retrieval plants in the southern parts of Sweden. For the case descriptions that include Alltransport, focus will be on the business area *Long-distance* and *Distribution*, which means that "Alltransport" equals *Long-distance* and *Distribution* unless otherwise noted.

Alltransport is mainly a regional company that competes in Norrköping and the surrounding areas. In fact, this is something that is an important aspect of the company's strategy. The business area manager says:

"Our strategy is that we want to be the strongest alternative on our local market. That's the main thing."

ALLTRANSPORT AND THE ENVIRONMENT

With regard to the environment, Alltransport tries to work with environmental issues and the business area manager says:

"Generally within the company we try to profile ourselves as working a lot with these [environmental] issues."

The awareness of environmental issues is considered to be high at Alltransport, since it is an area that the whole company is working with and one that Alltransport tries to profile themselves with. Alltransport is certified according to the environmental certification ISO 14 001. With regard to specific competences, the quality and environmental manager is perhaps the most important person as she is responsible for the environmental work at Alltransport. In order to increase the environmental competence of the employees, an internal training day is held once a year within the field of quality and environment. With respect to this, the business area manager states:

"We go through our sustainability report, what types of work we do, how that affects different things and how individuals' way of working affects the things that are important in the sustainability report."

5.1.2 DHL

Deutsche Post DHL is a mail and logistics service provider, founded in 1969 in San Francisco. Today, the company has its main office in Germany. DHL is divided into four divisions; Deutsche Post Mail, DHL Express, DHL Global Forwarding, Freight and DHL Supply Chain.

Deutsche Post Mail delivers mail items to households in Germany and to customers worldwide. DHL Express offers express deliveries. DHL Global Forwarding, Freight has two different focuses. DHL Global Forwarding focuses on air and ocean freight, while DHL Freight offers road freight operations. DHL Supply Chain works with warehousing and 3PL operations. Deutsche Post DHL is present in 220 countries around the world. In total, the company has around 400 000 employees and had a turnover of 401 900 MSEK in 2009. (DHL, 2011)

This case report will focus on the Swedish division of DHL Global Forwarding (DGF), and the term DHL will thus be equated with this division. In those cases where it is necessary to distinguish between DHL and DGF, the term DGF will also be applied. DGF has around 30 000 employees worldwide and about 325 of these work in the Swedish DGF division. With regard to the overall strategy of DHL in its entirety, the customer relationship manager says:

"It [our strategy] is to be one of the leading, or perhaps the leading transport company on a global level. And we have to be able to do that in an ethically correct way. And profitable, of course."

When DGF approaches potential customers, they try to emphasise price, availability, lead time and on-time deliveries. However, when the environmental manager is asked what she thinks that customers value the most when they buy from DGF, she immediately responds:

"Price"

DHL AND THE ENVIRONMENT

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

DHL started to work more resolutely with environmental issues four or five years ago. One example of this is that in 2007 DHL set a global target to cut CO₂ emissions by 30% by the year 2020. As a complement to the 30% goal mentioned above, DHL set a goal to cut CO₂ emissions by 10% by 2012 for their own vehicles and planes, which mostly belong to DHL Express and DHL Freight (trucks). The environmental manager says that DGF's own operations – business trips, company cars and electricity for the offices – cause 0.5% of the total environmental impact if the transports DGF perform for customers are taken into account. Thus, instead of trying to cut emissions for their own direct operations, DGF tries to involve customers and subcontractors in the environmental work. The Swedish environmental manager says:

"We have to decrease our emissions, and the only way we can do that is to involve our customers since we on a Swedish level have difficulties to involve our subcontractors since that is regulated from out German head office."

The environmental manager claims that a large part of the environmental work is to inform customers and try to get them interested in working towards environmental improvements together with DHL. She says:

"What we try to do is to provide customers with information and hope that they are interested..."

5.2 THE SHIPPERS

In this chapter, the four shippers will be presented. A brief general description of each shipper is followed by general information about each company's environmental work. Holmen Paper is presented first, followed by Onninen, SECO Tools and Ericsson. Table 5.2 shows some general information about the four shippers.

Table 5.2 – General information about the shippers

	Holmen Paper	Onninen	SECO Tools	Ericsson
Turnover MSEK	18 071	1 900 (Sw)	4 900	207 000
No. of employees	4 600	300 (Sw)	4 400	82 500
Industry	Producer of paper	Wholesaler for HVAC & electric power products	Producer of cutting tools and related products	Provider of telecommunications equipment and related services
Market focus	Mainly Europe	Sweden	Global	Global
Relationship with	Alltransport	Alltransport	DHL	DHL

5.2.1 HOLMEN

Holmen is a Swedish forest industry group founded in the 17th century. The head office is in Stockholm. In 2009 about 4 500 people were employed by Holmen and the turnover was 18 billion SEK. The company has two main types of business areas: Product oriented and Rawmaterial oriented. Product oriented business areas include Holmen Paper, Iggesund Paperboard and Holmen Timber. Holmen Paper produces printing paper of various types, while Iggesund Paperboard manufactures paper board for consumer packaging and graphic applications and Holmen Timber produces sawn timber. The raw-material oriented business areas include Holmen Skog, which has responsibility for Holmen's forest assets, and Holmen Energi, which is responsible for hydro power assets and the development of energy operations. Holmen has six production sites, of which four are located in Sweden (Norrköping, Iggesund, Strömsbruk and

Hallstavik), one in the UK and one in Spain. The main market for Holmen is Europe, where 90% of its products are sold. (Holmen, 2009)

The focus of this report is Holmen Paper and will therefore be more thoroughly described in the following. Holmen Paper has its head office in Norrköping in Sweden and around 60 people are employed there. Three of the six production sites mentioned above belong to Holmen Paper; Braviken, which has 700 employees, Hallsta, which also has 700 employees, and one in Madrid where 500 people are employed.

Holmen Paper's strategy is to be a leading manufacturer of high quality printing paper. The company is moving away from newsprint and towards more exclusive paper qualities. The high quality paper is more expensive for the customer to buy, and is also more expensive for Holmen to produce. Today, Holmen Paper has 10% of the European newsprint market, whereas the company has 30-40% of the European market of higher quality papers. All the "pink paper", used in the newspaper *Dagens Industri* for example, comes from Holmen.

Logistics is important for Holmen Paper, partially because of rules for Holmen Paper with regard to deliveries to customers. The customer often set an exact time for the order to arrive and if the truck is not there on time, it may have to wait many hours before being allowed to unload the goods. Holmen Paper's logistics director says:

"It is important that the product goes from the factory to the customer within the specified time limits and that it happens in such a way that when it arrives at the customer it is damage free."

On average, 14% of the sales price consists of transport costs, but that number differs according to the circumstances. For some customers, a problem is the distance between them and Sweden where Holmen Paper is mainly located. In order to be able to compete with other closer players on the market, Holmen needs to have warehouses in Europe to lower the lead times.

HOLMEN AND THE ENVIRONMENT

There is an environmental department at the Holmen Head Office in Stockholm that is responsible for environmental issues for Holmen as a whole. The environmental staffs at the different factories are responsible for their specific sites. There is no department or person responsible for environmental issues in logistics. The logistics director describes some of the environmental work conducted in the area of logistics within Holmen in the following way:

"Every second year we do a follow-up on how much we have emitted; sulphur, Nox, carbon dioxide and so forth, where we basically take all destinations into account."

He adds:

"From there it is not very easy to know what to do about it [the situation] but at least you get awareness about where we are."

The follow-up gives Holmen an idea of how well or badly they are performing. The estimations are based on calculations made by Holmen. Building the model took a lot of time, but since the industry is fairly conservative, the model does not require many changes from year to year.

According to the logistics director, there are LSPs that have a good idea about their emissions and would be able to give Holmen an approximate percentage for the contribution of their emissions. However, Holmen uses many different LSPs and many of them are very small and the logistics director does not think that they have the knowledge or the capacity to do these calculations. In addition, Holmen does usually not work with the largest players – they are too large. The logistics director says that as the situation is in Sweden, DHL and Schenker and companies of that size are too large to give the service needed in combination with reasonable costs.

The environmental competence within Holmen is high for those persons that have dedicated environmental positions in the company, but otherwise is not very high. Holmen has the ISO 14 001 environmental certification. Environmental training is not common within Holmen, but the logistics director thinks that it might appear in the factories, where there also are dedicated persons that work with environmental issues.

Driving forces for the environmental work within Holmen mainly come from two different sources. One is the customers, who think that Holmen should be at least as environmentally friendly and proactive as competitors. In fact, companies in the industry largely follow competitors with regard to environmental work. Indeed, Holmen basically follows industry standards, meaning that if Holmen or a competitor in some way "goes greener", the rest will follow. The other driving force is the environmental personnel at the factories. When the logistics director comments on the environmental work and the driving forces, he says:

"I believe that...it may sound defensive, like we don't do anything. The problem is that you can really do a lot but you have to see that it gives something back. Some customers appreciate it, they ask for it, but sometimes it feels as though it is almost trendy to ask."

The customers have different environmental demands and if Holmen are not able to fulfil these immediately, they do what is necessary to be able to deliver. But then, after Holmen has added that specific competence or other request, then the customer seems to forget about it. The logistics director says:

"It is just like they have been to a conference and heard that this is what they should ask."

5.2.2 ONNINEN

Onninen was founded in 1913 in Finland, where the parent company is still located today. The company offers a wide variety of products and services to contractors, industry, public organizations and technical product retailers. There are basically two different business areas within Onninen; heating and sanitation and electric power. With regard to the heating and sanitation, Onninen competes for third place in the industry with roughly 15% of the market share. Onninen's present goal is therefore to be the best "number three". With regard to electric power, Onninen is by far the biggest player in the industry with about 50% of the market share. Since it started in 1913, Onninen has been a family-owned company that has developed into a corporation with operations in Finland, Sweden, Norway, Russia, Estonia, Latvia, Lithuania and Kazakhstan. In 2009, the corporate group as a whole had a turnover of approximately 1 340 million Euro (≈ 11 700 MSEK) and had 3 000 employees. The focus of this case description, however, will focus on Onninen AB in Sweden (hereafter called Onninen) unless otherwise stated. Onninen's main office is in Solna, while the distribution centre is located in Örebro. The company has eighteen sites in total in Sweden. The In 2009, Onninen AB in Sweden employed 317 people and had a turnover of 1 830 MSEK. (Onninen, 2009)

Onninen's costs for transportation of goods are about 4% of total costs. When the transport coordinator talks about the importance of logistics, he distinguishes between the heating and sanitation segment and the electric power segment. Logistics is important for both of them, but more important for the customers within the electric power segment. He says:

"In reality, the customers [within heating and sanitation products] want very, very much service, but a lot of service costs a lot of money and in most cases they are not prepared to pay for it."

For these heating and sanitation customers, the transport coordinator guesses that the customers value the right price to 60% and various logistics parameters to 40%. He says:

"If we don't have functioning logistics operations, the customers won't buy from us, no matter how low our prices are."

For electric power products, price is less important than for heating and sanitation products. Logistics is, however, more important for this other products segment. The customers in this segment value suppliers that manage the difficulties that arise when products are to be delivered to different sites. The customers are large; the duration of contracts is long and as long as logistics operations are managed well, price is not an important issue. Sanitation and heating

customers often purchase from 2-3 different wholesalers and alternate between those that performs the best or has the lowest price.

ONNINEN AND THE ENVIRONMENT

Onninen is located on a water catchment, which means that there are strict environmental regulations for the company's operations. For example, it is not possible to have asphalt everywhere outside the central warehouse, since the water has to be able to stream away.

With regard to environmental efforts at Onninen, the transport manager mentions that he attended a general environmental course when he started working at the company, but he does not know if that is something every employee does or if it is just those in leading positions. The transport manager also says that the environmental standard of the company cars follows environmental policies, even though they do not live up to the toughest environmental requirements that would allow them to be classified as "clean vehicles". The transport coordinator also emphasises that Onninen has waste management. For him, however, one of the things that is important in the environmental work is to keep the need for transports as low as possible, and he believes that he has a role to play in Onninen's environmental work:

"The environmental work that I do is to decrease the amount of transports, in order to get rid of as many unnecessary transports as possible."

However, in the transport coordinator's work, he considers costs 90% of the time and the environment only 10%. Still, he says, decreased costs are believed to go hand in hand with lowered environmental impact.

With regard to environmental competence within Onninen, the environmental manager seems to have the most competence. The transport coordinator says:

"We have one [person] here that is good at environmental issues – our environmental and quality manager – but I can't say that we have a very high [environmental] competence; no, I don't think so."

Within Onninen it is not believed that environmental work will improve competitive advantage. The transport manager says:

"In the end, I don't think that customers will pay extra because we drive 'clean vehicles' that would cost a lot more. I don't think so, even though they would profile themselves as if they would [pay extra]."

5.2.3 SECO TOOLS

Although the company's history goes back to the 17th century, the actual company called SECO Tools was founded in 1974 (SECO Tools, 2009). SECO Tools' main products are so-called inserts – small hard metal plates – for milling cutters or holders, depending on the application. In order to reach all potential markets, SECO Tools also produce milling cutter bodies, drill bodies and holders for turning. The small inserts are the most important product if volume in sales is considered, even though the other products also generate money. Around 60 million inserts produced by SECO Tools are sold every year.

SECO Tools' head office is in Fagersta, where production also takes place. Additional production sites are located in Arboga, Norrköping, Ludvika and Norberg. Currently, SECO Tools has two distribution centres; one in Belgium and one in Singapore. In addition, SECO Tools has affiliates in 42 countries, some of which have production units and some of which are pure sales companies. The company has a turnover of 4 889 MSEK and employs 4 400 people (SECO Tools, 2009).

The strategy of SECO Tools is to be a premium brand within its market segments. This means that they do not mainly compete on low prices but, instead, they offer detailed knowledge about the products they sell and how they can be used. The following citation from the manager of global transport solutions describes the strategy:

"The strategy is to be one of the three to four actors on the market that has a complete, high-quality program, no matter what type of processing that you want to do, we should in 85-90% of the cases have a standard product to offer and in the rest we develop special solutions for that customer."

Environmental concern is a part of SECO Tools' strategy. The manager of global transport solutions mentions the code of conduct which sets rules for how company employees should and should not act.

"It is a part of being 'the good company'."

Even if quality is important for SECO Tools, competitors also offer high quality products to their customers. Therefore an important competitive weapon is on-time deliveries. In Western Europe and the Nordic region, deliveries at the required time have always been important. The ambition of the Nordic sales office SECO Nordic is that all orders that come in before 5 p.m. should be at the customers' sites before 9 a.m. the following morning. Today SECO Tools has a service level of around 90%. Consequently, the global transport solutions manager states that logistics is very important for SECO Tools.

"I myself am a part of the logistics organisation and naturally answer that we need it to survive. I also think that is the honest answer, not only in order to praise my own role..."

SECO TOOLS AND THE ENVIRONMENT

On a corporate group level at SECO Tools, environmental issues are taken very seriously and the environmental consciousness is high. On a more individual level, consciousness naturally varies. According to the manager of global transport solutions:

"In that way, I can brag a little about my employer; environmental work as a whole, including work environment, is taken very seriously."

SECO Tools has a department that is responsible for quality, environment and work environment, and that department is located in Fagersta at the main office. The people that work there act as support and internal auditors for the different subsidiaries. They also give SECO personnel updates on the management system, including the environmental aspects of that system. Otherwise, there is not specific environmental training for the personnel, unless it is explicitly asked for.

The process of selecting LSPs from global transports' perspective includes three main criteria. First, the LSPs need to offer a high enough service level. They also need to have realistic prices, and third, they must be able to show that they have organised their work in a way that considers environmental issues. The first step is to have an environmental management system, which does not necessarily have to be ISO 14 001. The environmental requirements have sometimes caused problems, for example in countries where LSPs not always can live up to the required standards.

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

"The ambition is that we want to produce more and sell more, but no necessarily damage the environment more."

There are several driving forces for the environmental work. First, it is important to be considered a "good company". The manager of global transport solutions says:

"I do not think we can act powerfully on an international market without having the safety of this [environmental work]. We want to be able to step up and say 'We take responsibility'." There are also financial incentives for the environmental work, because environmental concern also generates more business, according to the manager of global transport solutions. He says:

"If a company works internationally with environmental improvements, that [work] will increase market shares."

5.2.4 ERICSSON

Ericsson, which was founded in 1876, is a provider of telecommunication equipment, related services and multimedia solutions. In Ericsson's annual report from 2010, one can read: "Our vision is to be the prime driver in an all-communicating world. This means a world where everyone can use voice, data, images and video to share ideas and information, wherever and whenever they want." (p. 1). Over 40% of all mobile traffic goes through Ericsson equipment.

Ericsson is active in 175 countries, of which the United States and China are two of the largest markets. In 2010, Ericsson had a turnover of 207 billion SEK and employed 90 300 people. The company divides its business areas into five different segments; Networks, Multimedia, Global services, Sony Ericsson and ST-Ericsson. The first three of these are pure Ericsson segments, whereas the two latter are joint-ventures. Segment Networks is the largest of the three pure Ericsson segments and develops and delivers mobile and fixed infrastructure equipment and related software. Segment Multimedia develops and delivers software-based solutions for real-time & on-demand TV, consumer & business applications and Business Support Systems (BSS) for telecom operators. Finally, the Global services segment provides managed services, consulting, systems integration, customer support and network rollout. This segment is the second largest of the three segments. (Ericsson, 2009)

The remaining parts of this company description will focus on logistics within Ericsson, and more specifically distribution logistics, unless otherwise stated. The global strategy for the logistics division is to ensure that distribution and warehousing in the supply chain works. Centrally, about 80 people work with distribution logistics. Logistics and transports are very important to Ericsson, since they constitute an important part of the whole supply chain. However, the environmental advisor at Distribution Logistics does not know exactly how much of Ericsson's costs that derives from transport.

On a more general Ericsson level, transports are implicitly of importance. More specifically, one of the company's ideas is that people should not necessarily have to travel in order to communicate, since the products and services that Ericsson provides have a potential to lower the need for physical meetings between people. The environmental advisor at Distribution Logistics says:

"The sector that we belong to believes that it shouldn't be necessary to take that flight."

With regard to environmental work, Ericsson makes a Life Cycle Analysis (LCA) for all its products, and transports are one part of the LCA. The environmental advisor's work here involves the reporting of emissions from freight transports, and she therefore collects emissions reports from the logistics service providers. She states that it is too bad that there are no standards for how to measure and report CO₂ emissions and that this is a problem when emissions data is to be collected from the logistics service providers. However, since emissions are reported every year, the environmental advisor at Distribution Logistics points out that it is at least possible to see changes and improvements compared to previous years.

As a step towards developing a standard for measuring CO₂ emissions from transports, Ericsson has been actively involved in NTM.

ERICSSON AND THE ENVIRONMENT

Ericsson basically wants to be a part of creating a more sustainable world. The company wants to empower both individuals and companies to actually do something about the problems that the world faces. There are a number of people within Ericsson that work with environmental issues, such as those that are dedicated to environmental design and the development of products. This means that they are working to make the products less environmentally harmful.

There are a number of people who work with environmental issues on a corporate level at Ericsson. In addition, there are a number of people at different places in the organisation that working with environmental issues; for example, every region has an environmental advisor who has general environmental responsibility for that region.

Ericsson is aware that they are a part of environmental problem. The environmental advisor at Distribution Logistics says:

"We know that we definitely have a part in environmental effects, since transports are a large part of environmental effects."

This knowledge is also a driving force for environmental work at Ericsson – they want to contribute to improving the situation. Another driving force is that they see a connection between environmental work and cost savings:

"The right cost and the right carbon footprint go hand in hand."

The environmental advisor at Distribution Logistics is required to give quarterly reports on transport emissions to the corporate level.

Ericsson also measures the quantity of goods that are sent via so-called surface transports (road, rail and ocean) and air. Ericsson sends a lot of goods by plane, but as a part of their environmental work they are trying to decrease the percentage of air freight.

The environmental advisor's responsibility is to inform the organisation about environmental issues within the field of transports. On a corporate level, sustainability director Matilda Gustafsson is responsible for environmental issues within Ericsson, and environmental issues is one part of the sustainability work at Ericsson. Matilda Gustafsson's superior is the vice president for sustainability and corporate responsibility issues.

Environmental work within Ericsson is driven by different people within the organisation and in part from the corporate level.

6 CASE DESCRIPTIONS AND SINGLE-CASE ANALYSIS

In this chapter, the four cases will be presented and analysed separately. The aim of the chapter is to present the four buyer-supplier relationships and conduct a single-case analysis for each case in order to provide a basis for the analyses in Chapter 8.

Each case is first described based on general information about the relationship between the two companies in each buyer-supplier relationship. Next, a presentation of the green relationship for that specific case is presented, and this is followed by a single-case analysis. The order of the cases and the outline of the chapter are illustrated in Figure 6.1.

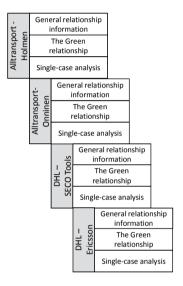


Figure 6.1 - Outline of Chapter 6

6.1 THE ALLTRANSPORT-HOLMEN CASE

Holmen Paper is Alltransport's largest customer and represents 20% of Alltransport's turnover. Of those 20%, about 35% are inbound transports to Holmen's factories and 65% outbound transports from Holmen's factories. The remaining parts of this case description will focus on outbound transports, for which the logistics director at Holmen Paper is responsible. For Holmen Paper, in its turn, Alltransport represent about 5% of transport costs. Even though 5% may seem like a small figure, Alltransport is the largest transporter of products from Braviken to destinations within Sweden.

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

There are basically two situations when the people interviewed at Alltransport and Holmen Paper is in contact with each. One is when negotiations for new contracts are made and once a year when price adjustments are discussed. In the case of Alltransport, the business area manager is the person who has the overall responsibility for the deal with Holmen, while the salesperson often is the person involved when adjustments, for example new destinations, are made during the contract period. The other situation that requires contact between Alltransport and Holmen is when trouble arises. For example, if the unloading at one of Holmen's customers is not working as it should, then Holmen Paper's logistics director is contacted by the customer. This, however, is something that rarely occurs. The logistics director says:

"But, I mean, if it [the relationship] works, then that is how it is. And basically it always does."

In addition to these two reasons for communication, other people within Alltransport and Holmen are in contact with each other as well. One example is the transport leaders, who are in contact with the unloading section at Holmen's site. That this communication is working as well is also important for the Alltransport-Holmen relationship.

Both Alltransport and Holmen are clear about the fact that there is trust in the relationship between the two companies. Alltransport's salesperson explains:

"Even if we have merely shaken hands on some issues, we still know that it [the handshake] is valid."

Alltransport's business area manager believes that Holmen trusts Alltransport because of the fact that Alltransport are allowed to do other things than just take care of transports. Trucks are sometimes loaded inside of Holmen's area when Holmen's working hours are over. More specifically, Holmen themselves have times scheduled for the loading of trucks each day, but in addition to these times, Alltransport's personnel do this job in the evenings. Furthermore, Alltransport also takes care of the unloading at some of Holmen's customers' sites. The logistics director at Holmen Paper even states that Alltransport is Holmen's "face towards the customers" and this has led to a strong connection between Holmen and Alltransport.

With regard to the power relationship between Alltransport and Holmen, both companies believe that Holmen is the more powerful. Even though Holmen Paper's logistics director initially says that the two power relations between the companies are equal, he admits that Holmen is the stronger since they are a big part of Alltransport's business and that Alltransport could be replaced if necessary, since "there are a lot of trucks". He says:

"If they [Alltransport] didn't have Holmen, then they wouldn't be able to have as many vehicles as they have. We, on the other hand, would find someone else."

Alltransport is also aware of the fact that Holmen could switch logistics service provider if they found it necessary, and that such a situation gives Holmen power. Still, Alltransport's salesperson says that Alltransport has kept a high level of service towards Holmen, and he thinks it is unlikely that the company will change suppliers. Moreover, the business area manager claims that Holmen and Alltransport often reach mutual solutions. Additionally, he thinks that Alltransport exercises some power since they are either capable or not capable of doing what the customer asks of them:

"We have a possibility to say no, of course - if there are circumstances that we can't accept or prices that we can't accept. But often we find mutual solutions."

Holmen Paper's logistics director concludes that even though Alltransport are more dependent on Holmen than Holmen on Alltransport, this is not something that Holmen takes advantage of. He also adds that Alltransport's size is of importance to Holmen, because the company is neither too big nor too small. If demand for transportation increases unexpectedly – for example because of news that in turn leads to an increase in demand for newspapers – and a truck must transport paper to a customer at 12 am, then Holmen can call a driver at Alltransport and ask him to do that. According to the logistics director, DHL would for example not be able to do this, since that company is too big to be so fast. He explains:

"So this is where they [Alltransport] have their niche. They help out. That's their strength. So they can't grow too much. If they grow, it is important that they keep the personal touch."

The relationship between Alltransport and Holmen is based on the function that is bought, that is, the transports. Holmen's logistics director says that although it is always nice to recognise the person sitting opposite you when you are negotiating, it is still the function that is bought. Alltransport's salesperson agrees that the contact between Holmen and Alltransport is mostly professional, but adds that it is to some extent built on more personal relationships. Alltransport's salesperson says:

"We have gotten to know each other very well over the passing years. We negotiate, we call each other about new changes once in a while and we meet at customer activities too, so we know each other well."

6.1.1 THE GREEN RELATIONSHIP

Environmental work is an issue in the relationship with Holmen, according to both the business area manager and the salesperson at Alltransport because of the desire to have high load rates and the need to minimise trucks running empty. This work is made easier since Alltransport takes care of both some inbound and some outbound transports for Holmen and both "sides" (inbound and outbound) were present at the same time during the previous negotiation. The business area manager at Alltransport says:

"We try to match the two deals that we have with Holmen, so that the outgoing volumes match the incoming. We match those flows, so that trucks that load paper from Norrköping to Stockholm or Västerås or some other place, for them we transport recycled paper back to the factory. So we try to match that as much as we can, so that it becomes almost a closed circle."

Alltransport's salesperson gives some more information about how they are working towards high fill-rates and states that Holmen themselves keep track of how much to load until a truck is fully loaded. He says:

"We hardly ever have half-filled trucks [for Holmen]; we make use of the loading possibilities to 100%, at least with regard to weight limits."

However, according to the salesperson, Holmen never speaks about the fill-rates in environmental terms; the measures to reach high fill-rates are for financial reasons. Other than high fill-rates, the environment is not taken into account in the Alltransport-Holmen relationship, according to Alltransport's salesperson. The logistics director at Holmen Paper states even more clearly that environmental issues do not exist in the relationship between Holmen and Alltransport. When asked if environmental issues are a matter of consideration in any way in the relationship with Alltransport, Holmen Paper's logistics director says:

"No, they actually aren't. We haven't really asked those questions. /.../ We have just focused on the product arriving at the right time and so on."

Both Alltransport and Holmen Paper are clear about the fact that Holmen Paper does not have any environmental demands at all and environmental agreements are never part of the contracts between the two actors. The business area manager at Alltransport even puts it like this:

"I perceive that [Holmen's environmental demand] as non-existent."

Likewise, Holmen's logistics director states that Holmen Paper does not have any specific environmental demands on logistics service providers in general, and says:

"When we negotiate transport deals, we have come pretty far with regard to secure loading requirements...But we don't have demands that they [the LSPs] should have a specific engine."

Thus, environmental work is not a reason for why Holmen is a customer of Alltransport. Service is the most important aspect, but if different LSPs can offer the same high service level, then environmental work could potentially be a factor that affects the choice of LSP for Holmen. Moreover, Holmen is not willing to pay for environmental work.

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

With regard to green focus within Alltransport, the salesperson at Alltransport thinks that Holmen thus is aware that Alltransport conducts environmental work. He says:

"I think they somehow know us so well and they receive documents about our environmental work, and somehow that is enough for them."

Holmen Paper, on the other hand, has no awareness of what Alltransport's environmental offering consists. According to the logistics director, Alltransport has never really tried to clarify the details of their environmental work, and Holmen has not asked for a clarification either. According to the logistics director, the situation in Sweden is different from other European countries, in the sense that Sweden has come further with regard to environmental issues. He says:

"...Sweden, at least, here – at least we perceive, and hope and believe – has come so far with regard to engines, that we shouldn't really have to be concerned here. But that's more of a feeling that we have."

This reasoning also applies to Alltransport. The logistics director says:

"...we think that they [Alltransport] have 'good things' and that they work with these things themselves. We read in their magazine which we get now and then and see that they have different projects. So I am certain that they don't just sit and do nothing."

Holmen Paper's logistics director thinks that it is vital that if environmental issues were to be discussed with an LSP, it must be done in the negotiation phase. He does not believe that it is of interest later in the process – at that point in time things have to go fast and everyone is busy.

According to Alltransport, the most environmentally driving company in the relationship is Alltransport. The salesperson believes that this has to do with the nature of the companies; Alltransport is a logistics service provider and it is more natural for such companies to be environmentally aware. When the business area manager explains why he thinks Alltransport is the most environmentally driving company in the relationship, he says:

"We at least try to inform them about our way of working and our way of thinking, and every year when our sustainability report has been published we have gone through it together with them so that they get to see it. So I think that they are aware of our [environmental] work. I hope..."

The logistics director at Holmen, on the other hand, does not see a clear driver of environmental work in the relationship between Alltransport and Holmen. He thinks that the question is difficult to answer, but concludes:

"We are not proactive and that goes for the other party [Alltransport] as well."

6.1.2 ANALYSIS OF THE ALLTRANSPORT-HOLMEN RELATIONSHIP

In this section, a single-case study of the Alltransport-Holmen relationship will be presented, starting with Step 1.

CASE ANALYSIS: STEP ONE

The first step of the single case analysis is to learn which green categories are mentioned in the Alltransport-Holmen Paper case. The green categories mentioned in the case are discussed below and emphasised in *italics* when they appear in the text. The green categories found are also shown in Table 6.1.

First of all, based on responses from representatives from both companies the results indicate that environmental consideration is not on the agenda when Holmen buys logistics services from Alltransport. Interestingly, both the business area manager and the salesperson at Alltransport initially say that green categories are a part of the relationship between the two companies, but then add that no actual green demands are put on Alltransport from Holmen. Instead, the case description indicates that Holmen's focus is on costs and on-time deliveries. Thus, the results suggest that there is a difference between how Alltransport and Holmen view measures such as *fill-rates* and *trucks run empty*, which Alltransport sees as environmental work, most likely in

combination with cost savings, while Holmen merely sees cost saving potential. Additionally, according to Alltransport, the two companies *discuss Alltransport's sustainability report* each year.

Table 6.1 – Green categories in the Alltransport – Holmen Paper relationship

	Alltransport - Holmen Paper			
	Alltransport	Holmen Paper		
Categories	High load-rates	General belief that LSP is proactive		
_	Minimising trucks run empty			
Green	Review of sustainability report			

The findings indicate that Holmen does not have any green demands that Alltransport needs to fulfil. However, the case description suggests that Holmen has given environmental issues in the relationship some thought and *perceives that Alltransport are relatively active with regard to environmental work*. Still, this is not something that is taken any notice of in the relationship between the two actors, and details about what this environmental work includes are not clear.

CASE ANALYSIS: STEP TWO

Step 2 of the case analysis includes a gap analysis where the Gap model presented in Chapter 4.7 is applied to the green categories found in step 1.

In accordance with the discussion above, there are four green categories in the Alltransport-Holman case that can be placed in the Gap model, which is shown in Figure 6.2. The results indicate that Alltransport perceives that high load-rates and minimising trucks running empty make up part of their offering. These green categories are not, however, mentioned by Holmen, nor does Alltransport perceive them to be part of their demands. According to the results, the same situation holds for the review of Alltransport's sustainability report, which is why it is also merely placed in the box "offering" in the Gap model. Finally, Holmen perceives that Alltransport is proactive with regard to environmental issues, and this green category is therefore considered to be a part of the perceived offering. Interestingly, the results do not give any indication that Holmen is actually interested in this proactive approach, and therefore it is not included in the actual demands.

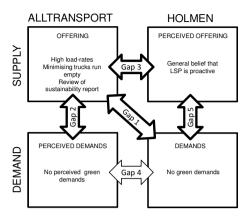


Figure 6.2 – Matches and mismatches in the Alltransport-Holmen relationship

As Figure 6.2 indicates, in the Alltransport-Holmen relationship there are mostly mismatches between green supply and green demand. More specifically, mismatches appear when Alltransport's stated offering is included, meaning that Gaps 1, 2 and 3 are mismatches between offerings and demands in the relationship. Gap 5 also is a mismatch, since the results from the single-case analysis indicate that Holmen knows that Alltransport works with environmental issues, but at the same time Holmen does not have any green demands. What is called Gap 4 in Figure 6.2 is in fact a match, since Alltransport perceives no green demands from Holmen, who in turn have no green demands.

CASE ANALYSIS: STEP THREE

As described in Chapter 4.7, step three of the single-case analysis is to study characteristics of the Alltransport-Holmen relationship. With regard to the length of the relationship, Holmen has bought transports from Alltransport for more years than anyone can remember. The case data shows that the duration of contracts is 2-3 years and although the amount of tons transported can vary between contracts, the two companies always have some business together. Holmen appears to decide the length of contracts.

With regard to outsourced activities, the case results indicate that Alltransport conducts a few more services for Holmen than merely transports, since they are is involved in both loading at Holmen's sites and unloading at Holmen's customers' sites. Furthermore, the results indicate that trust is important in the Alltransport-Holmen relationship. This appears to be closely linked to the outsourced services, because since Holmen trusts Alltransport to be the "face towards the customers" for example, the results indicate that because Alltransport is hired to conduct these extra services, trust is obviously important. Alltransport also states that a handshake can be

enough when deals are made in the relationship; the people involved know that the handshake is valid. Moreover, the case results suggest that the relationship between Alltransport and Holmen is mainly based on professional contact between the companies, and Holmen emphasises that the important thing is that a function is bought. Table 6.2 summarises the characteristics of the Alltransport-Holmen case.

Table 6.2 - Relationship characteristics of the Alltransport-Holmen case

Length of relationship	Length of contracts	Outsourced activities	Trust in the relationship
Long	2-3 years	Transports, loading and unloading	Yes

6.2 THE ALLTRANSPORT-ONNINEN CASE

Onninen represent about 3% of Alltransport's turnover, which makes them an average customer for the company, or "a good medium-sized customer" as the business area manager for Alltransport puts it. As for Onninen, Alltransport represent around 4.5% of total transport costs. All Onninen's goods that are to be delivered in Östergötland are transported by Alltransport. The logistics service provider is involved in deliveries of almost the whole range of heating and sanitation products and in the smaller deliveries of the electric power products offered by Onninen. Every evening, Alltransport sends a truck and trailer to Onninen's central warehouse. The goods are driven to Alltransport's terminal in Norrköping, where they are handled and sorted and then distributed the next morning in the distribution vehicles.

Onninen has been a customer of Alltransport since February 1st 2010, and the first contract is for three years. Onninen's transport manager says the following about the period of the contracts:

"I know who they [Alltransport] are and what type of quality they can deliver. At the same time, price is important as well; I get a lower price if I sign a three-year contract as opposed to a one-year contract. So I make money and they also benefit because of the security of three years so that they can develop. I could just as well sign a five-year contract. There is a clause, so if they mess up, then the contract is broken."

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

"Since I have sold transports, I know how a [transport] sales person works. So that's fun."

With regard to daily activities, the transport leaders are the people who manage the relationship between Alltransport and Onninen. The employees interviewed at Alltransport and Onninen are in contact with each other approximately once or twice a week and they meet physically every two months. Alltransport's business area manager is very seldom in contact with Onninen, since the salesperson is the person who is responsible for the contract with Onninen. The two companies are generally have contact for three different reasons, other than the negotiation process; problems, new circumstances or invoice issues. Onninen's transport manager also adds:

"There are also occasions when we just call to talk in general. But that's something I do with all our suppliers."

Alltransport and Onninen have a trustful relationship, according to both involved companies. Representatives from both companies mention that the trust is built on the employees at the other company. Onninen's transport manager specifically mentions Alltransport's salesperson, with who the transport manager is most often in contact. The transport manager has made it clear that the salesperson is the person he wants as his contact person and he was also the person the transport manager knew from his last job. The transport manager says:

"I know that Tommy Gustafsson [the salesperson] will fix this [Onninen's transport needs and problems that arise]."

The business area manager bases the presence of trust on a background story where Onninen had trouble with a logistics service provider that was responsible for the company's transports. That had led to a broken contract and a switch of logistics service provider to another provider. When Alltransport also wanted a deal with Onninen, convincing Onninen's personnel was difficult and during this time the transport manager was not very popular within Onninen. Alltransport's business area manager says:

"So when we came into the picture and wanted to take care of some transports, we had a tough job in convincing the personnel within their [Onninen's] organisation. Since John [Lind, the transport manager], who is responsible [for transports] within Onninen, has worked with Alltransport previously, he knew what we could achieve. But we had a tough job convincing the personnel within Onninen."

Alltransport's salesperson also says that Alltransport had to prove that they were able to live up to Onninen's demands and there were many meetings before the deal was closed. He says:

"Then there is the issue of convincing their [Onninen's] customers as well. In order for us to be a supplier, we had to manage the time restrictions in Östergötland. So we have had to rearrange much of our traffic in order for us to manage that. But this is a competitive advantage for Onninen as well; they can tell their customers that we arrive a certain time – much earlier than competitors – and that way they can sell more and we can sell more transports."

In addition, the relationship between Alltransport and Onninen was tested at an early stage since the start of the contract coincided with the chaos caused by heavy snow in Östergötland in 2010. That meant that Alltransport's trucks were often very late. The transport manager says:

"The transition [from the previous LSP] to Alltransport has not been without hitches. The first month was chaotic - there were the snowstorm in January and February - so they weren't off to the best start."

During this time, Alltransport and Onninen had daily communication in order to try to solve the problems. Although there were problems, the relationship between the two actors was strengthened during this time. After that, whatever problems that have arisen have been solved and solved quickly, and this has enabled a high degree of trust between Alltransport and Onninen.

Some adjustments have been made since the first year of the deal between the two companies because of things that have worked well and things that have worked less well. Alltransport's business area manager says:

"But it feels like we've sorted things out and that they have a high confidence in us today."

Onninen are also happy about the arrangement and are pleased with the work that Alltransport performs. The transport coordinator also says:

"Alltransport has been very responsive, come up with changes on their own and that is something we like – that I don't have to tell them what to do all the time and that they can come up with their own ideas."

With regard to their power relationship, Alltransport and Onninen, Onninen seems to be the most powerful in the relationship. However, Onninen's transport manager has not thought about power in the relationship and is convinced that it does not really matter. He reluctantly says that Onninen probably has more power, since they can switch transport supplier if Alltransport does not do a good job. He wants Alltransport to do their job well and power is not an issue. He says:

"I expect that they do what they are supposed to – those things we've agreed on – and that they develop during our collaboration and find better and smarter solutions and that we don't stand still and instead achieve continuous improvements."

Onninen's transport coordinator is more certain that Onninen has the power in the relationship between Alltransport and Onninen, because Onninen is the customer:

"After all, we are the ones who are in charge of whether or not we want them [Alltransport] to transport [goods]; they are not the ones who decide if they want to transport our goods."

Alltransport agrees and partially puts the power situation down to the fact that Onninen puts such high demands on Alltransport with regard to punctuality. The salesperson says:

"We have to adjust to their demands quite a lot."

Alltransport's business area manager compares the Alltransport-Onninen relationship with the Alltransport-Holmen Paper relationship (presented in Chapter 6.1). He thinks the relationships work a little differently and says:

"In the end it is the customer that has the advantage since they own the goods, but this [Onninen relationship] has worked a little differently than with Holmen. Holmen is a little old-fashioned, if that's the right word. You meet the purchasing director once a year and you have a meeting where you go through the contract. Onninen is a bit more modern. We meet on a regular basis; sales personnel and transport leaders and their operative personnel meet and we've brought our drivers to some meetings to talk about ideas and how we can improve and the importance of doing right. So in my view, Onninen has a more modern set-up."

The two companies are jointly responsible for the success of their relationship according to Alltransport's business area manager. He concludes:

"So, I think that our power [over Onninen] is pretty high, in spite of everything."

The relationship between Alltransport and Onninen is to a large extent based on personal connections, even though the transport coordinator only contacts Alltransport on a professional basis and has no personal contacts within the company. Alltransport's salesperson and Onninen's transport manager knew each other before the deal between the two companies was made. The salesperson says:

"We have a very good relationship since I already knew John [Lind, at Onninen] from the transport business. ... We have a business-like relationship, but a good one."

In addition, the transport manager previously had contacts within Alltransport. Alltransport's business area manager adds that many people within Alltransport have now also developed a personal relationship with the transport coordinator at Onninen and says:

"So it's based on a little more than just business relations. And that is something that we like."

Alltransport and Onninen basically agree that Onninen has the power over Alltransport, even though the transport manager at Onninen does not think that power is an issue that has any effect on the relationship.

6.2.1 THE GREEN RELATIONSHIP

During the negotiations between Alltransport and Onninen, environmental issues were not mentioned and according to Alltransport, the focus was on-time deliveries and price. Onninen's transport manager says:

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

Alltransport has tried to show what they are doing within the environmental field, but that was not what closed the deal with Onninen. The business area manager says:

"Nothing that I have been a part of in the relationship with Onninen has been about that [environmental requirements]."

According to Onninen's transport coordinator, however, one of Onninen's requirements was that Alltransport should have environmentally high-quality vehicles. He adds:

"Other than that, it [the environmental work] is that we should work towards decreased amounts of transports and plan transports in an as smart way as possible for both parties."

From Onninen's perspective, a decreased in the number of vehicles and smarter planning are viewed as mostly cost saving measures. Onninen's customers do not want more than one vehicle delivering goods and at the same time, and according to Onninen it is not financially possible for Alltransport not to consolidate goods. Consequently, the environmental side of this work is

merely seen as a bonus and is not explicitly discussed in the relationship between Alltransport and Onninen.

Both the transport manager and transport coordinator at Onninen know that Alltransport works with environmental issues and the transport manager says that if he had been a hauler, he would have driven efficiently in order not to use too much fuel for example, which would keep costs down. Driving efficiently would also benefit the environment, which is something he believes holds for many cost saving strategies for logistics service providers. The transport coordinator looked at the documentation of Alltransport's environmental offering during the negotiation process over a year ago, but he does not remember enough today to explain the offering. The transport manager also knows that Alltransport has new vehicles and that they constantly update their fleet. He says that when you are on the road:

"You see many trucks that belong to Alltransport, and they look new."

Environmental issues are not discussed when Onninen's transport manager and Alltransport's salesperson talk about different matters, but the transport manager knows about Alltransport's environmental work from their webpage and he knows that they have an environmental management system. He says:

"They are certified according to ISO within the environmental field as well [as quality], and then you know that they've done work in order to get this quality marking. You can't cheat your way to that, so there you get information that shows that they think about environmental issues and work towards them [environmental improvements].

With regard to Alltransport's green offering, Onninen's transport manager says:

"It is difficult to pin down what they [Alltransport] offer as far as environmental categories are concerned, besides the fact that they are [environmentally] certified. It's not as if they offer me two different suggestions — one 'dirty' truck and one environmental truck. I don't get those kinds of offerings from them. They have never given me two different options."

The environmental certification is important for Onninen and all suppliers need to have some environmental management system. The transport manager explains more about the green offering:

"I only notice that they are [environmentally] certified. I would probably not have chosen Alltransport if they weren't certified."

On the other hand, Alltransport's business area manager says:

"I get the feeling that they don't consider that [environmental demand] a prioritized issue."

Onninen has never had any green demands that Alltransport could not fulfil, but on the other hand, they have never required anything other than the environmental management system. Onninen's transport manager gives an example of Stockholm, which has strict environmental regulations and where it is not allowed to use any old truck – the truck has to live up to some environmental standard. The logistics service provider that takes care of Onninen's deliveries there has to follow strict environmental regulations. But since there are no similar environmental regulations in Norrköping, Alltransport does not need to fulfil the same requirements.

Alltransport is the most environmentally driving company in the relationship. One reason for this according to both Alltransport and Onninen is that Alltransport wants to send as few trucks as possible, with as high loading rates as possible. The transport manager says:

"They [Alltransport] are the ones who have to drive in the most economical way in order to make more money."

Another reason why Alltransport can be considered to be the party with the environmental interests is that Onninen has simply not demanded any environmental work yet. Alltransport's salesperson says:

"I do not know their environmental work, but since they have not required environmental work from the beginning, I still think that we are driving more [with regard to environmental issues]."

Both Alltransport and Onninen predict that the environmental demands from Onninen will increase in the future.

6.2.2 ANALYSIS OF THE ALLTRANSPORT-ONNINEN CASE

In this section, a single-case study of the Alltransport-Onninen relationship will be presented, following the three steps described in Chapter 4.7.

CASE ANALYSIS: STEP ONE

The first step of the single case analysis is to learn which green categories are mentioned in the Alltransport-Onninen relationship. The green categories mentioned in the case are discussed below and emphasised in *italics* when they appear in the text, and they are also shown in Table 6.3.

The results from the Alltransport-Onninen case description above indicate that green dimensions are basically not taken into account in the relationship. The transport coordinator recalls that Onninen had demands on environmentally *high-quality vehicles*, and the transport manager mentions that Alltransport should be environmentally certified according to *ISO 14001*. The Alltransport representatives, however, do not mention any environmental demands from Onninen.

Moreover, the findings from the Alltransport-Onninen case suggest that Onninen are convinced that *Alltransport works with environmental issues* and that, in addition, Onninen takes some of the environmental work as given, since it is believed to also decrease their costs.

Table 6.3 - Green categories in the Alltransport - Onninen relationship

	Alltransport - Holmen Onninen			
ies	Alltransport	Onninen		
ategori	No Green Categories	High-quality vehicles		
n C		ISO 14 001		
Gree		General belief that LSP is proactive		

CASE ANALYSIS: STEP TWO

In step 2, the green categories identified in Step 1 will be further analysed in the Gap model presented previously. Interestingly, the findings from the case study suggest that Alltransport does not perceive any green demands from Onninen. The case description does, however, indicate that ISO 14 001 is of relevance in the green relationship, since it is described as one criterion for why Onninen chose Alltransport as a logistics provider. Although this is not mentioned by Alltransport representatives in the Alltransport-Onninen context, the company presentation in Chapter 5.1.1 confirms that Alltransport can offer ISO 14 001 and thus fulfil this demand from Onninen. Thus, ISO 14 001 can be placed in all the boxes in the Gap model with the exception of "Perceived demands".

High-quality vehicles are mentioned by one of the representatives from Onninen and the results indicate that the representative also thinks that Alltransport is able to fulfil this demand. Therefore, high-quality vehicles are placed in both "Perceived offering" as well as "Offering", even though the Alltransport representatives themselves do not mention this as a part of their offering. The final green category from Step 1 above is Onninen's belief that Alltransport is a proactive LSP with regard to environmental work. Although this is perceived as a part of the offering, the results indicate that Onninen does not include this green category in their demands. Thus, it is only placed in the box "perceived offering".

In Figure 6.3, the offerings and demands mentioned in the Alltransport-Onninen relationship are placed in the appropriate boxes in the Gap model. As the figure shows, when Alltransport's perceived demands are considered (the lower left box in the Gap model) there appears to be mismatches. The results indicate that Alltransport is not aware of any green demands from Onninen at all. This finding in turn leads to mismatches in Gap 2 and Gap 4 in Figure 6.3.

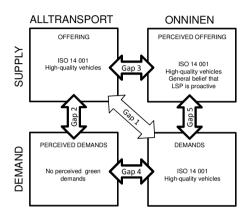


Figure 6.3 – Matches and mismatches in the Alltransport-Onninen relationship

CASE ANALYSIS: STEP THREE

Step three of the single-case analysis is to find characteristics of the Alltransport-Onninen relationship. Starting with the length of the relationship, Alltransport has been a supplier to Onninen for just over a year and the first contract has a duration period of three years. The case results show that Alltransport is mainly responsible for Onninen's distribution within Östergötland. In addition to pure transports, Alltransport also handles and sorts goods at Alltransport's terminal before further distribution.

The findings suggest that trust is an important element of the relationship between Alltransport and Onninen. From the case-description, this trust appears to be based on two main things. First, the personal relationship between the transport manager at Onninen and the salesperson at Alltransport is very important. Second, the events that happened prior to the contract was signed between the two actors, as well as that event at the very start of the relationship, have brought the two companies closer together. Before the contract was signed, Alltransport had to work hard in order for Onninen to trust them, and the transport manager at Onninen had to justify his belief in Alltransport.

As the discussion about trust implies, the relationship between Alltransport and Onninen is to a large extent based on personal connections between people. The transport manager at Onninen

and the salesperson at Alltransport knew each other before the deal took place between Alltransport and Onninen, and other people now also have close connections. Table 6.4 summarises the characteristics of the Alltransport-Onninen case.

Table 6.4 – Relationship characteristics of the Alltransport-Onninen case

Length of relationship	Length of contracts	Outsourced activities	Trust in the relationship
1 year	3 years	Transports, handling and sorting	Yes

6.3 THE DHL-SECO TOOLS CASE

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

According to the CRM at DHL, SECO Tools has been a DGF customer since 2003. They have continuous contracts, where no end-date is set and where price adjustments are negotiated once a year. If either DHL or SECO Tools are dissatisfied, there are varying terms of notice depending on the specific situation.

With regard to the contact between DHL and SECO Tools, it is the CRM who is the global coordinator for SECO Tools. The manager of global transport solutions at SECO Tools and the CRM at DHL have known each other professionally for many years. The CRM says:

"Since five years back I have been their [SECO Tools'] way into DHL, and they have decided that they want me no matter which division it is."

Besides communication with the CRM, the global transport solutions manager keeps in contact with DHL through global or regional managers within DHL Global Forwarding or DHL Express. He says:

"We are large enough [for DHL] to have special key account managers assigned to us for each region."

DHL and SECO Tools have a trustful relationship, according to representatives from both companies. For DHL, the CRM bases his opinion of trust on the fact that the two companies can speak openly about different solutions without having to hide things from each other. DHL's

environmental manager agrees and says that since she is not in a commercial position within DHL, she can tell things to SECO Tools that a sales person perhaps would not want to say. She would not do that without there being a feeling of trust in the relationship.

The manager of global transport solutions gives one main reason for the relationship of trust between DHL and SECO Tools which is that he believes that SECO Tools are really too small to have a key account manager. He thinks that the other companies that are assigned such key account managers have turnovers ten times greater than SECO Tools' turnover. However, according to the global transport solutions manager SECO Tools has complex transport specifications. At the same time, DHL are able to offer a large variety of services, from large deliveries like granting a charter of a plane or ship to small, time critical transports like single parcels by taxi. The global transport solutions manager concludes:

"They [DHL] have given us trust through assigning us specific contact people."

The CRM at DHL is a good example of such a person and SECO Tools' global transport solutions manager says:

"I have worked in the [transport] industry and created my own network, so some of the companies that SECO Tools works with today with regard to transport solutions would not have become a supplier if it wasn't for me, since I use old communication channels and sometimes of very informal character."

With regard to power, DHL's CRM is convinced that SECO Tools is the most powerful actor in the relationship. He says:

"The customer is always right."

SECO Tools global transport solutions manager is of another opinion. First, he says that that there is a good balance in the power between SECO Tools and DHL. He says:

"I might be naive in a Swedish way, but I would like to say that there is a good balance of power. Now we touch on things like personal chemistry, long respect for people who have worked professionally with things for many years. There is maybe not always respect between SECO Tools AB and DHL Global Forwarding Sweden AB or DHL Express Sweden AB, but on a personal level I would have to say that there is a very good balance."

He does, however, add some more information about his view of the relationship:

"However, if you look at it strictly business wise, we are just a pawn for DHL since a local office for them might as well be as large as we [SECO Tools] are globally."

Despite the fact that the global transport solutions manager perceives that DHL has most of the power, he is not concerned since the relationship works well on a personal and business level. The CRM at DHL seems to agree:

"SECO Tools is a so-called wise customer. They know that you can't demand a Rolls Royce if you pay for a Fiat. In that way it is fairly simple to have a dialogue with SECO Tools and they are prepared to pay for high quality."

Moreover, SECO Tools compares DHL's offerings with other LSP's offering and SECO Tools' global transport solutions manager claims that the company does have some power there:

"If DHL does not have the best balance between price, lead time and accuracy and can show environmental data that is correct, well, then they won't get the deal. Now, that was at least a bit cocky."

Both the CRM and the global transport solutions manager think that personal relations are important in the relationship. For example, the CRM is convinced that DHL and SECO Tools do more business together because of the personal connection between himself and the global transport solutions manager. These two company representatives did not know each other before the collaboration between DHL and SECO Tools started, but the confidence in the relationship was built early when they started working together. The CRM at DHL says:

"After our first meeting we decided that I would never go to Bengt [Brammefors, at SECO Tools] and sell something; he would tell me if he needed anything."

For SECO Tools part, the business deal itself is dealt with on a central level, but as soon as the contract is signed a lot of more people are involved than the global transport solutions manager. He believes that a business relationship is really built on communication between individuals and says:

"If you get a little bit philosophical, then you see that it is not companies that are in contact with each other – it is human beings."

DHL's CRM adds, however, that it is the business relations between the two companies that provide the basis for the collaboration.

6.3.1 THE GREEN RELATIONSHIP

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

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

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

"I think I can claim that the company that can show that it works actively with environmental issues and actually, over time, has better measurements and can explain those numbers and stand for them – even if it is 5% more expensive, that is the ones that get that deal, as opposed to one that is really cheap but where we feel that there is no serious environmental evaluation."

SECO Tools' customers value 1) the product 2) on-time deliveries and 3) price, and in that particular order. The CRM at DHL says:

"That's a bit unusual, that the price comes after the logistics parameter."

The fact that on-time deliveries are an important factor sets boundaries for the environmental work. More specifically, even though SECO Tools is interested in environmental issues, the company needs to live up to customers' demands. The CRM says:

"If you wonder how customers think about logistics, it is clear that SECO Tools is very interested in environmental issues, but at the same time, they have to give their customers as good a service as possible from a competitive point of view."

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

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

According to the CRM at DHL, there are basically three main projects that DHL and SECO Tools have performed, or are working on, together in terms of environmental work; decrease the amount of pick-up trucks at the DC in Brussels, open a new DC in China and open a national DC in Sweden. Details about these three projects are described below. In addition to these, SECO

Tools has stopped the using air freight to their site in India, and they have made changes in their planning which enables some large deliveries to be transported by ship.

A few years ago, the CRM at DHL and the global transport solutions manager at SECO Tools made a trip to Brussels where SECO Tools' distribution centre (DC) is located. The aim of the trip was to see if they could lower the number of trucks that picked up goods from the DC. At that time, fifteen trucks collected goods each day. The two company representatives tried to calculate at what time the goods had to be picked up in order to arrive at the customers on time. They did these calculations for the whole flow from the DC. This work enabled a decrease in trucks from fifteen to eight. The CRM at DHL says:

"We did pretty well. We managed to get down to eight [trucks]... The icing on the cake was when we managed to get DHL Express and Global Forwarding to collect with the same vehicle."

Because of changes in the structure in Brussels, the use of the same vehicle is no longer possible.

The second project includes changes in SECO Tools' distribution, and more specifically the start of a DC in China, since SECO Tools discovered that 40-50% of all goods that are sent to the Asian DC in Singapore end in China. The plan now is to send this 40-50% directly to Shanghai and thereby eliminate the extra distance between Singapore and Shanghai. DHL has assisted SECO Tools in this work and has helped them to think about certain issues. In addition, DHL's environmental manager has calculated the environmental effects such a change in the distribution would result in.

The final environmental project in the DHL-SECO Tools relationship includes yet another change in the distribution system. Today, goods that are produced in Sweden are transported to the DC in Brussels and goods that later are sold in the Nordic region are transported back north to the customers. SECO Tools is now considering opening a national distribution centre that could support customers in the Nordic region, the Baltic States and parts of Russia. If this was done for those goods, the return journey between Sweden and Belgium would be eliminated. The CRM at DHL says:

"And this is purely an environmental idea."

DHL's environmental manager helped SECO Tools with environmental calculations for this possible change in their distribution. In fact, SECO Tools is one of the few customers that have wanted help to calculate more advanced environmental data. However, the environmental manager is not sure if it is a genuine environmental agenda from SECO Tools' side, or if the global transport solutions manager may have got directives from higher up in the hierarchy. Still, she says:

"Approximately 140 customers want environmental reports, so it's not unique, but these [SECO Tools] seemed to want to do more."

Even though environmental issues are discussed in the relationship between DHL and SECO Tools, money is also a central factor in the discussion. The CRM at DHL says:

"There is a common denominator in all of these three cases, and naturally that is that...if you reduce the amount of pick-up trucks by half, then you don't just reduce the environmental impact; you also reduce costs."

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

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

As mentioned in the description of environmental work within DHL, the company works with a GoGreen concept, where customers can pay an extra fee and become a part of the decision about what that extra money should be used for. The CRM at DHL says that SECO Tools has not yet bought the GoGreen concept. However, he says:

"...and I think it attracts the type of environmentally aware customers that SECO Tools is a good example of."

He believes that SECO Tools will buy the GoGreen program if they find somewhere useful to invest the extra money. He gives an example of the portable water purification equipment that DHL works with and that could be something that SECO Tools can support in the future. On the other hand, SECO Tools has actively chosen not to buy DHL's Go Green concept. This is because SECO Tools thinks that the measures taken should be more directly related to the transports linked to their products. The global transport solutions manager explains:

"What we in that case want to pay for should have a more clear connection to the commitment in itself"

Thus, SECO Tools does not want to buy the GoGreen program. However, SECO Tools has other green demands, and the global transport solutions manager is clear about what these are:

"What we need is basic [environmental] data, which should be of high enough quality and we should understand how it was calculated."

The environmental data that SECO Tools requires is CO₂ emissions, partially because CO₂ emissions are the specific indicator for which an international standard has started to be developed. They have planned to add other indicators as well in the future, but as the global transport solutions manager says:

"We have to start somewhere."

DHL's environmental manager has partially helped the global transport solutions manager and his co-worker within global transport solutions to understand what type of data to require, in the sense that SECO Tools previously were interested in the exact fill-rate of a plane one specific day and exactly how much their portion of the freight weighed. Now they focus more on an average fill-rate that seems to be accurate enough over time. The global transport solutions manager says:

"It will never be completely accurate. I think that was an extremely important lesson learnt when we sat down with Linda [Bergsten, environmental manager at DHL] for a whole day. She actually helped us analyse our own material, and I think that is well done."

SECO Tools' global transport solutions manager also states that there are regional differences between the green offerings from different DHLs, which make the demand for uniform environmental data more difficult. He says:

"The offering does not look the same, even within [DHL] Express, here [Sweden], in Belgium, in Singapore and for USA flows."

The CRM at DHL believes that DHL are able to fulfil all environmental demands that SECO Tools have, as long as they are realistic about the fact that a transport needs to take place. DHL's environmental manager agrees and says:

"Yes, I think so – they haven't actually requested that much. They merely want to find some ways to lower the emissions – and we have done that – and we offer [environmental] reports. They are not interested in any green products and carbon offsets, but they are interested in a financial and environmental profit."

According to SECO Tools' global transport solutions manager, DHL has understood that environmental issues are important. He says:

"It is so modern, that those who offer a so-called green alternative in certain markets will gain market shares."

In a way, both SECO Tools and DHL encourage the work with environmental issues in the relationship between them. On the one hand, the global transport solutions manager says that since they do not have "a Linda [Bergsten, environmental manager at DHL]", they cannot compete with being the driver of environmental work.

"I cannot say that we [SECO Tools] have a person that is so devoted."

In addition, DHL believes that they are the party that pushes for environmental work since they come up with environmental suggestions with which they then approach SECO Tools.

On the other hand, both SECO Tools ad DHL seem to agree that SECO Tools to some extent is the driver of the environmental work, since the company has a green demand and asks questions that show that they are environmentally concerned.

In a way, both companies can be said to be driving forces with regard to environmental issues. The CRM at DHL thinks that both of their commitments go hand in hand and says:

"...since we know that they [SECO Tools] are open for such [environmental] argumentation, of course it helps our communication and our business relationship if we can prove ourselves to be inventive and help them reach their environmental targets."

6.3.2 ANALYSIS OF THE DHL-SECO TOOLS CASE

In this section, a single-case study of the DHL-SECO Tools relationship will be presented, starting with Step 1.

CASE ANALYSIS: STEP ONE

The first step of the single case analysis is to learn which green categories are mentioned in the DHL-SECO Tools case. The green categories mentioned in the case are discussed below and emphasised in *italics* when they appear in the text. The green categories found are also shown in Table 6.5. The case description of DHL and SECO Tools indicates that environmental issues are an important part of the relationship. In a comparison between SECO Tools and DHL's other customers, SECO Tools is more environmentally aware than many other companies, according to the key account manager interviewed at DHL. There are several other aspects of the relationship that indicate that environmental work is important. Environmental data, or more specifically reports of CO_2 emissions, are included in the relationship between DHL and SECO Tools. The projects that SECO Tools and DHL run together are another example. Although cost savings are mentioned as one driver for this work, environmental gains also appear to be

important in this specific relationship. The case description indicates that the projects aim to *decrease CO₂ emissions*, which is the label that will be used as the green category.

Furthermore, SECO Tools mentions DHL's environmental manager as one important aspect of the green relationship and that she gives DHL an advantage compared to competitors. *Environmental knowledge*, which in this case is suggested to the environmental manager, is therefore another green category. Finally, although this is not part of the actual relationship, the *GoGreen concept* is mentioned by company representatives from both DHL and SECO Tools as a part of DHL's green offering.

Table 6.5 - Green categories in the DHL - SECO Tools relationship

	DHL - SECO Tools				
	DHL	SECO Tools			
ies	CO ₂ report	CO ₂ report			
gori	GoGreen	GoGreen			
Categories	concept	concept			
_	Decrease of CO ₂	Decrease of CO ₂			
Freen	emissions	emissions			
5		Environmental			
		knowledge			

CASE ANALYSIS: STEP TWO

The second step in the single-case analysis is to place the green categories in the Gap model described in Chapter 4.7. Figure 6.4 shows in which boxes of the model the green categories are placed.

First of all, the case study results indicate that CO₂ reports are an important element of the green relationship between DHL and SECO Tools. DHL are aware that SECO Tools want to have these reports and are also are able to them. Thus, CO₂ reports fit into all four boxes of the Gap model. The same is true for the desire expressed by SECO Tools to decrease CO₂ emissions. Both companies are aware of this desire, and the case study findings suggest that SECO Tools are satisfied with the help they get. Thus, even though the decrease of SECO Tools' CO₂ emissions is not explicitly described as a part of DHL's green offering, the results indicate that the company are able to live up to this specific part of SECO Tools' demands.

The GoGreen concept is mentioned by both DHL and SECO Tools, who both acknowledge the fact that SECO Tools will not buy the concept as it is today. Therefore the GoGreen concept is placed in the boxes "offerings" and "perceived offerings". Finally, SECO Tools' perception of DHL's green offering indicates that the knowledge that DHL's environmental manager possesses has importance in DHL's offering. This knowledge is not something that is explicitly demanded by SECO Tools, but it can be utilised in their general desire for help to decrease CO₂ emissions.

Moreover, DHL are able to offer the environmental manager's knowledge, but the results point to the fact that they are not aware that she is actually a part of the offering.

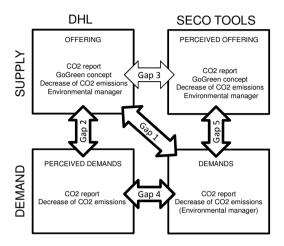


Figure 6.4 - Matches and mismatches in the DHL-SECO Tools relationship

As the discussion above indicates, there do not seem to be many mismatches between green offerings and demands in the DHL-SECO Tools relationship. One thing that seems relatively clear is that in its current form the GoGreen concept is not of interest for SECO Tools, although DHL believes that it might be in the future. Gap 1, as shown in Figure 6.4, is therefore a mismatch because of the different opinions on the GoGreen concept. Additionally, the resource that the environmental manager is to DHL and its green profile seems to result in a mismatch for Gap 2 and Gap 4.

CASE ANALYSIS: STEP THREE

As described in Chapter 4.7, step three of the single-case analysis is to find characteristics of the Alltransport-Onninen relationship. With regard to the length of the relationship between the companies, this is about eight years old. Moreover, the contracts are continuous, meaning that they do not have an expiry date. However, price adjustments are discussed once a year. With regard to the services that DHL perform for SECO Tools, the case results indicate that not only transports are conducted but that the two companies have also collaborated on both transport planning and logistics system design. The environmental projects that that two companies have worked on are examples of this. The findings suggest that with regard to these projects, DHL and SECO Tools to a large extent collaborate and DHL is thus involved in more than just the pure transport function from one point to another.

With regard to trust between DHL and SECO Tools, the results indicate that this is an important element in the relationship. Examples of this trust are the open communication between the two actors and the fact that DHL has assigned a key account manager to SECO Tools, something that SECO Tools does not take for granted. Moreover, the findings suggest that the relationship between DHL's CRM and SECO Tools' global transport solutions manager is based on a personal relationship, which adds to the examples of trust in the relationship. However, it is recognised that a business-like foundation is important for the relationship. Table 6.6 summarises the characteristics of the DHL-SECO Tools relationship.

Table 6.6 - Relationship characteristics of the DHL-SECO Tools case

Length of relationship	Length of contracts	Outsourced activities	Trust in the relationship
Eight years	Continous	Transports, transport	Yes
		planning, logistics	
		system design	

6.4 THE DHL-ERICSSON CASE

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

On a global level, the contracts between Ericsson and DHL do not have an expiry date. These so-called sales agreements enable regional and local Ericsson divisions to negotiate more detailed agreements that suit the local conditions. The local contracts in Sweden have a duration period of one year and constitute an extension to the global sales agreement. The inbound & domestic development manager at DHL thinks it is too bad that the contract periods are so short, since DHL and Ericsson continuously work with improvements in the relationship it is sometimes disturbing that negotiations have to interfere with that work. He says:

"That [negotiations] is not where focus should be right now."

During negotiations, DHL's share of Ericsson's transportation can change. The inbound & domestic development manager says that DHL has lost shares with regard to Ericsson's export flows, whereas inbound flow shares keep growing.

DHL has a meeting at every Ericsson site in Sweden once a month. The meetings are run by the environmental advisor at Ericsson Distribution Logistics and she helps to collect the necessary

information before each meeting. At these meetings, all flows are discussed and questions that arise are answered. Market tendencies are discussed as well as organisational changes and KPIs (Key Performance Indicators) and why they might have changed. The inbound & domestic development manager says:

"In this communication we have a very natural way of talking to each other about current problems, what has happened since the month before and what is going to happen in the near future."

DHL is also in contact with some of Ericsson's suppliers and discusses how the transport bookings should be handled. The environmental advisor at Distribution Logistics has contact with DHL when they provide emission reports and when Ericsson wants goods moved.

The relationship between DHL and Ericsson is perceived to be a trustful one, according to both companies. The inbound & domestic development manager bases this on the notion that the two companies work together to find solutions and he says:

"They [Ericsson] trust us, to a hundred percent."

Another reason to why the relationship is regarded as one of trust is that the two companies communicate well and they know how to deal with things if something goes wrong. The two companies have got to know each other well. The environmental advisor at Distribution Logistics at Ericsson says:

"We've made a journey together."

Moreover, the inbound & domestic development manager at DHL thinks that to achieve a high level of trust between DHL and customers, requires a lot of work; the companies need to see each other regularly, communication needs to be good and DHL needs to give the customer conditions to succeed in its work. He thinks that Ericsson values the fact that DHL puts the customer first and analyses customer needs to find suitable solutions, and he elaborates:

"They have a high trust in us. They know that if we make mistakes, we take responsibility for them. And if they make mistakes, we can talk to them as well. It's a give-and-take situation."

With regard to power, DHL's environmental manager is convinced that Ericsson holds the power over DHL in the relationship, while the inbound & domestic development manager at DHL and the environmental advisor at Ericsson Distribution Logistics have not considered power as an issue in the relationship. The inbound & domestic development manager considers the two companies as equals and adds:

"If I come into Ericsson's different sites, I feel at home."

Ericsson Distribution Logistics environmental advisor's view of power in the relationship is that the collaboration is built upon a strong relationship and that power is not an important issue. Service is trickier to buy than products, because it is not as easy to define what it is that you want. However, she admits that even though the environmental advisor says that Ericsson demands certain lead-times and service levels:

"We have certain requirements regarding the service we buy, but I don't think that's power; I think that is a part of the relationship that we buy."

DHL's inbound & domestic development manager has the same view and emphasises that improvements need to be achieved together with the customer, and therefore a good relationship is important and one partner's power over another can disturb the work in the relationship. He says:

"They know that we have switched on a light and that we need to walk together and we will get a lot of aha-experiences /.../. We do this together."

To some extent, personal relationships are important to the DHL-Ericsson relationship. The environmental advisor at Distribution Logistics and DHL's environmental manager have both been a part of a network – Arlanda logistiknätverk – and they got to know each other there. The inbound & domestic development manager believes that personal relationships between partners are important:

"You represent a company, but you come closer to a person. At the same time you need to be professional because you know that this relationship exists because of a job."

He says that the personal relationships do not matter in negotiations for example, but that trust is to a large extent built on the personal relationships and it is these that enable collaborations between the companies. From Ericsson's point of view, the relationship with DHL is regarded as strictly professional.

6.4.1 THE GREEN RELATIONSHIP

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

Another part of Ericsson's environmental work is that they want to shift from air transports to sea transports. 37% of Ericsson's goods are transported by planes, which corresponds to 93% of their CO₂ emissions. DHL's environmental manager says:

"Perhaps they haven't managed to shift that much [to sea], yet. But, they're working on it."

Moreover, Ericsson wants all five logistics service providers (or distribution service providers as they are called at Ericsson) to conduct an environmental project every year. The project should be something that is beneficial to both Ericsson and the involved logistics service provider. In 2009, DHL and Ericsson had a project that concerned eco-driving on the route between Gävle and Arlanda and that project resulted in less fuel consumption (the Gävle site is now closed). In 2010, DHL was in charge of one environmental project in which a milk round was initiated. Prior to the change, different sites were responsible for sending their goods to the central warehouse, which meant that each site used several transporters which, in turn added up to many transports to the site that ordered the goods and central warehouse had to deal with many transporters.

The milk round means that trucks go from one production site to the next to pick up goods. The trucks follow a time schedule, like buses do, and employees at the sites know when the trucks are scheduled to arrive. DHL's environmental manager explains:

"...we've taken over all of their [Ericsson's] flows that have gone between the factories and implemented a system where a truck arrives at 10 a.m. If there is nothing on the loading platform, the truck leaves at 10.30 a.m., period. There is no time to wait [for goods to arrive], because it comes back again at 2 p.m. and leaves at 2.30 p.m. So, it goes in loops like that./.../Like a bus, simply, in order to be able to plan and fill these trucks."

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

In the relationship in which the inbound & domestic development manager is involved between DHL and Ericsson, a lot of the environmental work is concerned with making Ericsson

understand that it is not necessary to use as they do in one case, seventeen different transporters in a delivery from A to B. He says:

"There is no one that can defend such behaviour – and they [Ericsson] don't. But, as I said, so many [people] are involved. Way too many people."

An interesting development in the milk-round project is that in Borås, the first biogas truck in Sweden will be a part of the scheduled delivery system. It is going to be tested locally, in order to see how much potential there is to expand its use, since there is still the problem that biogas driven vehicles cannot travel far without being refuelled.

There are still improvements to be made in the system implemented, for example get the sites to report the size of goods that they want delivered and standardise the way they book transports. The inbound & domestic development manager says:

"We see a lot of potential. And that is what we do – we win a deal, but we want to keep it and grow together with the customers."

According to DHL's inbound & domestic development manager, the project was not "forced" on DHL from Ericsson; instead it was driven by DHL employees.

The inbound & domestic development manager says that DHL and Ericsson have achieved a lot with regard to environmental work and continues:

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

The environmental advisor at Ericsson's Distribution Logistics says that when she and her colleagues are involved in the planning of the transportation of goods, most conditions are already set earlier in the supply chain. Therefore different transport options are limited when the environmental advisor gets involved. Because of that, information about environmental issues in logistics needs to be shared with other parts of the supply chain. The environmental advisor at Distribution Logistics says:

"A huge part of our job is to inform earlier parts of the supply chain about transport's [environmental] impact."

Traditionally, there has been a focus on cost and lead times when Ericsson has worked with logistics service providers. Recently, however, Ericsson has tried to integrate the environmental dimension to part of their communication with DHL. In the Ericsson-DHL relationship, many enquiries from different Ericsson divisions come to DHL, and normally DHL gets back to the Ericsson division and reports cost and lead-time for the changes. Internally, Ericsson has now tried to get their employees to ask for the environmental dimension, as well as cost and lead time, when they deal with DHL. Simultaneously, Ericsson has tried to get DHL to automatically

include environmental impact in every such report, even though Ericsson might not necessarily have asked for it. It is hoped that the inclusion of the environmental dimension will influence employees to considered environmental impact more than has previously been done.

Although Ericsson is considered interested in improvement of environmental issues, DHL is aware of that their customer is not prepared to pay extra for environmental services. In the work with Ericsson, both costs and environmental considerations are of interest for DHL. The inbound & domestic development manager says:

"It's a difficult combination. The customer has to save money. The management here [at DHL] has to see that is good business, and if I can include environmental consideration, then I'm satisfied."

The reality, he says, is that:

"Money talks and the environment doesn't."

When regard to DHL's environmental offering, the environmental advisor at Distribution Logistics says that DHL offers different modes of transport. Moreover, she knows that they offer climate offset programs, but say that Ericsson does not buy such services. She adds:

"I still think that they work actively with their environmental work within DHL."

With regard to green supply and demand in the relationship, the environmental advisor thinks that logistics service providers must take the lead in the environmental challenge, since they are the ones who impact the environment. Ericsson's core business is the products, and not transports, while the logistics service providers are experts on transportation. She does not think that logistics service providers in general are driving forces in environmental work. She says:

"Sometimes I feel like we are pushing them."

She also says:

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

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

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

The Clean Shipping Project provides an index in which shipping companies can report their environmental impact. Ericsson thus wants DHL buy shipping services from companies that are a part of the Clean Shipping database.

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

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

DHL's inbound & domestic development manager does not think that it is strange that DHL are able to fulfil Ericsson's green demand, according to him since he believes that DHL is leading the environmental work in the relationship. He says:

"Currently, it's we [who drive environmental work], without a doubt. It's we who present everything to them. And they are interested..."

The environmental manager agrees with this to some extent, but adds that globally, Ericsson is the actor that drives the environmental work in the relationship. Locally, however, she believes that DHL is a driver of this work.

DHL's view is that Ericsson's environmental demand will increase in the future and that inbound managers at the different sites will focus more on environmental issues when they become more accustomed to the new way of thinking. The good results from the domestic project described above are also likely to have helped Ericsson understand the potential of environmental work and they might therefore want similar projects in the future.

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

When DHL started working with inbound operations at Ericsson, no environmental demand existed and focus was merely on costs. Now, some Ericsson sites want to know the level of CO₂ emissions caused by their transports, in order to become more aware of the situation.

The inbound & domestic development manager at DHL has held a lot of presentations at Ericsson's different sites about the project and the improvements that have been accomplished. At some sites, this has generated a lot of interest and the management there has taken the presentation further and wants to know more. The inbound & domestic development manager thinks that the sites' managements are important elements in the continued work to improve inbound operations. He also thinks that the inbound division at DHL would benefit if they had an environmental specialist that could discuss green issues with the different sites at a higher level that what the inbound staff now is capable of.

However, the environmental advisor at Distribution Logistics thinks that DHL is the driving force with regard to environmental work in the relationship between Ericsson and DHL.

"It should be DHL – it [transport] is their core business."

6.4.2 ANALYSIS OF THE DHL-ERICSSON CASE

In this section, a single-case study of the DHL-Ericsson relationship will be presented, following the three steps described in Chapter 4.7.

CASE ANALYSIS: STEP ONE

The first step of the single case analysis is to understand which green categories are mentioned in the DHL-Ericsson relationship. The green categories mentioned in the case are discussed below and emphasised in *italics* when they appear in the text. The green categories found are also shown in Table 6.7.

The results from the DHL-Ericsson case study indicate that environmental issues are of importance in the relationship. The employees interviewed at both DHL and Ericsson appear to be committed to environmental work and both companies emphasise that a decrease in environmental impact also often leads to cost savings. The case description provides several suggestions to green categories that are a part of the DHL-Ericsson relationship. Ericsson would like DHL to commit to a *green project* every year and the goal is that the project should benefit both companies. The *GoGreen concept* is mentioned by both DHL and Ericsson, but it is not anything that Ericsson is interested in, and the case-study results indicate that DHL is aware of this fact. Moreover, CO_2 reports are included in green offerings as well as in green demands. Participation in the *Clean Shipping Project* is also mentioned by both DHL and Ericsson as an element of their green relationship.

In addition, the results suggest that Ericsson would be willing to include more green categories in the relationship with DHL, but that Ericsson does not know what that could be. *Unknown*

improvements are therefore part of yet another green category which is relevant in the relationship. Finally, the case data indicates that DHL would be capable of taking increased responsibility for *transport planning* for Ericsson, but this is not mentioned by Ericsson.

Table 6.7 – Green categories in the DHL – Ericsson relationship

	DHL - I	Ericsson
	DHL	Ericsson
S	Green Project	Green Project
Categories	GoGreen concept	GoGreen concept
ego	CO ₂ report	CO ₂ report
Cat	Clean shipping	Clean shipping
en	project	project
Green	Transport	Unknown
	planning	improvements

CASE ANALYSIS: STEP TWO

In Step 2 of the single-case analysis of DHL-Ericsson, the green categories from Step 1 are placed in the Gap model described in Chapter 4.7. The green offerings and demands in the relationship between DHL and Ericsson are shown in Figure 6.5.

The green project that Ericsson wants DHL to participate in every year is mentioned by representatives from both DHL and Ericsson. Although perhaps not a part of the general green offering for DGF, here the green project becomes a part of their green offering. This green category fits into all four boxes of the Gap model. The CO₂ reports and the participation in the Clean Shipping Project are also green categories that are mentioned by representatives from both DGF and Ericsson and that fit into all four of the Gap model's boxes. With regard to the GoGreen concept, the results from the DHL-Ericsson relationship indicates that DHL offers this green category and that Ericsson are aware of this element of the green offering. At the same time, Ericsson states that the GoGreen is nothing the demand and this is something that DHL is aware of. Thus, the GoGreen concept fits into "offerings" and "perceived offerings" in the Gap model.

Interestingly, the case description indicates that Ericsson does not to think that LSPs are proactive enough in their environmental work. The Ericsson representative claims that although DHL fulfils Ericsson's green demands, Ericsson can not know that no other green solutions exist. At the same time, the results suggest that DHL are for example capable of taking a larger responsibility for Ericsson's transport planning. Thus, *unknown improvements* should be placed in Ericsson's demands in the Gap model, and *increased transport planning* belongs to DHL's green offering.

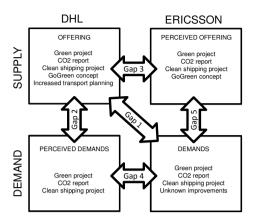


Figure 6.5 – Matches and mismatches in the DHL-Ericsson relationship

As illustrated in Figure 6.5, although there are some mismatches there are mostly matches in the DHL-Ericsson relationship. The green project, the CO₂ reports and the clean shipping project participation are located in all four gap-model boxes and thus there are only matches for these three green categories. The GoGreen concept is a part of "Offering" and "Perceived offering" and thus represents a mismatch in Gaps 1, 2 and 5. However, both DHL and Ericsson are aware that Ericsson is not willing to buy the GoGreen concept and therefore both know of these mismatches.

Finally, Ericsson is aware that DHL might know more environmental improvements that can be realised in the relationship and these unknown improvements result in mismatches in the Gap model. There is also a mismatch with regard to DHL's possibility to take over more of Ericsson's transport planning.

CASE ANALYSIS: STEP THREE

Step three of the single-case analysis is to find the characteristics of the DHL-Ericsson relationship. The two companies have had a business relationship for many years and, on a global level, contracts have no expiry date. In this specific DHL-Ericsson relationship, however, contracts are signed for one year at a time.

With regard to outsourced services, the results from the case presentation suggest that DHL performs more than merely operational transport activities for Ericsson. Firstly, DHL has control tower operations and thus acts as support for Ericsson's logistical operations and secondly, the green project described in the case presentation suggests that DHL also is involved in the planning of some of Ericsson's goods flows.

The relationship between DHL and Ericsson is one of trust and the results indicate that trust has been built through close collaborations over many years. The companies work together to find solutions and this "together"-aspect of the relationship seems to be important for both DHL and Ericsson. Trust is also built into the relations between the people in the relationship. Finally, the relationship is mainly built on professional relations between people and companies, but personal connections are important to some extent. Table 6.8 summarises the characteristics of the DHL-Ericsson case.

Table 6.8 - Relationship characteristics of the DHL-Ericsson case.

Length of relationship	Length of contracts	Outsourced activities	Trust in the relationship
Long	1 year	Transports, control tower operations, transport planning	Yes

6.5 SUMMARY OF THE SINGLE-CASE ANALYSES

In this section, the single-case analyses are briefly summarised. For Step 1 of the case analysis, twelve green categories were found in total. They are listed in Table 6.9 below and the corresponding case is marked with an X. Note that the two green categories *high-load rates* and *minimising trucks run empty* from the Alltransport-Holmen case are considered to belong to the green category *transport planning*, and are thus not separate categories in the table.

Table 6.9 - List of green categories in relation the four cases

	Alltransport- Holmen	Alltransport- Onninen	DHL-SECO Tools	DHL- Ericsson
High-quality vehicles		X		
Transport planning	X			X
CO ₂ report			X	X
ISO 14 001		X		
Review of sustainability report	X			
General belief that LSP is proactive	X	X		
Environmental knowledge			X	
Green Project				X
Decrease of CO ₂ emissions			X	
GoGreen concept			X	X
Clean shipping project				X
Unknown improvements				X

As can be seen from the Gap models in the four single-case analyses, many mismatches can be found on a general Gap-level. Table 6.10 summarises this information and indicates that only three of the twenty Gaps are a complete match. A "Yes" in the table indicates that there is a match, while a "No" indicates a mismatch.

Table 6.10 - Matches/mismatches for each Case and Gap

Case	Gap 1	Gap 2	Gap 3	Gap 4	Gap 5
Alltransport-Holmen	No	No	No	Yes	No
Alltransport-Onninen	Yes	No	No	No	No
DHL-SECO Tools	No	No	Yes	No	No
DHL-Ericsson	No	No	No	No	No

Finally, Table 6.11 summarises the relationship characteristics of the four cases.

Table 6.11 – Relationship characteristics for each case

	Length of relationship	Length of contracts	Number of outsourced activities	Trust in the relationship
Alltransport/Holmen	Long	2-3 years	Low-Medium	Yes
Alltransport/Onninen	Short	3 years	Low-Medium	Yes
DHL/SECO Tools	Medium	Continuing	Medium-High	Yes
DHL/Ericsson	Long	1 year	Medium-High	Yes

7 SUMMARY OF APPENDED PAPERS

This chapter presents a summary of the three appended papers, with focus on results from the papers. Further information about for example backgrounds and research approaches can be found in Appendixes 3, 4 and 5.

7.1 PAPER 1 – GREENING THE OFFERINGS OF LOGISTICS SERVICE PROVIDERS

Previous research into green logistics has to a large extent focused the environmental effects of transportation, based on the use of better technology and on designing more efficient transport networks (see for example Aronsson and Huge-Brodin, 2006; McKinnon, 2008). Very little focus has, however, been given to LSPs' environmental performance and even less, if any, research focuses on green offerings of LSPs.

The purpose of this paper is to develop a tentative description of green categories of a logistics offering, based on a combination of customer and logistics service provider perspectives.

A literature review with a focus on general green logistics literature resulted in the identification of nine green categories that could possibly be a part of LSPs' offerings and shippers' demands. A structured literature review confirmed that the literature about green logistics seldom takes the offering/requirement perspective, and of the large number of papers that were scanned only three were finally considered relevant. A survey, on the other hand, confirmed all the categories that were found in the initial literature review as relevant for LSPs and shippers. A homepage scan then offered additional insight into the green categories and suggested further details to several of them. In addition, the homepage scan gave examples of green categories that were not found in the literature reviews. Table 7.1 summarises all the green categories found in the research for Paper 1, and also shows additional information from LSPs' and shippers' homepages.

Table 7.1 – Green categories found in Paper 1

Green Category	Examples, logistics service providers	Examples, shippers
Fuels	Bio fuels and renewable energy; If fossil fuels, only env. class 1	Renewable transport fuels, Cleaner energy solutions including warehouses
Vehicle technologies Mode choice and intermodal	Replace fleets for more environmental alternatives; Natural gas vehicles Shift from air to ocean, from road to rail, Intermodal solutions	Environmental Class 1 diesel engines; Modern vehicles with less emissions Combining air and rail freight; Decrease of air transport
transports Behavioural aspects	Decrease fuel consumption; Eco-driving training	Encourage lower fuel consumption; All the logistics service providers' drivers must be educated in eco-driving
Logistics system design	Network design; More direct transports	Continuous improvement of distribution networks
Transport management	Delivery co-ordination; traffic management	Well planned routes
Choice of partners	Cooperation with customers to help them reach their own environmental targets; Encourage suppliers to commence their environmental work in line with ours.	Choosing environmentally conscious transport providers; Development of performance matrix tool for road transport
Environmental management systems	Internal EMS; ISO 14 001-certificates	ISO 14 001, EMAS
Emissions- and energy data	CO ₂ in general; CO ₂ from transport	Collect data on CO ₂ , NO _X , SO _X ; Presents CO ₂ and energy consumption from external transports
Other	Environmental education for all employees and all managers; Consider environmental aspects in all investments and purchases, Climate certificate for the customer; Teaching customers of sustainability in every-day life; Emission off-set programmes	Product development for decreasing the need for transport

7.2 PAPER 2 – MATCHES AND GAPS IN THE GREEN LOGISTICS MARKET

The interface between LSPs and shippers is an area that has received little attention in previous research and even less has been done when environmental issues are added to this interface. Nonetheless, the perception among researchers and the industry is that in many instances, supply and demand in this green interface does not coincide.

The purpose of this paper is to develop and apply a tool for the identification of matches and gaps in the interface between LSPs' green offerings and shippers' green demands.

A Gap model with five potential Gaps was developed and applied on questions from a websurvey sent out to both LSPs and shippers. The Gap model is shown in Figure 7.1. The survey questions are also shown there, as well as the ten green categories that were the same for all four questions. Below, the results for each one of the five Gaps are presented.

LSP-questions	Shipper-questions
A: To what extent do you include any of the	B: To what extent are the following
following categories in your green offering?	categories included in your green demand?
C: To what extent do you perceive that the	D: To what extent do you perceive that the
shippers include any of the following	LSPs include any of the following categories
categories in their green demand?	in their green offering?

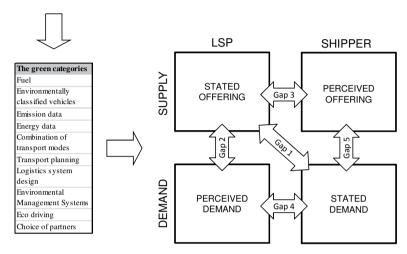


Figure 7.1 - The LSP-Shipper Gap model

Gap 1 shows the external gap between LSPs' stated offerings and shippers' stated demands. The results for this Gap indicates that the LSPs' stated offerings have higher mean values for all green categories than the shippers' stated demands.

Gap 2 shows the internal gap between LSPs' stated offerings and their perception of shippers' demands. Just as in the previously mentioned Gap, all green categories show a gap in Gap 2 where the LSPs stated offering score higher than their perception of demand. Moreover, the gaps are larger than for Gap 1 where LSPs' stated offering is included.

Gap 3 illustrates the external gap between LSPs' stated offerings and shippers' perception of these offerings. Again, most green categories show a gap where LSPs score higher than shippers. However, there are examples of very small gaps in Gap 3.

Gap 4 shows the external gap between shippers' stated demands and LSPs' perception of demands. For this Gap, the shippers' demand exceeds the LSPs' perception of the demand. This is interesting since it makes this gap the only one where the shippers have higher mean values than the LSPs.

Finally, Gap 5 illustrates the internal gap between shippers' stated demands and their perception of LSPs' offerings. This Gap is represented by small gaps, and for some green categories the gap is more or less non-existent.

The Gap model developed for and applied in the paper gives a more detailed picture of environmental aspects of the logistics market than appears to have been previously done.

7.3 PAPER 3 – PERFORMANCE MEARUREMENTS IN THE GREENING OF SUPPLY CHAINS

In response to increasing demands on improved environmental performance, companies need to develop their capabilities in assessing the environmental performance of their operations. Knowledge among practitioners as well as solid research results in this area lacks. This paper aims to present a framework of dimensions important to consider regarding environmental measurement in supply chain management. The paper also aims to present a practical example on how environmental performance measurements can be a success by applying these dimensions.

Literature regarding logistics management and performance measurement was coupled with theories regarding environmental logistics and green supply chain management. A framework was developed and a case study based on four actors in a reverse supply chain was then used to illustrate the framework. The literature review resulted in a framework of five dimensions in which the findings of the papers were placed:

Stakeholder perspective: There are increased environmental demands and pressures from a number of different stakeholders. However, few of the articles describe how the results from the measuring are communicated back to these stakeholders.

The purpose of measuring: There are different purposes to justify measurement at a general level. Few case descriptions, however, present their purpose of measuring in a clear way and there is a large focus on measuring present effects of historical decisions instead of measuring to provide support for future management.

Managerial levels of measuring: There is a need to integrate the measures used on different managerial levels (strategic to operational). However, few of the papers present empirical examples of how this can be done.

Measuring across the supply chain: There is a need to measure across supply chains, and to apply more process oriented measures. However, few empirical examples are presented of how this can be done.

Combination of measurements: There is a need for companies to link environmental performance measurements to other measurements and recognize and allow for trade-offs between these different aspects of performance.

Findings from a case illustrate how environmental performance measurements for example successfully can be applied across managerial levels as well as company borders in a supply chain.

8 ANALYSIS OF THE LOGISTICS MARKET FROM A GREEN PERSPECTIVE

This chapter presents a joint analysis of the three appended papers and the Thesis Frame. The chapter is structured according to the three research questions presented in Chapter 1. As noted in that chapter, the papers relate to two or three of the research questions. The relationships between the papers and the research questions are once again illustrated in Table 8.1. As can be seen in the table, each research question has one corresponding paper that has an aim to answer that specific research question. For Research Question 1, Paper 1 is the main contribution, for Research Question 2, Paper 2 and for Research Question 3 the Thesis Frame is the main contribution. All three research questions are enriched by information from one or more of the other papers and this is illustrated by an (X) in Table 8.1 below.

Table 8.1 - Relationship between Papers 1-3, Thesis Frame and Research Questions

RQ				
1	X	(X)	(X)	(X)
2	(X)	X	(X)	(X)
3		(X)		X
Paper	1	2	3	TF

The analysis of the logistics market will follow the logic of the sub-questions developed for each research question in Chapter 3.

8.1 DESCRIBING GREEN CATEGORIES ON THE LOGISTICS MARKET

The first research question deals with green categories that could be taken into account on the logistics market. All three appended papers in some way relate to Research Question 1, even though green categories are most explicitly dealt with in Paper 1. First, the results from literature reviews in Paper 1, 2 and 3 are analysed, followed by an analysis of green categories mentioned by companies. Finally, a comparison of these findings will be presented.

The literature review in Paper 1 resulted in the identification of nine different green categories. One category includes both emissions- and energy data and they will be viewed as two separate categories in this analysis, thus resulting in ten green categories. These are the first ten categories shown in Table 8.2, which gives an overview of the results for Research Question 1.

Continuing the analysis of literature findings, it is noted that the literature review in Paper 2 takes the categories from Paper 1 into account. However, literature that deals with environmental demands for the purchase of transport services gives other examples of green demands. The majority of these demands focus on technical aspects of the transport solutions, such as age, type of engine, type of fuel, modes of transport and maintenance of modes, which all correspond to

one of the three first categories in Table 8.2. More managerial aspects of purchasing demands are also found in the literature. Amount of return loads, load optimising and cost efficient driving are examples of these. The first two of these are a part of transport planning (McKinnon, 2008), whereas the third can be categorised into "Behavioural aspects" in the table below. Furthermore, management systems, especially ISO 14 001, are also found to be a green category that is of relevance, as well as the *use of IT*. This latter category is an additional category that was not found as a green category in Paper 1. In addition, *environmental education* can also be a part of green demands when transport services are bought.

Paper 3 is somewhat different to Paper 1 and 2 since it has a focus on environmental measurements within logistics. Although not explicitly dealing with green categories as a part of supply and demand, it is reasonable to believe that the measurements mentioned cross company borders. The results from the literature review in Paper 3 reveal that air emissions are one of the frequently mentioned measurements, which corresponds to the findings of the literature review in Paper 1.

Energy use data is also found in both these papers. Furthermore, fuel use is also one of the most frequently mentioned measurements in the literature review in Paper 3. Is there a difference between energy use and fuel use? Even though Paper 3 does not explicitly exclude LSPs from its scope, none of the papers found were actually about LSPs. Because this thesis is about the logistics market, in which LSPs and shippers meet, the measurements found in Paper 3 need to be considered in an LSP context. So, for the interaction between LSPs and shippers, energy use could very well be viewed as the same as fuel use. The difference from this and the results from Paper 3 is that, because of the hits in the literature review, Paper 3 deals with shippers. Energy use can thus concern the energy needed for production or heating in that context. In the relation between LSPs and shippers, however, fuel use is likely to be the major part of energy use. This is confirmed by the company presentation of DHL in Chapter 5.1.2, where DHL estimates that 0,5% of total environmental impact derive from DGF's own operations and the rest comes from transports performed for customers. To conclude, energy use and fuel use can be considered as roughly the same type of measurement with regard to the interaction between LSPs and shippers.

Recycling and water use are two additional green measurements frequently mentioned in the literature found in Paper 3 but they are not, however, mentioned by the other two papers. These two measurements are related to products (recycling) and production (water use) and are not explicitly linked to transport services. Since the focus of this licentiate thesis is LSP-shipper interactions, it is therefore not surprising that they are not found in other literature reviews other than the one conducted in Paper 3.

As can be seen in Table 8.2, the majority of the green categories are found in literature with a shipper perspective or a general green logistics perspective. A small number of green categories

are found in literature with a logistics market perspective or with an LSP perspective. As Research Question 3 has an aim to find green categories that can be taken into account as a part of offerings or demands on the logistics market, it is worth noting that almost none of the papers found explicitly discuss logistical offerings or demands.

Table 8.2 - The green categories found in the literature

	Market perspective	LSP perspective	Shipper perspective	General green logistics
Fuels			X	X
Vehicle technologies			X	X
Mode choice and intermodal transports			X	X
Behavioural aspects			X	X
Logistics system design				X
Transport management		X	X	X
Environmental management system			X	X
Choice of partners				X
Emissions data	X		X	X
Energy data	X		X	
Use of IT			X	
Environmental education			X	
Recycling data			X	
Water-use data			X	

With regard to companies' views on green categories, results from Paper 1 and the Thesis Frame are of interest. First, the ten categories found in the literature review of Paper 1 were used as the starting point for the survey that is briefly presented in Paper 1. However, respondents were given the possibility to add additional categories if they thought necessary, which no one did. In the homepage scan, both LSPs' and shippers' homepages were scanned for information on green categories. The point of reference was again the ten categories from Paper 1. However, additional green categories were also found. Environmental education for LSP employees was one such example, which corresponds to literature findings in Paper 2. LSPs also gave an example where they educated customers about sustainability, and this also fits in to the green category "environmental education", given that it can be both for LSPs as well as for shippers. The green categories found in the four relationships studied only concern issues relevant for those specific relationships. Table 6.9 in Chapter 6 shows a gross list of the green categories that were found in the cases.

A summary of all green categories found for the aim of Research Question 1 is shown in Table 8.3. A comparison between the literature and the three empirical data sets first aims to understand if the literature is up to date with regard to green categories. With regard to this, there are a number of green categories mentioned by companies but not mentioned by literature found in the literature reviews. Unlike the survey, the homepage scan resulted in a few additional categories. The LSPs gave examples of three green categories; consideration of environmental issues in investments and purchases, climate certificate for customers and emissions off-set programs. One additional category was found amongst shipper homepages; product development with an aim to decrease transport needs. Thus, four additional categories were found in the homepage scan.

The most additional green categories were, however, provided by the four cases. One of these categories is *emissions off-set programs*, which also were mentioned in the homepages. This is the only green category not mentioned in literature but found in two sets of data. The rest of the additional green categories are only mentioned by either the homepages or by the cases. In addition to the *emission off-set programs*, the six other green categories are mentioned in the cases; *review of sustainability report, general belief that LSP is proactive, environmental knowledge, green project, decrease of CO₂ emissions and clean shipping project.* The results from the case studies indicate that many of these green categories are relationship specific and have evolved during interactions between the LSPs and shippers. This can be said to be true for all green categories mentioned in the cases except for emission off-set programs and the clean shipping project. The possibility that some green categories are relationship-specific can be one reason for why the literature does not mention these green categories.

A cross-case analysis of the four cases indicates that the categories mentioned by the two Alltransport cases to a larger extent correspond to the literature's green categories than the DHL-cases. This in turn means that the results indicate that the DHL cases include more relationship-specific green categories, according to the reasoning above.

Table 8.3 – The green categories found and according research methods for Research Question 1

	Literature	Survey	Homepages	Cases
Fuels	X	X	X	
Vehicle technologies	X	X	X	X
Mode choice and intermodal transports	X	X	X	
Behavioural aspects	X	X	X	
Logistics system design	X	X	X	
Transport management	X	X	X	X
Environmental management system	X	X	X	X
Choice of partners	X	X	X	
Emissions data	X	X	X	X
Energy data	X	X	X	
Use of IT	X			
Environmental education	X		X	
Recycling data	X			
Water-use data	X			
Environmental consideration in investments and purchases			X	
Climate certificates for customers			X	
Emission offset programmes			X	X
Focus product development on decrease of transport needs.			X	
Review of sustainability report				X
General belief that LSP is proactive				X
Environmental knowledge				X
Green Project				X
Decrease of CO ₂ emissions				X
Clean shipping project				X

Another issue of interest for the comparison of the literature and the empirical data sets is if the green categories mentioned in literature are relevant for companies on the logistics market. The comparison reveals that many of the green categories mentioned in literature also are of relevance on the actual logistics market. As described above, the survey that was based on literature findings did not result in any additional categories. This could indicate that the respondents were pleased with those categories that were provided in the survey.

With regard to the homepages scan, it also had its point of reference in categories found in the literature and the scan resulted in further level of detail of all of these green categories found in literature. All ten categories from the literature review were filled with additional level of detail, meaning examples of actual environmental measures that companies mentioned on their homepages. All ten green categories from the literature review were thus confirmed. For

example, for the category "behavioural aspects", examples such as decrease of fuels consumption and eco-driving training and technology were found. Moreover, the findings from the homepages indicated that emissions data in fact means a large focus on CO_2 emissions and several more or less specific examples of CO_2 measurements were found. For energy data, on the other hand, the homepages only revealed a small number of examples.

As for the four cases, some of the categories mentioned correspond to those green categories found in the literature. High-quality vehicles, for example, were mentioned in a context in which environmental work was discussed, and they are therefore considered to belong to the green category "Vehicle technologies". High load-rates and minimising trucks run empty are strongly connected to the category "transport management" (see for example McKinnon, 2008), which naturally also is true for the transport planning that is mentioned in one case. Furthermore, CO₂ reports are mentioned in two of the cases and are also covered by the reviewed literature. ISO 14 001, which belong to environmental management systems, is considered important in one case.

According to findings presented above, the results indicate that most of the green categories found in the literature reviews are of relevance on the actual logistics market. Those green categories that are mentioned in literature as well as in all three empirical data sets are vehicle technologies, transport management, environmental management systems and emissions data. All these four green categories are relatively easy to communicate, which could be one reason to why they are frequently mentioned. In addition, because of the present focus on CO₂ emissions in the world in general as well as within the field of environmental logistics (McKinnon, 2010a), it is not surprising that emissions data is frequently mentioned by both literature and companies.

Moreover, environmental management systems are often used as a requirement for suppliers in general (Nawrocka et al., 2009). Therefore, it is not unexpected that these environmental management systems are mentioned by literature as well as by companies. Furthermore, transport management is a green category that is often expected by shippers even without the involvement of the environmental aspect of the demands since it is believed to be a prerequisite for efficient and cost saving operations of the LSPs. Possibly, vehicle technologies follow the same logic since "greener" vehicles are believed to be energy efficient (McKinnon et al., 2010), and could therefore in the long run result in cost savings for LSP.

With regard to less frequently mentioned green categories, three of the categories found in the literature were not mentioned in any of the empirical data sources; use of IT, recycling data and water-use data. With regard to the use of IT, it is possible that it is seen as a necessity in order for other green categories such as emissions data and transport planning to function. In that case, IT might not be regarded as an explicit part of green offerings or demands by companies. As

already suggested, recycling data and water-use data are more focused on product and production related aspects of logistics, which implies that they are not relevant for the logistics market.

To conclude, the results suggest that the green categories found in the literature and the ones mentioned by companies to a large extent correspond. However, when specific relationships on the logistics market are studied, the findings indicate that the green categories are increasingly relationship-specific and these are basically not mentioned in the literature. It is, however, possible, that some of these relationship-specific green categories include combinations of the more general categories mentioned in the literature.

8.2 DESCRIBING GREEN MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

The second research question aims to understand to what extent green categories found in Research Question 1 are taken into account by LSPs and shippers. For each Gap in the Gap model, both survey results and case study results will be analysed and then compared. The logic of the analysis follows the questions developed in Chapter 3.1.2. Thus, for each of the five Gaps, the survey will first be analysed and the balance between matches and mismatches in this perspective of the logistics market will be established, as well as whether the mismatches are positive or negative. The same analysis is then conducted for the cases, including a cross-case analysis in order to find similarities and differences among the cases. Each section ends with a comparison of the results.

Note that the size of mismatches, meaning small or large, only can be discussed in relation to the survey in which the size of the mismatches can vary because of variations in in mean values. In the cases, on the other hand, there either is a match or a mismatch and it is not possible to discuss small or large mismatches.

8.2.1 MATCHES AND MISMATCHES FOR GAP 1

Gap 1 represents the difference between LSPs' stated supply and shippers' stated demand. As indicated by Table 8.4, there appears to be mostly mismatches for this Gap, as most green categories have differences in mean values that are relatively large. The largest mismatches are found for transport planning, logistics system design, combination of transport modes and energy data, whereas the smallest mismatches are found for environmentally classified vehicles and fuel. Furthermore, Table 8.4 suggests that the LSPs' green offerings have higher mean values than shippers' stated demands for all categories lower. All green categories are thus represented by a positive mismatch, in line with the terminology of Lings and Brooks (1998), which means that the LSPs offer more than the shippers demand.

Table 8.4 – Mean values for Gap 1 according to the survey

	LSPs' stated offerings	Shippers' stated demands	Gap 1
Fuel	3,79	3,50	0,29
Environmentally classified vehicles	4,12	3,86	0,26
Emission data	4,13		0,83
		3,30	
Energy data	4,03	3,06	0,97
Combination of			
transport modes	3,89	2,86	1,03
Transport planning	4,13	3,03	1,10
Logistics system design	4,14	3,08	1,06
Environmental			
Management Systems	3,88	3,50	0,38
Eco driving	3,75	3,23	0,52
Choice of partners	3,77	3,05	0,72

 $1 = Totally\ disagree \rightarrow 5 = Fully\ agree$

Table 8.5 presents the matches and mismatches for the case studies when Gap 1 of the Gap model is considered. A category marked with (+) indicates a positive mismatch. The cross-case analysis indicates that in total, the cases present about the same amount of matches as mismatches for Gap 1. However, there are differences on a single-case level. One of the relationships merely shows mismatches (Alltransport-Holmen), whereas one merely shows matches (Alltransport-Onninen). The findings from two DHL-relationships suggest that both of them present both matches and mismatches with regard to offerings and demands.

With regard to positive or negative mismatches in the case studies, Table 8.5 reveals that all mismatches but one are represented positive, meaning that the LSPs offer the green categories but the shippers do not demand them. As Table 8.5 indicates, not many categories are mutual for the cases. CO₂ reports, which are a part of the two DHL-relationships, represent the only green category that is a match in more than one of the cases. Similarly, the GoGreen concept is indicated as a mismatch in Table 8.5. Other than that, the matches and mismatches are represented by, for the cases and this Gap, unique green categories.

Table 8.5 – Matches and mismatches for the four cases in relation to Gap 1

	Alltransport-Holmen	Alltransport - Onninen	DHL - SECO Tools	DHL -Ericsson
ES		ISO 14 001	CO ₂ reports	CO ₂ reports
MATCHES		High-quality vehicles	Environmental manager	Green Project
MA			Decrease of CO ₂ emissions	Clean shipping project
IES	High load-rates (+)		GoGreen concept (+)	GoGreen concept (+)
MISMATCHES	High load-rates (+) Minimising truck run empty (+)		GoGreen concept (+)	GoGreen concept (+) Increased transport planning (+)

A comparison of the results of the market perspective and of the specific relationship perspective indicates that in total, many of the green categories are represented by mismatches. However, the results from the cases suggest several matches as well and there is a larger balance between matches and mismatches for the cases than for the survey.

Furthermore, the results suggest that basically all mismatches, in the survey as well as in the cases, are positive. This appears to be a consequence of lower (in the survey), or lack of (in the cases) demands from the shippers, related to the offerings of the LSPs. The only exception according to the results appears to be the "unknown improvements" that implicitly are mentioned by Ericsson as part of their demands.

Four green categories correspond between the survey and the cases; transport planning, emissions data, environmentally classified vehicles and environmental management systems. Of these, the "transport planning" category represents the largest mismatch. Increased transport planning is mentioned in the DHL-Ericsson case, from which the results indicate that the environmental manager feels that DHL would be able to take more responsibility for the planning of Ericsson's transports.

Emissions data is the second largest gap of the mutual green categories. According to the case study results, however, this mismatch does not appear in the cases. In two of the cases emissions data is not mentioned and in the other two, CO_2 reports are both part of offerings and demand, thus resulting in a match.

Environmentally classified vehicles and environmental management systems are two of the smallest mismatches in the results from the survey and both of these are represented by a match in the Alltransport-Onninen relationship.

To summarise, not many similarities are found between the market and relationship perspective of Gap 1. The results from the market perspective give indications of mostly mismatches, whereas the relationship perspective gives indications of equal amounts of matches and mismatches. Moreover, only four categories are the same in the market and the relationship perspectives. The two smallest mismatches in the survey are represented by a match in the cases, thus suggesting corresponding results for the two different views of the logistics market. However, one of the largest mismatches in the survey is also represented by a match in the cases, indicating conflicting results.

8.2.2 MATCHES AND MISMATCHES FOR GAP 2

Gap 2 represents the difference between LSPs' stated supply and their perception of shippers' demand. The survey results, shown in Table 8.6, indicate that almost all categories present a mismatch larger than 1.0, which only was the case for three green categories in Gap 1 above. Therefore, most, if not all, categories can be considered to be represented by a mismatch. The largest mismatches are found for the categories energy data and transport planning, whereas the smallest mismatch is found for environmental management systems. Moreover, all green categories show a mismatch where the LSPs' stated offering score higher than their perception of demand. This situation indicates a positive mismatch, which for this Gap means that the LSPs perceive that they offer more than what the shippers demand.

Table 8.6 - Mean values for Gap 2 according to the survey

	LSPs' stated offering	LSPs' perception of demand	Gap 2
Fuel	3,79	2,84	0,95
Emission data	4,13	3,00	1,13
Energy data	4,03	2,51	1,51
Transport planning	4,13	2,71	1,41
Logistics system design	4,14	3,02	1,12
Environmental			
Management Systems	3,88	3,21	0,68
Eco driving	3,75	2,67	1,08
Choice of partners	3,77	2,72	1,05

 $1 = Totally\ disagree \rightarrow 5 = Fully\ agree$

Table 8.7 presents the matches and mismatches for the case studies when Gap 2 of the Gap model is considered. As the table indicates, most of the green categories mentioned in the cases appear to be represented by mismatches in Gap 2. Moreover, indications of mismatches are found in all four cases, whereas matches are found in two of them.

As for positive or negative mismatches, a category marked with (+) in Table 8.7 indicates a positive mismatch. As can be seen in the table, the case study results indicate that all mismatches are positive for this Gap, and thus, no negative mismatch are found.

With regard to the comparison of matches and mismatches between the four cases, one mutual match and one mutual mismatch are found. For the two DHL-cases CO_2 reports are both offered and perceived to be demanded, thus indicating a match. As for the GoGreen concept, DHL offers this but they do not perceive it as a part of demand. The GoGreen concept is therefore represented by a mismatch in two of the cases.

Table 8.7 – Matches and mismatches for the four cases in relation to Gap 2

	Alltransport-Holmen	Alltransport - Onninen	DHL - SECO Tools	DHL -Ericsson
(II)			CO ₂ reports	CO ₂ reports
MATCHES			Decrease of CO ₂ emissions	Green project
MA				Clean shipping project
HES	High load-rates (+)	ISO 14 001 (+)	GoGreen concept (+)	GoGreen concept (+)
MISMATCHES	Minimising trucks run empty (+)	High-quality vehicles (+)	Environmental manager (+)	Increased transport planning (+)
MIS	Review of sustainability report (+)			

A comparison of the survey and the four cases indicates a difference in the balance between matches and mismatches for the survey and the cases. Whereas the survey results basically only present mismatches for all green categories, the case study results indicate that there are some matches when LSPs give their view on offerings and demands. Indeed, there are more mismatches than matches in the cases as well, but the important finding is that there are matches.

As for the directions of the mismatches, all of those found in both the survey and the cases are positive. There is thus, neither in the survey nor in the cases, a green category for which LSPs perceive a higher demand than what they can offer.

When the survey and the cases are compared for Gap 2, three green categories are similar. For example, CO₂ reports are indicated as a match in two of the cases and it is one of the smallest mismatches in the survey. However, it is still large compared to the survey results for Gap 1. With regard to mismatches, there are two green categories that correspond to categories of the survey. First, transport planning is suggested to be a positive mismatch for the Alltransport-Holmen case (high load-rates and minimising trucks run empty) as well as for the DHL-Ericsson relationship. Interestingly, transport planning is also one of the largest mismatches found in the

survey. On the other hand, environmental management systems represent the smallest mismatch in the survey, whereas it is mentioned as a mismatch in one of the four cases.

To summarise the analysis of Gap 2, the comparison of the market and relationship perspectives shows both corresponding and contradicting results. The largest difference between the two sets of results is that the survey does not give any indications that there are any matches, whereas the cases present some matches. As for the corresponding results, all mismatches found are in fact positive, indicating that LSPs often believe that they are ahead of the shippers with regard to the green categories.

8.2.3 MATCHES AND MISMATCHES FOR GAP 3

Gap 3 represents the difference between LSPs' stated offering and shippers' perception of the offering. The results from the survey, which are shown in Table 8.8, suggest that there is a large spread in the size of the mismatches. The three smallest mismatches should perhaps even be regarded as matches, as the results for these suggest that the shippers to a large extent agree with the LSPs' offering. The smallest mismatches are found for environmentally classified vehicles, fuel and eco-driving. The largest mismatch in the survey analysis for Gap 3 appears for energy data, followed by emissions data. For all cases, the findings suggest that the LSPs give their green offering a higher score than what the shippers do when asked how they perceive the LSPs offering. All mismatches are thus positive.

Table 8.8 - Mean values for Gap 3 according to the survey

	LSPs' stated offering	Shippers' perception of offering	Gap 3
Fuel	3,79	3,59	0,20
Environmentally classified vehicles	4,12	3,93	0,19
Emission data	4,13	3,22	0,91
Energy data	4,03	2,94	1,09
Combination of transport modes	3,89	3,06	0,83
Transport planning	4,13	3,29	0,84
Logistics system design	4,14	3,42	0,73
Environmental Management Systems	3,88	3,47	0,41
Eco driving	3,75	3,53	0,22
Choice of partners	3,77	3,06	0,72

 $1 = Totally\ disagree \rightarrow 5 = Fully\ agree$

Table 8.9 presents the matches and mismatches for the case studies when Gap 3 of the Gap model is considered. A category marked with (+) indicates a positive mismatch. As Table 8.9 suggests, both matches and mismatches are found for the green categories for the cases, even

though the majority of the green categories are represented with a match for Gap 3. Interestingly, one case only presents mismatches, whereas two other cases clearly present mostly matches. Most of the mismatches that occur are positive, but two negative mismatches are also found. These are for the same category; a general belief that the Alltransport is environmentally proactive.

As Table 8.9 suggests, four green categories appear in more than one case. CO₂ reports are represented by a match in the two DHL cases, thus indicating that the LSPs' and the shippers' view of the offering correspond to each other. The same is true for the GoGreen concept. Among the mismatches, one category is mentioned for both Alltransport cases, and it is the belief that the LSP is proactive that is also mentioned previously as a negative mismatch. For the Holmen-Alltransport case, the general belief that the LSP is environmentally proactive is mentioned by Holmen, at the same time as Alltransport mentions review of the sustainability report. Perhaps the review of the sustainability report and the general belief that Alltransport is environmentally proactive go hand in hand, even though not viewed in the exact same way by the two companies. If that is the case, then these two green categories could be combined into one and a match would appear. However, the findings from the Alltransport-Onninen case also indicate a mismatch since Onninen believes that Alltransport is environmentally proactive.

The final category that is mutual for two cases is the transport-planning category. According to the results, both Alltransport and DHL consider this category as a part of their offering, while the shippers do not appear to perceive it in the same way.

Table 8.9 – Matches and mismatches for the four cases in relation to Gap 3

	Alltransport-Holmen	Alltransport - Onninen	DHL - SECO Tools	DHL -Ericsson
		ISO 14 001	CO ₂ reports	CO ₂ reports
HES		High-quality vehicles	GoGreen concept	GoGreen concept
MATCHES			Environmental manager	Clean shipping project
×			Decrease of CO ₂ emissions	Green project
ES	General belief that LSP is proactive (-)	General belief that LSP is proactive (-)		Increased transport planning (+)
H)	High load-rates (+)			
MISMATCHES	Minimising trucks run empty (+)			
MIS	Review of sustainability report (+)			

On a general level, a comparison of the survey and the four cases suggests that for Gap 3, there is a mix of matches and mismatches in both the market perspective and the relationship

perspective. There are, however, large variances within the cases, of which one only presents mismatches and two basically only present matches. Moreover, while the survey results merely suggest positive mismatches, the cases give examples of two negative mismatches. Hence, there are situations in the specific relationships of the cases for which the shipper's perceive the LSPs' offerings to include more than what the LSPs themselves perceive.

With regard to correspondence between matches and mismatches for green categories in the survey and in the cases, there are some examples of this. Environmentally classified vehicles, which is a category represented by a small mismatch in the survey, is a match in the Alltransport-Onninen case. Moreover, transport planning is represented by a mismatch in two of the cases and this is a relatively large mismatch according to the survey results. For these two green categories, the findings suggest that the survey and cases give similar views of the logistics market. CO₂ reports, or emissions data, on the other hand, represent the second largest mismatch in the survey whereas this category in two of the cases is represented by a match. Thus, the results indicate that for this category, the survey and the cases contradict each other.

The analysis of Gap 3 indicates that both the market and relationship perspectives are represented by a spread of matches and mismatches with regard to how well LSPs' and shippers' perceptions of the LSPs' offerings correspond. Unlike the market perspective, the cases give examples of negative mismatches for which the shippers perceive more in the green offering than what the LSPs do. Finally, an interesting finding is that CO₂ emissions are represented by a match in two cases, but in the survey it is the second largest mismatch.

8.2.4 MATCHES AND MISMATCHES FOR GAP 4

Gap 4 represents the difference between shippers' green demand and LSPs' perception of this demand. The survey results, shown in Table 8.10, indicate that there are examples of an almost complete match as well as a number of mismatches. Many of the mismatches are, however, small compared to the previously discussed Gaps and the results suggest that the LSPs and shipper agree to a large extent. Nevertheless, the categories of fuel, eco-driving and energy data do indicate that there are mismatches between what the shippers demand and how the LSPs perceive this demand. Logistics system design is by far the smallest mismatch. Environmental management systems, emissions data and transport planning are the three following "small" mismatches, but there is a relatively large leap between these and the very smallest mismatch.

Table 8.10 - Mean values for Gap 4 according to the survey

	Shippers' stated demand	LSPs' perception of demand	Gap 4
Fuel	3,50	2,84	0,66
Emission data	3,30	3,00	0,30
Energy data	3,06	2,51	0,54
Transport planning	3,03	2,71	0,31
Logistics system design	3,08	3,02	0,06
Environmental			
Management Systems	3,50	3,21	0,29
Eco driving	3,23	2,67	0,56
Choice of partners	3,05	2,72	0,34

 $1 = Totally\ disagree \rightarrow 5 = Fully\ agree$

With regard to which actors that represent the highest mean values, the survey results indicate that it is the shippers that give their green demand a higher score than what the LSPs do. Interestingly, this makes Gap 4 the only one of the five Gaps for which the shippers' mean values are higher than the LSPs'.

In Table 8.11, the case studies' matches and mismatches for Gap 4 are shown. As shown in Table 8.11, there are about the same amount of matches and mismatches in total. The Alltransport-Holmen case neither presents matches, nor mismatches, which is explained by the fact that both of the companies perceive Holmen's green demands as non-existent.

For this Gap, a category marked with (-) in Table 8.11 indicates a negative mismatch for which shippers think their demands include more than what the LSPs perceive. As the table shows, all mismatches found are negative.

A comparison of the green categories in the cases suggests that there are mutual results for two of the categories in the two DHL cases; CO₂ reports represent a match and the environmental manager presents a mismatch.

Table 8.11 - Matches and mismatches for the four cases in relation to Gap 4

	Alltransport- Holmen	Alltransport - Onninen	DHL - SECO Tools	DHL -Ericsson
\sim			CO ₂ reports	CO ₂ reports
CHE			Decrease of CO ₂ emissions	Green project
MATCHES				Clean shipping project
~				
MISMATCHES		ISO 14 001 (-)	Environmental manager (-)	Unknown improvements (-)

When the survey and the case studies are compared, the results indicate that more matches are found for the cases than in the survey. Basically, the survey gives indications of one match, while five are found in the cases. Both the survey and the cases merely show negative mismatches for Gap 4, which means that this is the only Gap for which all mismatches are negative.

As for correspondence between green categories in the survey and in the cases, there appears to be a lack of similarities. The survey results basically show the same size for the mismatches of environmental management systems and emissions data (0.29-0.30), whereas one of these represents a mismatch and one a match in for the cases. These are the two of the smallest mismatches in the survey, but because of the contradicting results, no real conclusion can be drawn for these categories.

To conclude, all mismatches found in Gap 4 are negative, both for the market perspective and the relationship perspective. Thus, the results indicate that the shippers demand more than what the LSPs perceive that the shippers want.

8.2.5 MATCHES AND MISMATCHES FOR GAP 5

Finally, Gap 5 represents the comparison between shippers' green demands and how they perceive the green offerings from the LSPs. The survey results, shown i Table 8.12, suggest that shippers perceive that there mostly are matches between their demands and what they perceive that the LSPs offer. Some small mismatches are found for logistics system design, eco-driving and transport planning. Green categories such as choice of partners, environmental management systems, environmentally classified vehicles, emissions data, fuel and energy data are basically represented by matches according to the survey results. There are both positive and negative mismatches for Gap 5. All the negative mismatches belong to the four smallest mismatches which basically are matches. The actual mismatches that the results of the survey suggest are positive.

Table 8.12 - Mean values for Gap 5 according to the survey

	Shippers' stated demand	Shippers' perception of offering	Gap 5
Fuel	3,50	3,59	0,09
Environmentally classified vehicles	3,86	3,93	0,07
Emission data	3,30	3,22	-0,08
Energy data	3,06	2,94	-0,12
Combination of			
transport modes	2,86	3,06	0,19
Transport planning	3,03	3,29	0,26
Logistics system design	3,08	3,42	0,33
Environmental			
Management Systems	3,50	3,47	-0,03
Eco driving	3,23	3,53	0,30
Choice of partners	3,05	3,06	0,00

 $1 = Totally\ disagree \rightarrow 5 = Fully\ agree$

The matches and mismatches from the cases are shown in Table 8.13.A category marked with (+) indicates a positive mismatch, which for this Gap means that shippers perceive that LSPs offer more than what is included in shippers' demands. A category marked with (-) thus means that shippers' demands are higher than what the shippers perceive that the LSPs offer. As Table 8.13 indicates, there are a larger number of categories that are represented by a match than a mismatch. Thus, the results indicate that the shippers perceive that their demands are fulfilled for many of the green categories relevant for the specific relationships on the logistics market. Moreover, all mismatches except for one are positive and it is the "unknown improvements" in the DHL-Ericsson relationship that cause the negative mismatch.

There are a few categories that appear to be mutual for more than one case. First, CO₂ reports are a match in both the DHL-SECO Tools case as well as the DHL-Ericsson case. Moreover, the results indicate that both Alltransport cases show a mismatch because of the shippers' belief that the LSP is environmentally proactive. Additionally, the two DHL-cases share the result that there is a mismatch for the GoGreen concept in both cases.

Table 8.13 - Matches and mismatches for the four cases in relation to Gap 5

	Alltransport- Holmen	Alltransport - Onninen	DHL - SECO Tools	DHL -Ericsson
SS		ISO 14 001	CO ₂ reports	CO ₂ reports
MATCHES		High-quality vehicles	Environmental manager	Clean shipping project
Æ			Decrease of	Graan project
Σ			CO ₂ emissions	Green project
MISMATCHES	General belief that LSP is proactive (+)	General belief that LSP is proactive (+)	GoGreen concept (+)	GoGreen concept (+)
5				Unknown
ΙΣ				improvements (-)
SS				
Ξ				

A comparison of the survey and the four cases indicates Gap 5 is in fact not a mismatch for most of the categories. The survey presents several "almost matches" and the majority of the green categories in the cases are matches. The results suggest that most of the mismatches for Gap 5 are positive. The survey gives indications of a few negative mismatches, but the mismatches are so small that they can be considered as matches. Moreover, the cases give one example of a negative match.

As for mutual matches and mismatches in the survey and in the cases, three of the green categories that are represented by a match in the cases are also basically matches in the survey results. This is the case for environmental management systems, environmentally classified vehicles and emissions data.

To summarise, both the market and the relationship perspective indicate that shippers' demands and their perception of the LSPs' offerings to a large extent correspond to each other. Moreover, three matches in the survey are confirmed as matches in the case studies as well.

8.2.6 CONCLUSIONS FROM THE ANALYSIS OF MATCHES AND MISMATCHES

Starting with a comparison of the cases, an overview of the number of matches and mismatches for each case and Gap is shown in Table 8.14. As can be seen in the table, the results suggest that the two Alltransport cases present the same number of, or more, mismatches than matches for their green categories. In the two DHL-cases, both relationships are represented by a higher number of matches than mismatches. Moreover, the results from the Alltransport cases point to few green categories that are a part of the relationships, whereas the DHL cases include a higher number of green categories.

Table 8.14 - Matches/mismatches for each case and Gap

	Gap 1	Gap 2	Gap 3	Gap 4	Gap 5	Total
Alltransport-Holmen	0/3	0/3	0/4	1/0	0/1	1/11
Alltransport- Onninen	2/0	0/2	2/1	0/2	2/1	6/6
DHL-SECO Tools	3/1	2/2	4/4	2/1	3/1	14/9
DHL-Ericsson	3/3	3/2	4/1	3/1	3/2	16/9
Total	8/7	5/9	10/10	6/4	8/5	

With regard to the balance between matches and mismatches, a comparison of the survey and case study results indicates that the largest differences appear for Gap 1 and Gap 2. In the results of the survey, these two represent the largest and the highest number of mismatches and basically no matches are found. Gap 1 represents the difference between LSPs' offerings and shippers'

demands and the survey thus suggests that these do not match. In the cases, however, several matches are found, as indicated by Table 8.14, and one of the largest mismatches in the survey $(CO_2 \text{ reports})$ is also represented by a match in the cases.

Gap 2 represents the difference between LSPs' offerings and LSP's perception of demand. In the survey, all categories are represented by mismatches and many of them are relatively large. Indeed, the results from the cases also point to several mismatches, but there are also examples of matches. Thus, whereas the survey merely point to mismatches between LSPs' offering and perception of demands, the cases indicate that there are examples where LSPs' view of supply and demand correspond.

The findings for Gap 1 and Gap 2 could suggest that in specific buyer-supplier relationships, green supply and demand correspond to a larger extent than on the general logistics market. One reason for this could be that their stated offering is directed towards present as well as potential customers and it has to fit a large variety of shippers. CO₂ reports will prove as an example. The results from the cases show that DHL are able to provide shippers with CO₂ reports, and that they know that such reports are a part of both SECO Tools' and Ericsson's demands. If a less environmentally aware DHL-customer would have been included in an additional case, DHL would still be able to offer CO₂ reports, and CO₂ reports would then possibly be a mismatch in Gap 2 for such a case. Hence, one LSP serves many customers and there is likely to be a large spread of customers. As long as an LSP provides one single customer with CO₂ reports, is likely that it will be able to include it in its offering to all other customers as well. This could be one reason to why the survey merely indicates large mismatches for Gap 2, whereas the cases suggest that there can be a match between LSPs' offerings and their perceptions of demands. Moreover, this could also be a reason why the results suggest a large mismatch for CO2 reports in the survey and a match in the cases for Gap 1, especially if many of the shippers that have answered the survey are those that do not demand CO₂ reports.

On a general level, the survey results indicate that there is a mismatch between LSPs offerings and shippers' green demands. Even though there are a number of matches found in the cases, the mismatches indicate that supply and demand not always correspond in a buyer-supplier relationship either. Moreover, basically all mismatches in both the survey and in the cases are positive, suggesting that the LSPs could be ahead of their customers with regard to the green categories. This result confirms the findings of Wolf and Seuring (2010), who also suggest that there is a positive mismatch between green supply and demand on the logistics market.

The fact that both survey and case study results point to a majority of positive mismatches could potentially suggest that LSPs are the ones that drive the environmental development on the transport market. This would mean that green categories on the logistics market would be different from third-party logistics, for which the development was driven by both LSPs and

shippers (Berglund, 1997). However, results from the two DHL cases do not fit into this description. In these two cases, the shippers are an active part of many of the green categories that are included in the relationships. In the DHL-Ericsson case, for example, the green project that is a part of the relationship is in part initiated by the shipper. The results also indicate that DHL initiate different programs within this green project. As described above, the findings from the case studies suggest that the DHL cases include more green categories in their relationships than the Alltransport cases. Therefore, it is possible that in actual "green" relationships, that include many green categories, the environmental development is driven by both actors in the relationship.

Despite the findings above, all mismatches do not necessarily appear because shippers lag behind with regard to environmental awareness. The GoGreen concept that DHL offers is an example of this. This carbon offsets program is not included in neither SECO Tools' nor Ericsson's demands and these two shippers are not interested in this type of offering from the LSPs. Carbon offset programs were never a part of the survey, but the same logic could apply to other green categories as well. Thus, high mean values on the supply side and a low mean values on the demand side of the survey do not necessarily imply that the shippers are behind. One possibility is that the shippers, although interested in other green categories, do not *want to* include this specific category in their demands. This in turn could indicate that LSPs have focused on the wrong things in their green offerings.

A specific focus on the cases suggests that few matches and mismatches are common for more than one green category. According to the results from Chapter 8.1 where the overall picture of green categories was developed, however, not many categories are mutual for more than one case. Hence, if not the categories are mutual, it is impossible for the matches and mismatches in the cases to be mutual to a large extent. However, there are a few green categories that are mentioned in more than one case. Interestingly, the findings suggest that the mutual categories (transport planning, CO_2 reports and the GoGreen concept), always show a similar result, meaning a match or a mismatch.

8.3 EXPLORING GREEN MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

Research Question 3 aims to explore why there are matches and mismatches in the logistics market in relation to green categories. Basically, two different types of analyses will be conducted, as explained in Chapter 4.8.3. One is related to the green categories found in the cases and the other is related to relationship characteristics of the four cases.

8.3.1 MATCHES AND MISMATCHES IN RELATION TO GREEN-CATEGORY CHARACTERISTICS

In order to find any patterns for the characteristics of green categories in relations to the matches and mismatches, the initial step is to classify the green categories mentioned in the cases according to Shostack's (1977) framework. The discussion will start with the most tangible green offerings and demands and continue to the most intangible. It is important to note that it is the relative position between the green categories that is of importance, and not their exact placement along the tangibility line in Figure 8.1.

The green categories ISO 14 001, participation in the clean shipping project and the GoGreen concept are placed close to the tangible dominant services in the classification of Shostack (1977). Even if neither of the green categories ISO 14 001 and clean shipping project are actually tangible as such, it should be easy for LSPs to communicate to shippers whether they are certified according to the ISO 14 001 standard or not. The same reasoning applies to the clean shipping project. It should therefore also be relatively easy for shippers to understand this part of the green offering. The GoGreen concept, which includes emission offsets, also has a relatively simple setup and the service is ready for the shippers to purchase without any large adjustments. In addition, the results from the two DHL-cases indicate that the two shippers do not want to buy the GoGreen concept. There are, however, probably other shippers that are likely to buy the concept as a way of building up a green image and DHL can market the concept as a way to do this. Thus, the GoGreen concept is one example of a relatively tangible service that can be marketed with more abstract images. To summarise, ISO 14 001, participation in the clean shipping project and the GoGreen concept are placed very near the "Tangible Dominant" part of the left vertical axis and they both belong to Group 1 in Figure 8.1.

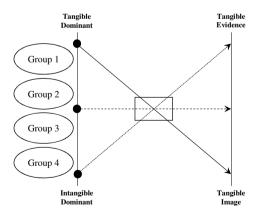


Figure 8.1 – The green categories in relation to tangible/intangible Shostack's (1977) classification

Moving further down the tangibility line, vehicle technology and CO₂ reports are also somewhat straight forward at first glance. However, compared to the three previously mentioned green categories they are all relative. Specific demands for vehicle technology can, for example, include different levels of "green" for different actors. An environmentally proactive shipper may demand a higher level of environmental standard for vehicles than what a less environmentally proactive shipper does. CO₂ reports can also lead to some level of confusion. In the DHL-Ericsson case, for example, there were initial discussions about how the CO₂ reports should be conducted and this indicates that some type of clarification between the actors may be needed. Based on the above discussion, vehicle technology and CO₂ reports are considered to belong to Group 2 in Figure 8.1, and this means that they are relatively tangible, but less tangible than Group 1.

The green project mentioned in the DHL-Ericsson case is a clear part of Ericsson's wish, but the case results indicate that project in itself can include a number of different environmental efforts, ranging from small to large. Therefore, communication between the buyer and supplier is needed so that both actors agree on what a green project can include, and this makes the green project somewhat intangible. Moreover, transport planning can also include different levels of work put in, like for example freight consolidation on existing routes or a more advanced approach where vehicle routes can be planned differently in order to increase freight consolidation (McKinnon, 2008). Transport planning is therefore not straightforward for LSPs to offer and they might need to specify what they mean in their specific buyer-supplier relationships. Interestingly, as shown in the analysis in Chapter 8.2, results from two cases indicate that the shippers do not perceive transport planning as a part of the LSPs' green offerings. In the Alltransport-Holmen case, the results suggest that Alltransport views transport planning partially as environmental considerations, whereas it is possible that Holmen merely views it as cost savings. Based on this discussion, it appears that transport planning can be placed more towards the intangible end of the tangibility line than the green factors in Group 2. Similarly, the review of sustainability report that is suggested as a green category in the Alltransport-Holmen case can be considered to be slightly intangible. The review as such is easy to grasp, but the point of the review probably needs to be clarified in order for shippers to be interested. Based on the above discussion, the three green categories green project, transport planning and review of sustainability report are placed in a third group in Figure 8.1.

The four remaining green categories mentioned in the cases are placed in Group 4 in Figure 8.1, and are thus considered to be the most intangible categories. Environmental knowledge is one of these categories and it is placed there because there is likely to be a difficulty in specifying this knowledge for LSPs. The reason for this is that environmental knowledge can include a number of different things, such as knowledge about regulations, technology or transport management. Similarly, shippers who include environmental knowledge as a part of their demands might have trouble to pinpoint exactly what they are after. The DHL-SECO Tools case point to that the

environmental manager at DHL is important for the green relationship and that she has provided SECO Tools with knowledge about various environmental issues. The environmental manager is, in line with Shostack's framework, a tangible evidence of the environmental knowledge.

The next green category is the general belief that the LSP is proactive which was mentioned in the two Alltransport cases, and it appears to be based on a feeling that the respondents at Holmen and Onninen have. Even though the case study results indicate that they think this green category is a part of Alltransport's offering, they do not demand it and they do not perceive any environmental work i particular. This licentiate thesis will not evaluate the environmental work of Alltransport, and only acknowledges that the company might have come far, but the shippers do not to a large extent specify what they mean by "far". Based on this discussion, it appears that the general belief that the LSP is proactive is on an intangible level. With regard to the general wish for decreased CO₂ emissions, as mentioned in the DHL-SECO Tools case, this is a vague offering or demand as well. However, the goal, which is to lower CO₂ emissions, is clear and tangible evidence such as CO₂ reports can be used as a tool to understand this green category better. Finally, unknown improvements are much like the decrease of CO₂ emissions. They could include a number of different measures and in order to get any further with such an offering or demand, it is likely that the actors need to use tangible evidence, such as lower costs or decrease of CO₂ emissions in order to get any further. In accordance with the discussion above, the green categories environmental knowledge, general belief that LSP is proactive, decrease of CO2 emissions and unknown improvements are considered to belong to the fourth group in Figure 8.1. A summation of the four groups and the corresponding green categories is shown in Table 8.15.

Table 8.15 - The tangible/intangible groups and corresponding green categories

Group 1	ISO 14 001
	Clean shipping project
	GoGreen concept
Group 2	Vehicle technology
	CO ₂ reports
Group 3	Green project
	Transport planning
	Review of sustainability report
Group 4	Environmental knowledge
	General belief that LSP is proactive
	Decrease of CO ₂ emissions
	Unknown improvements

After the classification of the green categories is finalised, the number of mismatches for each category is of interest. Table 8.16 summarises this information and shows the positive and negative mismatches for each green category mentioned in the cases. Thus, if neither a plus nor a minus is shown, this indicates a match for that specific Gap and green category.

The results indicate that the fewest mismatches are found for the most tangible green categories at the top of the table. Specifically, the most categories that show no mismatches are found here. The GoGreen concept, however, does not fit into this description, but the findings suggest that this green category is punished because all involved actors are aware that it is a part of DHL's green offering. In reality, this should not be a mismatch in the specific relationships. Therefore, the mismatches can be considered to be relatively few for Group 1 and 2 in Figure 8.1 and it is suggested that:

Proposition 1. The more tangible a green category is, the higher the likelihood of a match between supply and demand in specific buyer-supplier relationships.

Table 8.16 - Number of mismatches for each green category and Gap

		Gap 1	Gap 2	Gap 3	Gap 4	Gap 5	No. of mismatches
	ISO 14 001/EMS		+		-		2
	Clean shipping project						0
	GoGreen concept	+	+			+	3
	Vehicle technology		+		-		2
ığ	CO2 report						0
iii	Green Project						0
igil	Transport planning	+	+	+			3
Decreasing tangibility	Review of sustainability report	+	+	+			3
ecreas	Environmental manager		+		-		2
Ğ	General belief that LSP is proactive			-		+	2
	Decrease of CO2 emissions						0
$\bigsqcup^{}$	Unknown improvements	-			-	-	3

Relating to the discussion above, there are indications that the opposite of Proposition 1 might be another reason for mismatches. With the exception of the decrease of CO₂ emissions, all

categories in Group 3 and 4 (see Figure 8.1) show two or three mismatches each. Because of this, it is proposed that:

Proposition 2. The more intangible a green category is, the higher the likeliness of a mismatch between supply and demand in specific buyer-supplier relationships.

The case study results points to a number of relationship specific green categories, meaning that they are only mentioned in one of the four cases. The clean shipping project is for example only mentioned in the DHL-Ericsson case, and the same is true for the green project. A decrease in CO_2 emissions can be considered as a green category according to the DHL-SECO Tools case. For all of these categories, the involved companies are aware that they are a part of both offerings and demands. The result is that no mismatches appear for these green categories. Based on this discussion, it is suggested that:

Proposition 3. The more relationship specific green categories are, the fewer are the number of mismatches that appear in a buyer-supplier relationship.

8.3.2 ANALYSIS OF MATCHES AND MISMATCHES IN RELATION TO RELATIONSHIP CHARACTERISTICS

As described in Chapter 4.8.3, the second step of the analysis of Research Question 3 is to place the four relationships on a relationship continuum. Based on literature about business relationships (mainly Bowersox et al., 2010; KPMG, 2000), a continuum was developed in Chapter 3.1.3. Furthermore, characteristics of relationships that decide where on the relationship continuum a relationship belongs were found in literature such as KPMG (2000) and Selviaridis and Spring (2007). The relationship characteristics that came as a result of the single-case analysis are presented in Table 8.17, and in order to understand where on the relationship continuum that the four cases should be placed there is a need for a comparison between them. The most important part of the classification, however, is perhaps not the absolute position on the continuum, but rather their positions relative to each other. Therefore, the cases will be discussed one by one and put in relation to each other and given approximate places on the relationship continuum. The more to the right a relationship is positioned along the continuum, the closer that relationship is considered to be.

Table 8.17 - Relationship characteristics for the four cases

	Length of relationship	Length of contracts	Number of outsourced activities	Trust in the relationship
Alltransport-Holmen	Long	2-3 years	Low-Medium	Yes
Alltransport-Onninen	Short	3 years	Low-Medium	Yes
DHL-SECO Tools	Medium	Continuing	Medium-High	Yes
DHL-Ericsson	Long	1 year	Medium-High	Yes

Starting with the Alltransport-Holmen case, it was noted in the single-case analysis that Alltransport conducts a few more services than merely transports for Holmen. This characteristic of the Alltransport-Holmen relationship indicate that it should be placed somewhere between outsourcing and third-party logistics on the relationship continuum. Moreover, the relationship has lasted for a very long time, which indicates that the relationship probably goes beyond the first level of relationship which is the pure purchasing of transports. The length of contracts is 2-3 years, which is a characteristic for Third-Party logistics in the continuum (KPMG, 2000). There also appears to be trust in the relationship, which also takes the relationship further to the right of the continuum. Most of the relationship characteristics for the Holmen-Alltransport case thus indicate that it should be placed somewhere around outsourcing and third-party logistics on the relationship continuum.

Moving on to the Alltransport-Onninen relationship, it is considerably newer than the relationship between Alltransport and Holmen. Even though this could be an indication of that the relationship should be placed at the far left side of the relationship continuum (see Selviaridis and Spring, 2007), this does not seem to be the case. Instead, it appears that Onninen has trusted Alltransport to perform more than merely transports, since they also handle and sort goods at Alltransport's terminal before further distribution. The results suggest that one reason for this is the personal relationship between Onninen's transport manager and Alltransport's salesperson. However, compared to Holmen, for which Alltransport loads trucks at Holmen's sites and unloads at customers' sites, Onninen appears to have outsourced less activities to Alltransport. Then again, two characteristics of the Alltransport-Onninen relationship move them more to the right in the relationship continuum; length of contracts and trust in the relationship. In total, the findings indicate that even though the Alltransport-Onninen relationship is very new, other characteristics such as length of contract, trust and amount of outsourced activities are similar to the Alltransport-Holmen relationship. However, it appears that Holmen outsources a few more logistics services to Alltransport than Onninen does, and the Alltransport-Onninen relationship is therefore placed to the left of Alltransport-Holmen.

With regard to the relationship between DHL and SECO Tools, they have had a business relationship for some time; long enough for the manager of global transport solutions at SECO Tools and the CRM at DHL to get to know each other well and develop a personal relationship. As the single-case analysis of the DHL-SECO Tools relationship suggests, there is a lot of collaboration between DHL and SECO Tools with regard to things such as transport planning and logistics system design. Compared to Holmen and Onninen, SECO Tools appear to give DHL responsibility for more logistics related services than merely operational transport activities. Contrary to the other three cases, DHL and SECO Tools have continuous contracts between them and this also indicates that the relationship does not belong at the far left of the relationship continuum. Together with the fact that both DHL and SECO Tools think that their relationship is built on trust, the results indicate that the DHL-SECO Tools relationship should

be placed further to the right on the relationship continuum than the two previously discussed cases.

Finally, there is the case of DHL and Ericsson. Similarly to two of the other cases, they have had a business relationship for relatively long time. With regard to outsourced services, the results from the single-case analysis indicate that Ericsson outsources, or at least collaboratively with DHL work with, other things than merely operational transport activities. This was the case for the DHL-SECO Tools case as well, but contrary to that case, the DHL-Ericsson relationship has contract periods of one year. For DHL-SECO Tools they are continuous. As in the rest of the cases, both involved actors perceive their relationship to be trustful. The DHL-Ericsson case is similar to the DHL-SECO Tools case, except for the length of contract periods. Because of this difference, DHL-Ericsson relationship is placed to the left of the DHL-SECO Tools relationship on the continuum.

The position of the cases on the LSP-shipper relationship continuum is shown in Figure 8.2. As mentioned before, the exact position is not the most important aspect of the positing; instead, it is the relative positions between the cases that are of interest. Nonetheless, the results indicate that all cases have closer relationships than the pure purchase of transport services that is to the far left on the relationship continuum. Moreover, none of the cases seem to be close to the alliances and enterprise extensions that Bowersox et al. (2010) have placed at the far right side of the relationship continuum.

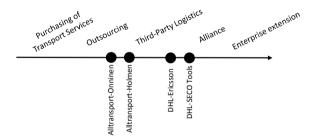


Figure 8.2 - The cases in relation to the relationship continuum

A comparison between the Gap models for all four cases indicates that a considerably larger amount of green categories are mentioned in the two DHL-cases than in the Alltransport-cases. If the number of green categories can be said to indicate the level of environmental awareness within a relationship, the results indicate that the environmental awareness is higher for the two DHL-relationships than for the two Alltransport-relationships. Thus, for the four case studies in this thesis, the findings indicate that the closer a relationship is the more green categories are present in the relationship. Interestingly, with regard to their classification of relationships,

Bowersox et al. (2010) state that the further to the right a relationship is located, the more information is shared amongst the involved actors. Bowersox et al. write about information in general terms, but it is likely that it could include information about green supply and demands as well as any other information. With support from, Bowersox et al. (2010), it is proposed that:

Proposition 4. The closer a business relationship is, the higher the number of green categories that are present in that relationship.

The results from the four Gap models suggest that the GoGreen concept is a little different than many of the other green category. This emissions offset program is a mismatch both in the DHL-SECO Tools case and in the DHL-Ericsson case. The situation is the same in both these relationships; the GoGreen concept is offered by DHL but the shippers do not want to buy it. However, both the LSP and the shippers are aware that GoGreen is a part of DHL's offering and all actors, including DHL, are aware that the shippers do not wish to buy it. The results indicate that this GoGreen concept is central when regular "offerings" or "demands" are mentioned, but it is actually not a part of the two studied DHL-relationships. Other green categories are, however, part of the two relationships and from the case presentations of the green relationships it looks as if both the green offerings and demands for both cases go far beyond the GoGreen concept. The GoGreen concept is the only green category in the four studied buyer-supplier relationships for which the involved companies know that they have a mismatch. It therefore seems as if they have good communication about green categories. Interestingly, the two cases where this situation appears are the two cases furthest to the right on the relationship continuum. As noted in the previous discussion, information sharing is believed to increase as relationships move to the right on the relationship continuum (Bowersox et al., 2010). Therefore, it is proposed that:

Proposition 5. The closer a business relationship is, the better the communication about green categories in that relationship.

With regard to the mismatches within the four cases, the results point to that on an aggregated level (shown in Table 6.10) there are about the same amount of mismatches for all four cases. However, a more detailed look at the Gap models indicate that there are more matches than mismatches within each Gap for the two DHL-cases (see Table 8.14). Indeed, there are also more mismatches and this is made possible because of the fact that more green categories are mentioned in these cases. Looking at the matches and mismatches from a more relative view, however, the matches outnumbers the mismatches for the DHL-cases, which cannot be said for the Alltransport cases. Figure 8.3 gives an example for Gap 1. For the Alltransport-Holmen relationship, Gap 1 is represented by three mismatches. On an aggregated level, this naturally also becomes a mismatch. For the DHL-SECO Tools case, Gap 1 is represented by three matches and one mismatch. On an aggregated level, this would also mean a mismatch. Although this is only one example, a view of all four Gap models reveals that this is also the general picture.

Hence, the results point to that the two relationships with the highest amount of green categories are unfairly treated by an aggregated level of analysis for the cases. The fact that the relationships where the matches outnumbers the mismatches are found to the right on the continuum could possibly be explained by the increased information sharing that is associated with more integrated relationships (Bowersox et al., 2010). Therefore, it is suggested that:

Proposition 6. The closer a business relationship is, the higher the number of matches compared to mismatches of green categories.

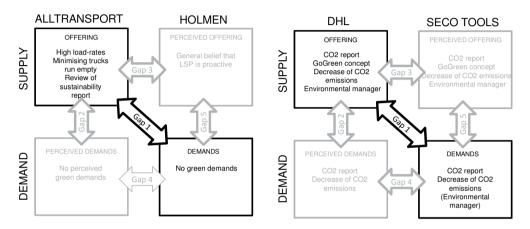


Figure 8.3 – An aggregated versus a detailed view of Gap 1

In relation to Proposition 6, the results from the two DHL-cases indicate that collaboration is an important element of the green relationships. It is even explicitly emphasised in the DHL-Ericsson case that it is the relationship that has to drive the environmental development, and the results from the case study indicate that collaboration is vital in order for the green projects to succeed. Similarly, the results from the DHL-SECO Tools case also indicate that collaboration is important in the success of that green relationship. Supported by the idea that adaption and mutual learning between companies increase as the relationship develops (Ford et al., 1998), this finding suggests that:

Proposition 7. The closer a business relationship is, the higher the level of collaboration with regard to green categories.

9 CONCLUSIONS

This chapter starts with conclusions for the three research questions which together aim to answer the purpose of this licentiate thesis. The findings contribute in different ways to both research and practice and this is further elaborated in the following section. After that, there is a section about the research process in retrospect and the thesis ends with several suggestions for further research.

9.1 GREEN CATEGORIES ON THE LOGISTICS MARKET

By means of an analysis of both logistics literature and empirical data, a list of the green categories that can be taken into account on the logistics market has been developed. The green categories that appear to be of interest in the interaction between LSPs and shippers are shown in alphabetical order in Table 9.1. It appears that many of the green categories mentioned in literature are relevant for companies active on the logistics market. However, it seems that specific buyer-supplier relationships include a number of green categories that have not yet been considered in the literature.

Table 9.1 - Green categories relevant for the logistics market

Green cat	egories (examples)
Behavioural aspects (Eco driving; Decrease fuel consumption)	Focus product development on decrease of transport needs
Choice of partners (Cooperation with customers to help them reach their own environmental targets; Choosing environmentally conscious transport providers)	Fuels (Bio fuels and renewable energy; If fossil fuels, only env. class 1)
Clean shipping project (A database where shipping companies' environmental impact is shown)	General belief that LSP is proactive
Climate certificates for customers	Green Project (Relationship-specific environmental project between LSP and shipper)
Decrease of CO ₂ emissions (A general wish from the shipper)	Logistics system design (More direct transports; Continuous improvement of distribution networks)
Emission offset programmes (The GoGreen concept)	Mode choice and intermodal transports (Shift from air to ocean, from road to rail, Intermodal solutions)
Emissions data (CO ₂ reports)	Recycling data
Energy data (Presents energy consumption from external transports)	Review of sustainability report
Environmental consideration in investments and purchases	Transport management (Well planned routes; high fill-rates)
Environmental education (Green logistics courses for shippers; promote that LSP have taken courses)	Use of IT
Environmental knowledge (Environmental manager; knowledge about technology or green management)	Water-use data
Environmental management system (ISO 14 001, EMAS)	Vehicle technologies (Modern vehicles with less emissions; Replace fleets for more environmental alternatives)

9.2 MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

A large number of matches and mismatches between green supply and demand on the logistics market have been identified in this thesis. The findings are based on studies with both a market perspective and a relationship perspective. With regard to the market perspective, it appears that there are a number of large mismatches between LSPs' green offerings and shippers' green demands. Moreover, the size of the mismatches is even larger when LSPs' offerings and their perception of shippers' demands are compared. Although the relationship perspective also indicates several mismatches in this area, the buyer-supplier relationships studied present more matches between green offerings and green demands than the market perspective does. Thus,

there are several examples where green categories are both a part of an LSP's offering and are included in a shipper's demands.

Moreover, there seems to be large differences between the market perspective and the relationship perspective with regard to specific categories. One such category is CO₂ reports, for which no mismatches are found when a relationship perspective is taken. On the general logistics market, however, this green category is often represented by large mismatches between LSPs' and shippers' perceptions.

Almost all of the mismatches found in both the market and the relationship perspective are so-called positive mismatches (following the terminology of Lings and Brooks, 1998), which means that LSPs seem to include more in their offerings than the shippers appear to include in their demands. Only a few occurrences of negative mismatches have been found. Even though this finding suggests that LSPs drive the environmental development on the logistics market, the relationship perspective shows that in "green" relationships, the environmental development is driven by both actors in the relationship.

Finally, there seem to be large differences between the various relationships that make up the logistics market. The research conducted for this thesis provides examples of both relationships in which green categories are barely discussed, and others which include a wide variety of green categories in their interactions. In truly "green" relationships, the matches appear to outnumber the mismatches between green offerings and demand.

9.3 POSSIBLE REASONS FOR THE MATCHES AND MISMATCHES ON THE LOGISTICS MARKET

When reasons for matches and mismatches have been explored, it has been on the basis of two assumptions. The first one is that characteristics of the green categories could potentially influence the matches and mismatches that occur. Based on a categorisation of products and service developed by Shostack (1977), green categories were placed along a tangibility line ranging from tangible to intangible dominant. Possible connections between the patterns among the green categories and patterns among the matches and mismatches were studied, and a number of connections were found. Based on this analysis, the following propositions are suggested:

Proposition 1. The more tangible a green category is, the higher the likelihood of a match between supply and demand in specific buyer-supplier relationships.

Proposition 2. The more intangible a green category is, the higher the likeliness of a mismatch between supply and demand in specific buyer-supplier relationships.

Proposition 3. The more relationship specific green categories are, the fewer are the number of mismatches that appear in a buyer-supplier relationship.

The second assumption that has guided the analysis of potential reasons for the matches and mismatches is that different types of relationships can influence these matches and mismatches. Based on the relationship classifications developed by Bowersox et al. (2010) and KPMG (2000), a relationship continuum for LSP-shipper relationships was developed. Specific buyer-supplier relationships were then placed along this continuum in relation to how close they were considered to be. Several patterns which showed potential connections between relationship types and matches and mismatches occurred. It is therefore suggested that:

Proposition 4. The closer a business relationship is, the higher the number of green categories that are present in that relationship.

Proposition 5. The closer a business relationship is, the better the communication about green categories in that relationship.

Proposition 6. The closer a business relationship is, the higher the number of matches compared to mismatches of green categories.

Proposition 7. The closer a business relationship is, the higher the level of collaboration with regard to green categories.

The propositions presented are a result of exploratory research that provides initial insights that might lead towards a better understanding of the reasons for matches and mismatches on the logistics market.

9.4 CONTRIBUTIONS

The results of this thesis contribute mainly to two different fields of research. Firstly, it contributes to the field of environmental logistics which has previously given very little attention to the logistics market and its green offerings and green demands. Secondly, it contributes to the area of general logistics which has a focus on the logistics market and logistics service offerings and demands. In addition, the results of this thesis have practical implications for companies active on the logistics market. The following sections will describe these contributions further.

Green logistics literature has to a very limited extent given attention to the logistics market and its green offerings and demand. Of the variety of green categories that have been presented in this thesis, some have therefore been derived from general green logistics literature (see for example McKinnon, 2008; Wu and Dunn, 1995) and given a market perspective. In addition to these green categories, the empirical studies suggested several other categories relevant for companies active on the logistics market. The large number of green categories in this thesis thus

provides novel information to the field of green logistics. In contrast to green logistics literature, several researchers within the field of general logistics have studied the logistics market and the offerings of LSPs. However, very little focus appears to have been given to environmental aspects of the offering in general logistic literature, as the recent literature reviews of Yu et al. and Rajesh et al. (2011) are clear examples of. The variety of green categories that came as a result of this research adds information to this general view of LSPs' offerings.

The green categories also provide valuable information for LSPs and shippers active on the logistics market. This research indicates that there is confusion with regard to what shippers really want in terms of green categories, and the LSPs therefore encounter problems when they develop their green offerings. For LSPs and shippers, the green categories presented in this thesis help to clarify what types of green categories exist that can be included in green supply and green demand. This will help to reduce the "fuzziness" of green products and services in the interaction between LSPs and shippers (DHL, 2009).

The research presented in this licentiate thesis gives insights into the logistics market with a focus on green categories. Moreover, a dyadic perspective has been taken, meaning that views of both LSPs and shippers have been taken into account. By applying this perspective, it has been possible to study matches and mismatches on the logistics market in greater detail than what appears to have been done before. The description of green matches and green mismatches from both a market and relationship perspective offers additional information to the field of green logistics, and especially to the studies of Wolf and Seuring (2010) and Lieb and Lieb (2010). The description of green matches and mismatches also contributes to the field of general logistics market research since it offers a novel view on offerings and demands within logistics.

In addition, the matches and mismatches suggested in this thesis can be of help for LSPs and shippers that strive to improve their environmental work in their interactions with each other. The suggestion that both LSPs and shippers drive the environmental development in "green" relationships is a valuable learning. Moreover, the comparison of tangible and intangible categories can contribute to companies' developments of their green offerings and demands as it might shed light on which types of categories that lead to the fewest mismatches.

9.5 THE RESEARCH PROCESS IN RETROSPECT

A research process has to start somewhere. In retrospect, it can be interesting to wonder which impact the initial choices of the study have had on the outcome. Was it for example a good choice to start with a survey to obtain knowledge about the logistics market? The question of "which came first, the chicken or the egg?" is naturally difficult to answer, but it still deserves some attention here. Two different perspectives of the logistics market have been applied in this thesis; the market perspective and the relationship perspective. The market perspective was

studied with the help of a survey that included questions about LSPs' offerings and shippers' demands with regard to ten different green categories. As has been shown previously, more than ten green categories were found after additional literature reviews and empirical studies had been conducted. The survey does thus not give information about the additional green categories. In order for that to change, primarily the case studies would have had to be conducted first, in order to obtain knowledge about the additional categories. If that would have been done, however, the initial knowledge of mismatches and matches would have been lacking and it would have been difficult to know what to look for in the cases. Even though the survey did not include all green categories that were found in the end, the research had to start somewhere and the survey still provided valuable knowledge about green categories in relation to the market perspective.

Some additional focus on the survey is in order. Four questions about LSPs' green offerings and shippers' green demands were asked in the survey and each question included the same ten green categories. As noted in Paper 2, two of the green categories were phrased a little differently in one of these four questions. The results that include these two categories have been discarded in this licentiate thesis. While the mistake was unfortunate, the survey gives an overall picture of the logistics market that is not likely to change due to the two errors. It is therefore believed that the mistake only causes a problem when the specific green categories are studied, and that is why they were taken out of the data set.

As for the cases, which have given input to the relationship perspective of the logistics market, a few things need to be discussed. First of all, the choice of the case companies is likely to have had a large impact on the results of the case study analysis. The choice of LSPs is, for example, of interest in a study such as the one conducted for this thesis. In order to increase the likeliness of a variety of explanations for matches and mismatches on the logistics market, the two LSPs were partly chosen because of their differences in for example size and market focus. Once chosen however, DHL and Alltransport have been considered as two general "LSPs" throughout this thesis, without any specific point being made about the differences between the two companies. However, both DHL-relationships were considered to be closer than the two Alltransport-relationships (according to the relationship continuum) and this was an important assumption on which the analysis of the cases was partially based on. One possibility is that the differences in LSPs had a greater impact on this categorisation than what has been acknowledged in this thesis.

With regard to the choice of shippers, the LSPs were asked to suggest "green customers" that could be suitable for the case studies. A "green customer" is a relative term that most likely means different levels of environmental commitment depending on which LSP is asked. As it turned out, there were large differences between the shippers in the different cases. Both the cases in which DHL was involved included a variety of green categories, while the two Alltransport cases included considerably fewer green categories in their relationships. A choice

of less environmentally aware companies in DHL's case is likely to have given different results than the ones obtained in this study. However, due to the exploratory approach of this research, the aim was to find as "green" customers as possible. Therefore, the most surprising thing was perhaps not that there were many green categories involved in the DHL cases, but instead that there were so few green categories involved in the Alltransport cases.

Based on the discussion above, it appears that too few cases have been studied in this research in order to distinguish if the type of LSP or shipper has anything to do with the results of the thesis. Moreover, it should be acknowledged that the four relationships do not differ to a large extent. Even though small differences were found, the relationship categorisation of the cases showed four relatively similar relationships.

As has been mentioned before, the market perspective and the relationship perspective give two different views of the logistics market. These two views do not measure the same thing and this complicates a comparison between the two sets of results. A comparison has, however, been conducted and the results from that did not point to many similarities between the two sets of data. The types of green categories were to a large extent different between the survey and the cases, and the balance between matches and mismatches did not appear to correspond between them. Perhaps it could have been anticipated that the results would not correspond, but the possibility that they would was enough to conduct the analysis. While similar results would have shed more light on the survey results, the differing results did instead point to the importance of relationships in the green interaction between LSPs and shippers.

In relation to the two perspectives of the market, a discussion about the Gap model is in order. In Chapter 4.7.2, the Gap model applied on the survey was modified to better fit the analysis of the case studies. "Stated offering" was changed to "Offering" in order to emphasise that the specific buyer-supplier relationships were in focus. The general stated offering is that of a service offering that can be used in general marketing towards existent and potential customers. The other type of offering is customer dependent and is what an LSP offers to every individual customer. This type of offering can differ between different relationships, depending on which customer is a part of that specific relationship. In the analysis of the case studies, there has been a difficulty in separating between "Stated offering" and "Offering". In the Alltransport-Holmen case, for example, transport planning is mentioned as a part of the relationship by Alltransport. At the same time, the company representatives do not perceive this green category as a demand and Holmen does not perceive it as an offering. Is transport planning then in fact a part of the relationship or not? The GoGreen concept, or emission offset program, mentioned in the two DHL cases is another example. The LSP and the two shippers are aware of the offering and that the shippers do not wish to purchase this green category, and it is thus not a part of the relationships. In this thesis, however, these green categories have been considered to be a part of the relationships. The results suggest that that merely "Offering" in the Gap model is not sufficient for the analysis of the case companies. It seems as though the stated offering can include different green categories for different shippers, which would require a split of the "stated offering"-box into two different boxes. In such an extended Gap model, it would have been possible to distinguish between the differences in "Stated offering" and "Offering".

Closely related to the discussion about the Gap model is a consideration with regard to one aspect of the interviews. The LSPs were never specifically asked about their general offerings, since the specific buyer-supplier relationships were in focus. More detailed questions about these general offerings would perhaps have helped to give a better understanding as to if the LSPs in fact are ahead of the shippers with regard to the green categories.

9.6 SUGGESTIONS FOR FURTHER RESEARCH

The results of this licentiate thesis open up for a number of directions for further research. Some of them come as a result of the seven propositions presented in Chapter 8.3, of which about half suggest that there is a connection between the degree of how close a relationship between an LSP and a shipper is and various aspects of the green categories. There is a need for additional studies of relationships on the logistics market in order to better understand this proposed connection. One direction for further research could be to study which role the type of LSP has on green relationships between LSPs and shippers. The two LSPs studied in this licentiate thesis were not sufficient to suggest any connections between the type of LSP and the extent of matches and mismatches in the relationships. They were, however, different with regard to for example range of service offering, size and resources for the environmental work. In order to understand which role the type of LSP has in a relationship, one suggestion is to therefore to increase the scope of the study to include a larger number of LSPs. From such research it might be possible to find patterns in the types of LSPs with regard to the inclusion of green categories, as well as matches and mismatches in the relationships.

The type of research suggested above could be conducted either with or without the inclusion of corresponding shippers. One approach could be to locate shippers that are mutual for more than one LSP. Onninen, for example, purchases logistics services from both Alltransport and DHL, and it would be interesting to learn if these two relationships are similar with regard to the inclusion of green categories. Another approach could be to limit the number of LSPs to one or two and instead focus on a wide variety of shippers. The results from the four cases presented in this thesis indicate that the shippers' level of environmental interest has an influence on the green relationships. A study of a number of customers to the same LSP could shed light on if and how LSPs adapt the environmental work to different customers.

Research with a starting-point in shipper characteristics could also be of interest. With such a focus, it would be possible to first identify a number of shippers that have an interest to "green"

their logistics, and from there locate the corresponding LSPs. Such an approach could possibly offer additional insights to studies that start with the identification of LSPs. Another approach could be to study a few shippers' different relationships with LSPs to see if the green relationships differ. Although the starting–point still should be environmentally proactive shippers, it would be interesting to understand if such shippers vary the level of "green" in the relationship according to different factors. One such factor could be the importance of an LSP for a shipper; if the LSP is responsible for a large portion of the shipper's transports, then the environmental efforts in the relationship are perhaps greater than in a relationship with a less important LSP. In such a study, shippers' intentions when they search for suppliers, in this context LSPs are likely to have a large effect on the type of relationship that develops. One framework that is well recognised as a purchasing tool is the matrix of Kraljic (1983), where suppliers can be categorised into four different fields of a matrix (see Figure 9.1). Suppliers are placed in the matrix according to the impacts of a purchase on financial results and supply risk. Is it perhaps possible that these two parameters have an impact on the level of inclusion of green categories in a business relationship?

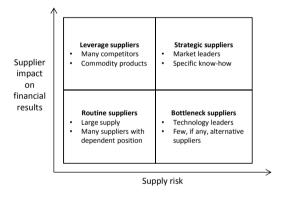


Figure 9.1 – Kraljic's matrix (adapted by van Weele, 2010)

Given that buyer-supplier relationships actually do play an important role for the "greenness" in the relationship, another direction for further research could be to in more detail than what has been done for this thesis study how the companies work together with regard to environmental issues. Do they have mutual routines for the environmental work? Does it matter which people that are involved in the relationship? Are there any connections between the environmental work in the relationship and the general environmental work in the individual companies? Research that aims to answer questions such as these could possibly shed light to how the relationship drives the environmental work, or if it in fact is either the LSP or the shipper that drives this work.

Even though the research in this thesis points to that relationships could play an important role for the explanation of matches and mismatches between green supply and demand, there could also be a wide variety of other explanations. As discussed above, size and range of service offerings could be of interest in relation to the relationships. Such factors could perhaps also offer explanations without the link to relationships necessarily being studied. One possibility is to go back to the survey that has provided the description of the market perspective and conduct additional analyses that take the types of companies into account.

Related to this, it would also be interesting to conduct an additional survey some time from now and compare the results to the results of the survey presented here. Such a study over time could give indications to the green development on the logistics market.

Another related approach would be to instead of the survey study relationships over time to understand if and in that case how the environmental work changes. Besides that such a study would be interesting from a relationship perspective, it could shed more light to Propositions 4-7 in this thesis, which basically suggest that the closer the relationship is, the greener it is. Over time, a relationship would have had a chance to develop and become closer and an increase in the environmental work would strengthen the propositions. Moreover, it could perhaps be the other way around, meaning that the common environmental work has an impact on the level of closeness in the relationship. A relationship study over time could possible shed light to these questions.

Since relationships in this thesis have been suggested to be of importance for the green matches and mismatches, it could be fruitful to study green relationships from various theoretical perspectives in order to understand them better. Theories on transaction costs, exchange and resource dependence, and industrial networks could for example provide valuable insights for additional analysis of the four buyer-supplier relationships.

Another area of research that perhaps could shed some new light to this relationship perspective is the service dominant logic. One issue that has not been discussed in this thesis is the notion of value and whether green offerings can be considered as value among shippers. According to the service dominant logic, suppliers can only make value-propositions and the customers then have to be a part of the value creation process (Vargo and Lusch, 2008). Value is thus co-created between the buyer and the supplier. Since the results from this thesis point to the possible importance of joint environmental work in LSP-shipper relationships, the service dominant logic could be of interest for additional understanding of the cases.

In this thesis, propositions have also been suggested with regard to connections between tangible and intangible characteristics of green categories and matches and mismatches in buyer-supplier relationships. These propositions need to be further researched in order for the connections to be better validated. One such research approach could be to further analyse the survey that has been

a part of the results in this thesis. The categories in the survey can most likely also be categorised according to the level of tangibility and a factor analysis could potentially show results that correspond or contradict the four Groups of green categories that were a part of the case-study results. Moreover, new patterns could perhaps open up for additional possible explanations of the green matches and mismatches on the logistics market.

In addition to the possible connection between tangibility and matches and mismatches for green categories, other characteristics of the categories could also be of interest for further research. One direction for such research could be to relate the green categories to costs and service from both a shipper and an LSP perspective. Such research is also supported by Paper 3, in which it is recognised that there is a need to integrate environmental performance measurements into other aspects of performance. Service and cost are two such performance measurements that are relevant for both shippers and LSP active on the logistics market.

The research in this thesis has not gone into detail with regard to what type of people that were interviewed in the LSP-shipper relationships. Could the position that the interviewed people hold at the companies possibly influence the level of green in the relationships? And are these people perhaps influenced by people on other levels in the companies' hierarchies? In Paper 3 it is noted that there is a need to integrate environmental measures on different managerial levels, but that not much research goes into detail with regard to how this could be done. McKinnon (2003) and Aronsson and Huge-Brodin (2006) suggest that decisions taken on for example a structural level in a company hierarchy sets limits for decisions that can be taken on a tactical or operational level. Thus, a person that could impact structural changes in a company could therefor open up for, or limit, increased environmental work. More research is needed in order to understand if this has any impact on the specific relationships studied.

The research in this thesis has focused on the Swedish logistics market. It would be interesting to extend the study to include other logistics market as well, in order to understand if they show similar results in terms of matches and mismatches. It could also be of interest to learn if the same green categories are of interest on other market as well. In the EU, the transport sector generates 10% of GDP for the whole European Union (Europa, 2011), while the Swedish transport sector generates about 6% of the GDP (Transportgruppen, 2006). This point to differences between countries with regard to the importance of transports and this could possibly also have an impact on the green categories on the various logistics markets.

A number of different paths to choose for researchers interested in environmental aspects of the logistic market have been suggested in this last section. As for myself, I am happy to be able to put an end to the writing of this licentiate thesis, but I am also intrigued by the many directions in which I can go from here. There is a good chance that I in a near future will dig into some of the suggestions given above.

REFERENCES

- Alltransport, (2009), "Hållbarhetsredovisning 2009",
- Andersen, I. (1998), Den Uppenbara Verkligheten Val av Samhällsvetensakplig Metod, Studentlitteratur, Lund.
- Andersson, D. & Norrman, A. (2002), "Procurement of Logistics Services--A Minutes Work or a Multi-Year Project?", European Journal of Purchasing & Supply Management, Vol. 8, No. 1, pp. 3-14.
- Arbnor, I. & Bjerke, B. (1997), *Methodology for Creating Business Knowledge*, Sage Publications, USA.
- Aronsson, H. & Huge-Brodin, M. (2006), "The environmental impact of changing logistics structures", *International Journal of Logistics Management*, Vol. 17, No. 3, pp. 394-415.
- Azzone, G. & Noci, G. (1998), "Identifying effective PMSs for the deployment of "green" manufacturing strategies", *International Journal of Operations & Production Management*, Vol. 18, No. 4, pp. 308-335.
- Beamon, B. (1999), "Designing the Green Supply Chain", *Logistics Information Management*, Vol. 12, No. 4, pp. 332-342.
- Berglund, M. (1997). *Third-Party Logistics Provider Towards a Conceptual Strategic Model*. Linköping University.
- Bickel, P., Friedrich, R., Link, H., Stewart, L. & Nash, C. (2006), "Introducing Environmental Externalities into Transport Pricing: Measurement and Implications", *Transport Reviews*, Vol. 26, No. 4, pp. 389-415.
- Björklund, M. (2005). Purchasing Practices of Environmentally Preferable Transport Services Guidance to Increased Shipper Considerations. Doctoral Thesis Lund University.
- Björklund, M. (2011), "Influence from the Business Environment on Environmental Purchasing Drivers and Hinders of Purchasing Green Transportation Services", *Journal of Purchasing & Supply Management*, Vol. 17, No. 1, pp. 11-22.
- Bowersox, D. J., Closs, D. J. & Cooper, M. B. (2010), Supply Chain Logistics Management, McGraw-Hill, Singapore.
- CAN Europe, (2011), "30% Why Europe Should Strengthen its 2020 Climate Action",
- Department of Energy & Climate Change, (2009), "Climate Change Act 2008 Impact Assessment".
- DHL, D. P., (2009), "Customer Needs in 2020 and Beyond: A Global Delphi Study", AG, D. P.,

- DHL, D. P. (2011). *Company Portait* [Online]. Available: http://www.dhl.com/en/about_us/company_portrait.html [Accessed February 18th 2011].
- Dubé, L. & Paré, G. (2003), "Rigor in Information Systems Positivist Case Research: Current Practices, Trends, and Recommendations", *MIS Quarterly*, Vol. 27, No. 4, pp. 597-635.
- Edwards, J. B., Cullinane, S. L. & McKinnon, A. C. (2008), "Carbon auditing conventional and online book supply chains: As easy as ABC?". in Lyons, A., ed., *Logistics Research Network* 2008 Conference proceedings.
- Edvardsson, B. (1997), "Quality in new service development: Key concepts and a frame of reference", *International Journal of Production Economics*, Vol. 52, No. 1/2, pp. 31-46.
- EEA, (2007), "Transport and Environment: on the way to a new transport policy, TERM 2006: indicators tracking transport and Environment in the European Union", Agency, E., Report No. 1.
- Eisenhardt, K. M. (1989), "Building Theories from Case Study Research", *Academy of Management Review*, Vol. 14, No. 4, pp. 532-550.
- Eisenhardt, K. M. & Graebner, M. E. (2007), "Theory Building from Cases: Opportunities and Challenges", *Academy of Management Journal*, Vol. 50, No. 1, pp. 25-32.
- Ekonomifakta. (2011a). *Tjänsteproduktionens Sammansättning* [Online]. Available: http://www.ekonomifakta.se/sv/Fakta/Ekonomi/Produktion-och-Investeringar/Tjansteproduktionens-sammansattning/ [Accessed 10 February 2011].
- Ekonomifakta. (2011b). *Växthusgaser* [Online]. Available: http://www.ekonomifakta.se/sv/Fakta/Miljo/Utslapp-i-Sverige/Vaxthusgaser/ [Accessed February 23rd 2011].
- Ericsson, (2009), "Annual Report 2009",
- Europa. (2011). *Transport* [Online]. Available: http://europa.eu/pol/trans/index_en.htm [Accessed 10 February 2011].
- European Commission. (2010). *The EU Climate and Energy Package* [Online]. Available: http://ec.europa.eu/clima/policies/brief/eu/package_en.htm [Accessed February 25th 2011].
- Fabbe-Costes, N. & Jahre, M. (2008), "Supply chain integration and performance: a review of the evidence", *International Journal of Logistics Management*, Vol. 19, No. 2, pp. 130-154.
- Fabbe-Costes, N., Jahre, M. & Roussat, C. (2009), "Supply chain integration the role of logistics service providers", *International Journal of Productivity and Performance Management*, Vol. 58, No. 1, pp. 71-91.

- Ford, D., Gadde, L.-E., Håkansson, H., Lundgren, A., Snehota, I., Turnbull, P. & Wilson, D. (1998), *Managing Business Relationships*, John Wiley & Sons, West Sussex.
- Forslund, H. (2006), "Performance gaps in the dyadic order fulfillment process", *International Journal of Physical Distribution & Logistics Management*, Vol. 36, No. 8, pp. 580-595.
- Forslund, H. (2010), "Supply chain performance management: Logisitcs service providers' perspective". in Stentoft Arlbjørn, J., ed., *The 22nd Annual NOFOMA Conference Logistics and Supply Chain Management in a Globalised Economy*, University of southern Denmark, 341-356.
- Gadrey, J. (2000), "The Characterization of Goods and Services: An Alternative Approach", *Review of Income & Wealth*, Vol. 46, No. 3, pp. 369-387.
- Giannakis, M. (2007), "Performance measurement of supplier relationships", *Supply Chain Management*, Vol. 12, No. 6, pp. 400-411.
- Gummesson, E. (1991), *Qualitative Methods in Management Research*, Sage Publications, Newbury Park.
- Hervani, A. A., Helms, M. M. & Sarkis, J. (2005), "Performance measurement for green supply chain management", *Benchmarking: An International Journal*, Vol. 12, No. 4, pp. 330-353.
- Holmen. (2009). *Annual Report 2009* [Online]. Available: http://www.holmen.com/Main.aspx?ID=8cf71426-59dc-48f8-a727-915b31f0f806 [Accessed February 14th 2011].
- Hopkins, S. A., Strasser, S., Hopkins, W. E. & Foster, J. R. (1993), "Service Quality Gaps in the Transportation Industry: An Empirical Investigation", *Journal of Business Logistics*, Vol. 14, No. 1, pp. 145-161.
- Jacobsen, D. I. (2002), Vad, hur och varför? Om Metodval i Företagsekonomi och Andra Samhälssvetenskapliga Ämnen, Studentlitteratur, Lund.
- Kohn, C. (2008). Towards CO2 Efficient Centralised Distribution. Linköping University.
- Kohn, C. & Huge-Brodin, M. (2008), "Centralised distribution systems and the environment: how increased transport work can decrease the environmental impact of logistics", *International Journal of Logistics: Research & Applications*, Vol. 11, No. 3, pp. 229-245.
- Kovács, G. & Spens, K. M. (2005), "Abductive Reasoning in Logistics Research", *International Journal of Physical Distribution & Logistics Management*, Vol. 35, No. 2, pp. 132-144.
- KPMG. (2000). Outsourcing Logistics: Status, Issues and Trends in Partnerships [Online]. Available: http://www.bearingpoint.de/media/industries_infrastructure_services/outsourcing_logistics_rotterdam.pdf [Accessed February 13th 2011].

- Kraljic, P. (1983), "Purchasing Must Become Supply Management", *Harvard Business Review*, Vol. 61, No. 5, pp. 109-117.
- Kumar, R. & Kumar, U. (2004), "A conceptual framework for the development of a service delivery strategy for industrial systems and products", *Journal of Business & Industrial Marketing*, Vol. 19, No. 5, pp. 310-319.
- La Londe, B. J. & Cooper, M. C. (1989), Partnerships in Providing Customer Service A Third Party Perspective, Council of Logistics Management, Oak Brook.
- Lammgård, C. (2007). Environmental Perspectives on Marketing of Freight Transports The Intermodal Road-Rail Case. Doctoral Thesis, Göteborg University.
- Large, R. O. & König, T. (2009), "A gap model of purchasing's internal service quality: Concept, case study and internal survey", *Journal of Purchasing & Supply Management*, Vol. 15, No. 1, pp. 24-32.
- Leahy, S. E., Murphy, P. R. & Poist, R. F. (1995), "Determinants of Successful Logistical Relationships: A Third-Party Provider Perspective", *Transportation Journal*, Vol. 35, No. 2, pp. 5-13.
- Lemoine, O. W. & Skjoett-Larsen, T. (2004), "Reconfiguration of supply chains and implications for transport: A Danish study", *International Journal of Physical Distribution & Logistics Management*, Vol. 34, No. 10, pp. 793-810.
- Levitt, T. (1972), "Production-line Approach to Service", *Harvard Business Review*, Vol. 50, No. 5, pp. 41-52.
- Lieb, K. J. & Lieb, R. C. (2010), "Environmental Sustainability in the Third-Party Logistics (3PL) Industry", *International Journal of Physical Distribution & Logistics Management*, Vol. 40, No. 7, pp. 524-533.
- Lieb, R. C. & Randall, H. L. (1996), "CEO Perspectives on the Current Status and Future Prospects of the Third-Party Logistics Industry in the United States", *Transport Logistics*, Vol. 1, No. 1, pp. 51-66.
- Lings, I. N. & Brooks, R. F. (1998), "Implementing and Measuring the Effectiveness of Internal Marketing", *Journal of Marketing Management*, Vol. 14, No. 4/5, pp. 325-351.
- Lovelock, C. & Gummesson, E. (2004), "Whither Services Marketing?: In Search of a New Paradigm and Fresh Perspectives", *Journal of Service Research*, Vol. 7, No. 1, pp. 20-41.
- Lumsden, K. (2006), Logistikens Grunder, Studentlitteratur, Poland.
- Maack, C. & Huge-Brodin, M. (2010), "Logistics Companies' Potential in Greening their Offered Services", Paper presented at 17th International EurOMA Conference, 6-9 June 2010, Porto,

- Makukha, K. & Gray, R. (2004), "Logistics Partnerships Between Shippers and Logistics Service Providers: The Relevance of Strategy", *International Journal of Logistics: Research & Applications*, Vol. 7, No. 4, pp. 361-377.
- Marasco, A. (2008), "Third-Party Logistics: A Literature Review", *International Journal of Production Economics*, Vol. 113, No. 1, pp. 127-147.
- Markley, M. J. & Davis, L. (2007), "Exploring future competitive advantage through sustainable supply chains", *International Journal of Physical Distribution & Logistics Management*, Vol. 39, No. 9, pp. 763-774.
- McIntyre, K., Smith, H. A., Henham, A. & Pretlove, J. (1998), "Logistics Performance Measurement and Greening Supply Chains: Diverging Mindsets", *International Journal of Logistics Management*, Vol. 9, No. 1, pp. 57-68.
- McKinnon, A. (2010a), "Environmental Sustainability A new Priority for Logistics Managers": McKinnon, A., Cullinane, S., Browne, M. & Whiteing, A. (eds.) *Green Logistics Improving the Environmental Sustainability of Logistics*. Kogan Page. New Dehli, 3-30.
- McKinnon, A., (2010b), "European Freight Transport Statistics: Limitations, Misinterpretations and Aspirations", ACEA,
- McKinnon, A., (2010c), "Green Logistics: The Carbon Agenda", 6.
- McKinnon, A. (2010d), "Increasing Fuel Efficiency in the Road Freight Sector": McKinnon, A., Cullinane, S., Browne, M. & Whiteing, A. (eds.) *Green Logistics Improving the Environmental Sustainability of Logistics*. Kogan Page. New Dehli, 140-166.
- McKinnon, A., Allen, J. & Woodburn, A. (2010), "Development of Greener Vehicles, Aircraft and Ships": McKinnon, A., Cullinane, S., Browne, M. & Whiteing, A. (eds.) *Green Logistics Improving the Environmental Sustainability of Logistics*. Kogan Page. New Dehli, 140-166.
- McKinnon, A. C. (2003), "Logistics and the environment": Hensher, D. A. & Button, K. J. (eds.) *Handbook of Transport and the Environment*. Elsevier. Amsterdam, 665-685.
- McKinnon, A. C. (2008), "The Potential of Economic Incentives to Reduce CO2 Emissions from Goods Transport", Paper presented at Transport and Energy: the Challenge of Climate Change, 28-30 May 2008, Leipzig,
- McKinnon, A. C. & Piecyk, M. I. (2009), "Measurement of CO2 emissions from road freight transport: A review of UK experience", *Energy Policy*, Vol. 37, No. 10, pp. 3733-3742.
- Merriam, S. B. (1994), Fallstudien som Forskningsmetod, Studentlitteratur, Lund.
- Miljö och Utveckling. (2011). *Utsläppskraven Hårdnar för Lastbilarna* [Online]. Available: http://www.miljo-utveckling.se/nyheter/artikel.php?id=34011 [Accessed February 25th 2011].

- Miljödepartementet. (2011). *Arbetet med Klimatfrågorna* [Online]. Available: http://www.sweden.gov.se/sb/d/3188/a/18807 [Accessed 4 May 2011 2011].
- Mukherjee, A. & Nath, P. (2005), "An Empirical Assessment of Comparative Approaches to Service Quality Measurement", *Journal of Services Marketing*, Vol. 19, No. 3, pp. 174-184.
- Murphy, P. R. & Poist, R. F. (1995), "Role and Relevance of Logistics to Corporate Environmentalism", *International Journal of Physical Distribution & Logistics Management*, Vol. 25, No. 2, pp. 5.
- Murphy, P. R. & Poist, R. F. (2000), "Third-Party Logistics: Some User Versus Provider Perspectives", *Journal of Business Logistics*, Vol. 21, No. 1, pp. 121-133.
- Naula, T. & Ojala, L., (2002), "Advanced Logistics Services in the Baltic States (AD LOG)", TEDIM.
- Nawrocka, D., Brorson, T. & Lindhqvist, T. (2009), "ISO 14001 in environmental supply chain practices", *Journal of Cleaner Production*, Vol. 17, No. 16, pp. 1435-1443.
- Nilsson, J. 2011. Hållbar Logistik Behov, Hinder och Lösningar. Inköp + Logistik.
- Ohnell, S. & Woxenius, J. (2003), "An Industry Analysis of Express Freight from a European Railway Perspective", *Un análisis de la industria del flete express desde una perspectiva ferroviaria europea.*, Vol. 33, No. 8, pp. 735-751.
- Onninen. (2009). *Annual Report 2009* [Online]. Available: http://www.onninen.com/ [Accessed February 18th 2011].
- Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research", *Journal of Marketing*, Vol. 49, No. 4, pp. 41-50.
- Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1988), "SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality", *Journal of Retailing*, Vol. 64, No. 1, pp. 12-40.
- Patton, M. Q. (2002), Qualitative Research & Evaluation Methods, Sage Publications, USA.
- Rajesh, R., Pugazhendhi, S., Ganesh, K., Muralidharan, C. & Sathiamoorthy, R. (2011), "Influence of 3PL Service Offerings on Client Performance in India", *Transportation Research: Part E*, Vol. 47, No. 2, pp. 149-165.
- Rao, P. & Holt, D. (2005), "Do Green Supply Chains Lead to Competitiveness and Economic Performance?", *International Journal of Operations & Production Management*, Vol. 25, No. 9, pp. 898-916.

- Ribeiro, K. S., Kobayashi, S., Beuthe, M., Gasca, J., Greene, D., Lee, D. S., Muromachi, Y., Newton, P. J., Plotkin, S., Sperling, D., Wit, R. & Zhou, P. J., (2007), "Transports and its Infrastructure", Press, C. U.,
- Road Transport Research (1996), Integrated Advanced Logistics and Road Freight Transport, OECD, Paris.
- Rondinelli, D. & Berry, M. (2000), "Multimodal transportation, logistics, and the environment: managing interactions in a global economy", *European Management Journal*, Vol. 18, No. 4, pp. 398-410.
- Roth, A. & Kåberger, T. (2002), "Making transport systems sustainable", *Journal of Cleaner Production*, Vol. 10, No. 4, pp. 361.
- Sarkis, J. (2003), "A strategic decision framework for green supply chain management", *Journal of Cleaner Production*, Vol. 11, No. 4, pp. 397-409.
- Sarkis, J., Meade, L., M. & Talluri, S. (2004), "E-logistics and the natural environment", *Supply Chain Management*, Vol. 9, No. 4, pp. 303-312.
- SECO Tools, (2009), "Seco Tools Årsredovisning 2009",
- Selviaridis, K. & Spring, M. (2007), "Third Party Logistics: A Literature Review and Research Agenda", *International Journal of Logistics Management*, Vol. 18, No. 1, pp. 125-150.
- Seth, N., Deshmukh, S. G. & Vrat, P. (2006), "A conceptual model for quality of service in the supply chain", *International Journal of Physical Distribution & Logistics Management*, Vol. 36, No. 7, pp. 547-575.
- Sheffi, Y. (1986), "Carrier/Shipper interactions in the transportation market: An analytical framework", *Journal of Business Logistics*, Vol. 7, No. 1, pp. 1-27.
- Sheffi, Y. (1990), "Third Party Logistics: Present and Future Prospects", *Journal of Business Logistics*, Vol. 11, No. 2, pp. 27-39.
- Shostack, G. L. (1977), "Breaking Free from Product Marketing", *Journal of Marketing*, Vol. 41, No. 2, pp. 73-80.
- SIKA. (2005), "Transport and Communications Yearbook 2005", Bulls Tryckeri AB,
- SIKA, (2006), "Varuflödesundersökningen 2004/2005",
- SIKA, (2009), "Transportbranschen Hur står det till? Statistik om transportbranschen och sex delbranscher åren 1997-2007", Grafiska, E.,
- Simpson, D., Power, D. & Samson, D. (2007), "Greening the automotive supply chain: a relationship perspective", *International Journal of Operations & Production Management*. Vol. 27, No. 1, pp. 28-48.

- Skjoett-Larsen, T., Paulsson, U. & Wandel, S. (2003), "Logistics in the Öresund region after the bridge", *European Journal of Operational Research*, Vol. 144, No. 2, pp. 247-256.
- Skålén, P. & Fougère, M. (2007), "Be(com)ing normal not excellent", *Journal of Organizational Change Management*, Vol. 20, No. 1, pp. 109-125.
- Spens, K. M. & Bask, A. H. (2002), "Developing a Framework for Supply Chain Management", *International Journal of Logistics Management*, Vol. 13, No. 1, pp. 73-88.
- Starkey, R. (1998), "The Standardization of Environmental Management Systems: ISO 14001, ISO 14004 and EMAS": Welford, R. (ed.) *Corporate Environmental Management Systems and Strategies*. Earthscan Publications Ltd, Sedond ed. UK, 270.
- Stefansson, G. (2006), "Collaborative Logistics Management and the Role of Third-Party Service Providers", *International Journal of Physical Distribution & Logistics Management*, Vol. 36, No. 2, pp. 76-92.
- Sweeney, E. & Envangelista, P. (2005), "3PL Definition and Taxonomy", Technical Focus in Logistics Solutions, the Journal of the National Institute for Transport and Logistics, Vol. 7, No. 2, pp. 9-10.
- Svensk Åkeritidning. (2008). *Pris till Alltransport i Östergötland* [Online]. Available: http://www.akeri.se/svensk-akeritidning/nyheter/pris-till-alltransport-i-ostergotland [Accessed April 19th 2011].
- Tarkowski, J., Ireståhl, B. & Lumsden, K. (1995), Transportlogistik, Studentlitteratur, Lund.
- Transportgruppen, (2006), "Transportgruppens Lilla Blå En Faktasamling om Transportsektorn", Utredningsinstitut, A. H.,
- van Weele, A. J. (2010), *Purchasing and Supply Chain Management*, Cenage Learning EMEA, Hampshire.
- Wandel, S., Ruijgrok, C. & Nemoto, T. (1992), "Relationships among Shifts in Logistics, Transport, Traffic and Informatics Driving Forces, Barriers, External Effects and Policy Options": Storhagen, N. G. & Huge-Brodin, M. (eds.) Logistiska Framsteg Nordiska Forskningsperspektiv på Logistik och Materialadministration. Studentlitteratur. Lund, 96-136.
- Vargo, S. L. & Lusch, R. F. (2004), "Evolving to a New Dominant Logic for Marketing", *Journal of Marketing*, Vol. 68, No. 1, pp. 1-17.
- Vargo, S. L. & Lusch, R. F. (2008), "Service-Dominant Logic: Continuing the Evolution", Journal of the Academy of Marketing Science, Vol. 36, No. 1, pp. 1-10.
- Webster, J. F. E. (1992), "The Changing Role of Marketing in the Corporation", *Journal of Marketing*, Vol. 56, No. 4, pp. 1.

- Veleva, V., Hart, M., Greiner, T. & Crumbley, C. (2003), "Indicators for measuring environmental sustainability: A case study of the pharmaceutical industry", *Benchmarking: An International Journal*, Vol. 10, No. 2, pp. 107-119.
- Wolf, C. & Seuring, S. (2010), "Environmental impacts as buying criteria for third party logistical services", *International Journal of Physical Distribution & Logistics Management*, Vol. 40, No. 1, pp. 84-102.
- World Economic Forum & Accenture, (2009), "Supply Chain Decarbonization: The Role of Logistics and Transport in Reducing Supply Chain Carbon Emissions",
- Wu, H.-J. & Dunn, S. C. (1995), "Environmentally responsible logistics systems", *International Journal of Physical Distribution & Logistics Management*, Vol. 25, No. 2, pp. 20.
- Yin, R. (2009), Case study research: Design and methods, Sage Publications, London.
- Yu, T., Ellinger, A. E. & Haozhe, C. (2010), "Third-Party Logistics Provider Customer Orientation and Customer Firm Logistics Improvement in China", *International Journal of Physical Distribution & Logistics Management*, Vol. 40, No. 5, pp. 356-376.
- Zeithaml, V. A., Parasuraman, A. & Berry, L. L. (1985), "Problems and Strategies in Services Marketing", *Journal of Marketing*, Vol. 49, No. 2, pp. 33-46.

APPENDIX 1

List of Respondents

Company	Name of Responent	Position at Company	Date of Interview
Alltransport	Mattias Bodin	Buisness Area Manager	18 November 2010
Alltransport	Tommy Gustafsson	Salesperson	7 December 2010
DHL	Lennart Wilén	Customer Relationship Manager (CRM) and Business Development Manager	21 January 2011
DHL	Linda Bergsten	Environmental Manager	2 February 2011
DHL	Juan Barrena	Inbound and Domestic Development Manager	28 February 2011
Holmen	Bo Wibrén	Transport Manager	15 November 2010
Onninen	John Lind	Transport Manager	20 January 2011
Onninen	Johan Grönkvist	Transport Coordinator	20 January 2011
SECO Tools	Bengt Brammefors	Manager of Global Transport Solutions	4 January 2011
Ericsson	Maria Hasselrot	Works in Inbound Distribution Development and as Environmental Advisor Distribution Logistics	28 February 2011

APPENDIX 2

Interview Guide

QUESTIONS TO THE LOGISTICS SERVICE PROVIDERS

The respondent

- What is your position at the company?
- How long have you been working at the company?
- Who do you report to?
- Who reports to you?

The company in general

• What is the strategy of the company/relevant division?

The company with regard to environmental issues

- How are environmental issues taken into account at the company?
- What environmental competences exist in the company?
- What are the driving forces for the environmental work?
- Who is responsible for environmental issues?
- Who is the environmental work driven by at the company?

The relationship with a specific shipper

- How much of your transports are represented by the shipper?
- How and when do you interact with the shipper?
- How long has the shipper been a customer to the company?
- What are the characteristics of your relationship?

The environmental relationship with a specific shipper

- What are the environmental aspects of your relationship with the shipper?
- What is your perception of the shipper's green demands?
- What can your company offer in regards to what the shipper demands?
- Which actor is the driver of the environmental work in the relationship?

QUESTIONS TO THE SHIPPERS

The respondent

- What is your position at the company?
- How long have you been working at the company?
- Who do you report to?
- Who reports to you?

The company in general

- What is the strategy of the company/relevant division?
- What role does logistics have for the company?

The company with regard to environmental issues

- How are environmental issues taken into account at the company?
- What environmental competences are found in the company?
- What are the driving forces for the environmental work?
- Who is responsible for environmental issues?
- Who is the environmental work driven by at the company?

The relationship with a specific LSP

- How large portion of your transport needs is represented by the LSP?
- How and when do you interact with the shipper?
- How long has the company been a customer to the LSP?
- What are the characteristics of your relationship?

The environmental relationship with a specific LSP

- What are the environmental aspects of your relationship with the LSP?
- What is your perception of the LSP's green offering?
- What does the company demand in regards to what the LSP offers?
- Which actor is the driver of the environmental work in the relationship?