Logistics Service Providers going green – insights from the Swedish market

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ABSTRACT

During recent years pressures on the logistics and transport industry to involve and engage more in environmental work have increased. Governmental awareness of environmental impact has led to an increased pressure on the logistics and transport industry to reduce the emissions incurred by their operations. In addition, customers have become more interested and demanding regarding green initiatives in their purchasing of transport services. Although logistics service providers (LSPs) are becoming more aware of environmental problems, the development of green initiatives in the logistics and transport industry is described in the literature as being in its infancy phase. Considering the scarcity of studies on LSPs’ green initiatives, a study that reveals potential factors influencing the adoption of green initiatives may be helpful to fill the knowledge gap and provide opportunities for further research in this field.

The purpose of this licentiate thesis is therefore to describe how different factors can affect the adoption of green initiatives among LSPs, and how the adoption of green initiatives can be reflected in the service offering. This includes identifying different kinds of triggers, drivers and barriers, as well as firm characteristics and describing how these factors can affect the adoption of green initiatives. Furthermore, ways in which the adoption of green initiatives can be reflected in the service offering are exemplified in order to answer the second part of the purpose.

The theoretical base in this licentiate thesis can be linked to general environmental logistics literature, sustainable service, and product development research. The research in this study is in its nature explorative and empirical data have been obtained from a cross case study of six companies, and a survey study investigating LSPs active on the Swedish market.

Based on the findings from the analysis, the LSPs studied have commenced to adopt green initiatives since they experience the pressure to adapt to future expectations and, understand the consequences. This will enable the LSPs to respond to the increasing and more global competition. Although increased competitiveness seems to act as a trigger, the role of competitors as a driver affecting the adoption of green initiatives among LSPs are neither stressed in the case study nor singled out in the survey study as a significant driver. Increased interest from customers and decisions from top management are both highlighted as triggers for LSPs to start adopting green initiatives, in the literature as well as among the LSPs studied.

The role of customers and top management also seem to be prominent drivers in the further green development. By adopting green initiatives, LSPs strive to win new customers and there is also a desire to improve customer relationships. Furthermore, the engagement and support from top management can be crucial for how successfully the adoption of green initiatives is integrated into the company and received by the employees. In addition, among the LSPs studied, their employees can be considered as an essential driver and a resource when adopting green initiatives.
Regarding the studied barriers, financial and economical barriers emerge as crucial when LSPs adopt green initiatives. In addition, customers are also perceived as a barrier among the LSPs studied due to reasons such as lack of customer support, unwillingness to pay for green initiatives as well as unclear and unreasonable green requirements from customers.

Another finding from the study is that size of the company, type of service offerings provided, as well as type of customers seems to play an essential role when LSPs adopt green initiatives. The analysis indicates that firm characteristics can moderate the effects of different drivers and barriers and suggests that firm characteristics rather effect the adoption of green initiatives indirectly than directly.

Finally, despite the early phase of LSPs greening process, the analysis presents three different patterns that reflect the current behaviour and anticipations among the LSPs studied. The development of green service offerings includes the internal work as well as the explicit service offering. This in turn indicates that the selected green approach and how LSPs choose to react and adopt green initiatives will in the end be either directly or indirectly reflected in the service offering.
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While I am writing these very last words, I am at the same place where I once took the decision to start this journey. I truly hope that all of you want to be by my side on my continued journey to become a PhD.

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1 INTRODUCTION

In order to give the reader an insight into the main contents of this licentiate thesis, this chapter addresses how the logistics service providers’ industry has developed during recent years as well as how this industry has been affected by the ongoing debate in society. The background leads then into the purpose and the research questions of this thesis. In addition, the scope and the focus of the study as well as definitions of central concept and terms are presented, and the chapter ends with a presentation of the outline of this licentiate thesis.

There are always changes in all industries affected by different dominant drivers. In recent years, it has become common to have an increasing focus on logistics, as companies have seen new opportunities to streamline their operations and increase their competitiveness (Zacharia and Mentzer, 2007). Some examples of drivers that have been identified for business change and new structures in the logistics chains during the last decade are presented below.

Let us start with the globalization of supply chains, which has prompted many firms to develop logistics as part of their corporate strategy (McGinnis and Kohn, 2002). One effect of this is the fact that logistics has been given a more prominent and strategic role within many companies (Zacharia and Mentzer, 2007). These authors also stress that logistics has become a source of competitive advantage, especially through transportation deregulation and improvements in information technology which have enabled companies to gain competitive advantage through competence in delivery speed, reliability, responsiveness and low cost distribution.

Due to the introduction of new information and communication technology (ICT), new opportunities have been created in controlling and follow-up logistics development, such as increased the possibility of transferring information both geographically and between different supply chain participants (Lemoine & Skjøtt-Larsen, 2004).

Another prominent driver that has affected the reconfiguration of the supply chains is market requirements. Higher requirements on customized products and services have led to new logistics solutions, where integration and cooperation is increasingly important when the dependence on external actors’ performance directly affects the business delivery service. In other words, this change is driven by new demands from customers, competitors, new solutions, more advanced concepts and new roles and collaborations. Companies face new challenges to change and organize to be able to offer competitive solutions in the new emerging logistics network. Changes in the logistics chains will also produce changes in the demands for freight transport (Drewes Nielsen et al., 2003). In order to meet these demands and to deliver products and services quickly to customers, many companies seek to outsource their logistics activities to logistics service providers (LSPs). This reflects the trend of using LSPs in order to satisfy the increasing need for logistics services (Lieb and Miller, 2002). Even though LSPs have an important role in logistics, Fabbe-Costes et al. (2009) indicate that LSPs often are seen as the neglected actors of supply chain integrations. However, these players have lately received increased...
attention, due to the negative impact on the natural environment caused by transport and logistics operations. The following section will present some of the set targets and challenges connected to climate change that have been directed towards the logistics and transport industry.

1.1 CLIMATE CHALLENGES
As the general awareness of the changing global environment is increasing, governments are starting to react more strongly and more actively to counteract the negative impact on the environment caused by society and businesses. Reductions of greenhouse emissions are one common objective that has been set in order to decrease the effects of global warming. These set targets are related to the UN’s convention on climate change and the associated Kyoto Protocol. A joint study between Allianz and WWF (2009a) provides an analysis of the G8’s national efforts to tackle climate change. However, different nations have reacted differently to climate challenge for reasons such as level of development, industrial structure, availability of natural resources, public perceptions and economic activities that result in greenhouse gas (GHG) emissions. For example, Germany has set a national emission target that envisages a 40% emissions reductions by 2020 compared to 1990 levels, but show no convincing strategy for low carbon transition in the transport sector. Another example, United Kingdom, has set a target to reduce GHG emissions by at least 34% by 2020 and at least 80% by 2050 compared to 1990 levels. (WWF, 2009a)

Hence, in order to reach these targets, new policies and measures focusing on the transport sector are needed, especially increased improvements within the road freight transport segment (Piecyk, 2010a).

After receiving a feeling how other countries have responded, the question remains; how has Sweden reacted and tackled the climate change challenges? The Swedish national targets are overall more challenging than the EU targets, and Sweden has the ambition to reach a 40% reduction in GHG emissions outside the European Emissions Trading System by 2020 (2/3 domestic, 1/3 offsets) and aim for a zero net GHG emissions by 2050 (compared to 1990 levels). (WWF, 2009b). The impact of emissions (CO2 eq.) from different sectors in Sweden is illustrated in Figure 1 below.

As Figure 1 shows, transport sector represents about 32% of the total emissions (CO2 eq.) and thus has a greater impact than the other sectors. In addition, the transport sector is also the one with the fastest growth (Trafikverket, 2010). The transport sector’s carbon footprint is dominated by road transports (including both passenger and freight transports), which constitute about 95% of the transport sector’s domestic CO2
emissions. (Transportstyrelsen, 2011). However, during the 2000s, the increase in emissions from road transports has been dampened by the increased use of alternative fuels and more fuel-efficient vehicles (Trafikverket, 2010). Nevertheless, this has not been enough to compensate for the increased traffic growth, and as a result, the emissions increased by about 10% between the years 1990 and 2009 (Transportstyrelsen, 2011). Today the Swedish Transport Agency has a focused environmental approach regarding vehicle and fuel development towards more energy efficiency and an increased proportion of sustainable bio fuels within the road transports sector (ibid.). For example, a set target within this sector is to have a vehicle fleet independent of fossil fuels by 2030 (WWF, 2009b).

However, the overall development within the transport sector continues to progress too slowly to reach the set targets; this applies first and foremost to carbon dioxide emissions (Transportstyrelsen, 2011). This indicates that if the transport sector is going to contribute to reaching the set targets, measures and instruments with a stronger impact are needed. Technical solutions, such as more efficient vehicles as well as an increased proportion of renewable energy and the electrification of road transport will not be enough (ibid.). Therefore, unless there is a change in our behaviour, both in society and among companies, it will lead to increased levels of emissions from transports in the future.

From a company perspective, managers must start questioning themselves how they can green their companies and supply chains in order to contribute to lowering carbon emissions. However, this will not be without challenges. One example of a company that has shown willingness to take on these challenges and considers itself to be proactive in its approach to climate change is Deutsche Post, DHL (DHL, 2010). The CEO of Deutsche Post DHL, Frank Apple states:

“I am sure that the pursuit of sustainability will transform the logistics industry. At the same time, the logistics industry, with its unique position all along the supply chain and its expertise, can offer important assistance to many sectors as they progress towards a low-carbon economy. Logistics can help foster sustainability.” (p. 10)

In order to better understand how these challenges can be addressed within the LSP industry, the next step is to gain insights into how this industry has developed over the past decades.

1.2 THE DEVELOPMENT WITHIN THE LSP INDUSTRY
The logistics and transport business is an industry which over the years, has undergone fundamental changes and where the individual players have faced new challenges of strategic as well as structural nature (Persson and Virum, 2001). For example, the increasing trend towards the outsourcing of the logistics activities has given prominence to the concept of LSPs and seems most likely to continue to grow over the next few years as well (Lieb and Bentz, 2005).

From a traditional point of view, transport is often viewed as separate from the supply chain and is described as the least integrated link, where there is a great focus on cost
reductions (Stank and Goldsby, 2000). The LSPs have played a supportive role for the supply chain by providing resources, knowledge, utilities or assets for primary members in the supply chain (Spens and Bask, 2002). This view of LSP has started to change, as these actors have become increasingly influential in the context of supply chain, since the extent to which the logistics functions are prudently undertaken will influence the efficiency and consequent performance of the supply chain (Panayides and So, 2005). Moreover, Lieb and Bentz (2004) stress that the services offered by LSPs can clearly be used as an important element of a company’s supply chain management strategy, both domestically and internationally. In other words LSPs can play an important role in linking users to their major vendors and customers, and thereby facilitating supply chain integration.

Another change mentioned by Carbone and Stone (2005), is that more consolidation within the 3PL industry is expected. A few market leaders offer a wide range and scope of services, while most other firms have a diversified portfolio of interests. One common conclusion of several studies suggests that the market for logistics and transport services is becoming larger and more complex (see for example Andersson and Norrman, 2002; Hertz and Alfredsson, 2003 and Lieb and Bentz, 2005). This situation which is evolving in the form of growth and diversification, presents opportunities and challenges for companies, which in turn generate new players from different fields that are entering the market and are competing with the traditional transport and warehousing firms (Hertz and Alfredsson, 2003). Example of such new players can be post offices, ICT consultants and info-providers (Carbone and Stone, 2005).

The increased competitions on the market has put a higher pressure on LSPs and Panayides and So (2005) mean that the competitiveness of LSPs will depend to a large extent on their ability to add value to the bottom line of their clients. However, Lemonie and Skjoett-Larsen, (2004) raise the question of how the users of logistics services will satisfy their clients’ demand when LSPs are the least integrated link in the supply chain. Therefore, the evolving role of LSPs in the supply chain will change and probably affect their relationships with customers. This in turn will place greater pressure on LSPs to fulfil the new demands. In addition, Hertz and Alfredsson (2003) stress that in order to add customer value, it will be necessary to develop skills, competencies and gain scale/scope advantages that are superior to the competitors’. Other benefits of developing logistics service capabilities mentioned in the literature other than added value to customers, are an increase in market share, customer satisfaction, differentiation-based competitive advantage and facilitation of market segmentation.

The review above, gives a brief description of the changes in market conditions and challenges within the logistics service industry in recent years. Another challenge that the LSP industry faces today, as mentioned earlier in this section, concerns the challenge to create sustainable practice and performance. This is an area that can be seen to be of increasing importance for LSPs as their core activities (e.g. transport activities) have a strong environmental impact.
1.3 **Need for green research within the LSP Industry**

The development of the role of LSPs, as outlined above, puts these actors in a critical position to support efforts aimed at improving the environmental sustainability of supply chain operations.

In the literature, environmental practices in service sectors have started to attract the attention of researchers (Kassinis and Soteriou, 2003). However, most of the literature and empirical studies regarding environmental sustainable improvements have primarily been directed towards manufacturing companies (see, for example Eltayeb and Zailani, 2009; Hong *et al.*, 2009). In relation to the LSPs sector specifically, two recently published literature reviews on LSPs barely mention sustainability related issues (Maloni and Carter, 2006; Selviaridis and Spring, 2007). A literature review conducted by Lin and Ho (2008), revealed that only a limited number of articles have focused on environmental issues in the context of the logistics industry in the last decade. In addition, Lieb and Lieb (2010) also point out that the LSP industry has been given very little attention in green supply chain research. This in turn shows the relevance of exploring the green development among LSPs and according to Lin and Ho (2008):

“Much remains to be learned empirically about the adoption of environmental practices for logistics service providers” (p. 18).

Since the importance of green management has increased over the past decade (e.g. Skjoett-Larsen, 2000 and McKinnon, 2010), this has led into higher demands on companies to deliver products and services to customers in more environmentally friendly ways. Within in the green logistics area, research has been directed towards a variety of areas, for example assessing the environmental impacts of freight transports. Focus has been on different kinds of externalities associated with freight transport (such as effects of atmospheric pollution, noise pollution and accidents), measuring the environmental impact of freight transport as well as different kinds of environmental standards (both mandatory as well as voluntary/management standards). The assessment of environmental impacts at the company and product level has recently attracted an increased focus on GHG emissions (Cullinane and Edwards, 2010). Therefore, concepts such as “carbon foot-printing” have been introduced in order to help companies to understand and manage their GHG emissions. This area has evolved rapidly in recent years, and carbon auditing in the road freight sector has been shown to provide quicker and more cost-effective means of finding opportunities for decarbonisation within a logistics operation (Piecyk, 2010b).

Another area within green logistics concerns the environmental impacts of different kinds of freight transport modes. Advances in vehicle technology and stricter regulations on emission levels have reduced the transport externalities (McKinnon, 2010). However, Woodburn and Whiteing (2010) claim that in order to meet the CO$_2$ emissions target, a more concerted action of transferring freight to “greener” transport modes (for example by rail and water) may be necessary. The green logistics research area, as mentioned above, seems to address a variety of environmental effects and its impact on logistics, whereas the role of LSPs in this context seems to be neglected.
Pressures on the LSP industry to involve and engage in more environmental work can come from a variety of sources. For example, as mentioned earlier in this section, governmental awareness of environmental impact has led to an increased pressure on the transport industry to reduce the emissions incurred by their operations, and Rothengatter (2010) state that this will have clear consequences for the transport sector. In addition, a recent report conducted by DHL (2010) indicates that customers will become more demanding about green initiatives in their purchasing of transport services. The LSP industry thus faces a huge challenge to green their operations in order to meet the increased demands from governments as well as customers. Hence, before suggesting how LSPs should manage to meet and fulfil these set targets and demands, it is necessary to find out how LSPs respond to different pressures today. As mentioned earlier, different kind of sources can drive a company to green their operations, which makes it interesting to find out what actually “triggers” LSPs to start considering to adopt green initiatives within their companies. Increased pressures from governments as well as green demands from customers are both mentioned above as examples of sources of influence but what role and what influence do these stakeholders have on LSPs regarding the actual adoption of green initiatives?

Even if LSPs are becoming more aware of environmental problems and are working with green initiatives (e.g. DHL, 2010, DB Schenker, 2011), the development of green initiatives in the logistics industry is described in the literature as being in its infancy phase (Lin and Ho, 2008). In order to get a better understanding and clarify what kind of factors affect the greening process among LSPs, it can be fruitful to investigate and consider factors that stimulate (drivers) and inhibit (barriers) LSP to adopt green initiatives. However, Lin and Ho (2008) indicated in their research that all organisations are not exposed to the same type of pressure or to the same extent, which in turn, indicates that different types of LSP may be influenced and affected differently when it comes to greening their businesses, and also that they choose different paths in their work.

Furthermore, the adoption of green initiatives can also be seen as a business opportunity for LSPs and a means to attract new customers (Lieb and Lieb, 2010). However, in order to make this happen, LSPs must consider how their efforts on environmental issues can be addressed towards their customers to obtain their awareness and interest.

Considering the scarcity of studies on LSPs’ green initiatives, a study that reveals potential factors influencing the adoption of green initiatives may be helpful to fill the knowledge gap and provide opportunities for further research in this field. This type of study is relevant since the importance to integrate green initiatives within the company’s business, as well as in the logistics service offerings, will probably attract even more managerial attention in the logistics industry in the future (Lieb and Lieb, 2010) and there will be a need of guidance.
1.4 PURPOSE AND RESEARCH QUESTIONS

Based on the previous discussion, the purpose of this licentiate thesis is to:

Describe how different factors can affect the adoption of green initiatives among Logistics Service Providers, and how the adoption of green initiatives can be reflected in the service offering.

In this thesis the term “factor” has been divided into triggers, drivers and barriers as well as firm characteristics, and in line with the main purpose, four further research questions have been developed and studied. First, in order to understand why LSPs have started to show interest and adopt green initiatives, an important step is to identify how different triggers can initiate the adoption of green initiatives. This clarification can facilitate the understanding of how the LSPs can progress further in greening their operations. This reasoning leads to the first research question, namely:

RQ1: How can different triggers initiate the adoption of green initiatives?

To clarify, in this thesis a trigger should not necessarily be associated with a driver. A trigger can be an incentive that “triggers a reaction” and activates or causes something to happen, while a driver stimulates or act as an impetus to activities or processes to move further. Therefore, in order to better understand what influences LSPs in their move towards a green development of their operations, the next step is to identify various drivers as well as barriers affecting LSPs in their adoption of green initiatives. Thus, the second research question is as follows:

RQ2: How can different drivers and barriers affect the adoption of green initiatives?

As mentioned in section 1.3, all companies may not be exposed to the same type of pressure or to the same extent (Lin and Ho, 2008). Therefore, it can be interesting to investigate how the perception of drivers and barriers might vary between different LSPs when adopting green initiatives. The disparity of perceptions can in turn depend on and be explained by the nature of the company and its characteristics. The third research question thus provides increased understanding of how firm characteristics can affect the adoption of green initiatives.

RQ3: How can firm characteristics affect the adoption of green initiatives?

The research questions presented above concern the LSPs’ green performance throughout the entire company. In this thesis, green initiatives do not necessarily need to be a concrete green service offering to the customers. Instead, green initiatives can be a part of the general service offering or in some way support and affect the development of the service offering. Therefore, the last research question aims to consider in which ways the adoptions of green initiatives can be addressed towards the customers and be reflected in the LSPs’ service offerings.

RQ4: In which ways can the adoption of green initiatives be reflected in the service offering?
To conclude, in order to clarify the purpose and to facilitate for the reader, the connection between the main parts of this study and the research questions is illustrated in Figure 2 below:

![Figure 2 The position of the Research Questions.](image)

1.5 **DEFINITIONS OF CENTRAL TERMS**

This section aims to discuss the central terms applied in order to ensure their clarity and consistent meaning throughout the thesis. This is essential in order to further specify and describe the focus of this licentiate thesis.

**Logistics service provider (LSP)** – The definitions of this term varies and an LSP can broadly be defined according to the Council of Supply Chain Management Professionals (CSCMP) as: “any business which provides logistics services. Includes those businesses typically referred to as 3PL, 4PL, LLP, etc. Services may include provisioning, transport, warehousing, packaging etc” (CSCMP, 2011). Furthermore, in this licentiate thesis, the activities of LSPs are in line with the definition of third party logistics proposed by Sweeney and Evangelista (2005): “Third-party logistics are activities carried out by a logistics service provider on behalf of a shipper and consisting of at least transportation. In addition, other activities can be integrated into the service offering such as warehousing and inventory management; information related activities, such as tracking and tracing; and value added supply chain activities, such as secondary assembly and installation of products”.

**Green initiatives** – Since the development of environmental sustainability research in the logistics service industry still is in its infancy phase, there is not an explicit definition of green initiatives in the specific context of LSP. Hence, Martinsen and Hugue-Brodin (2010) made an attempt in their article to group green initiatives into transport related measures (e.g. fuels, vehicle technology, mode choice, behavioural aspects, transport management) and beyond-transport initiatives (e.g. logistics system design, choice of partners, environmental management system, emissions and energy data). This approach has been applied in here.

**Green service offering** – As mentioned in the section 1.4 above, green initiatives do not necessarily need to be equated with green service offerings. Instead, in this thesis, a green service offering is a service offering with a more environmental focus, consisting of or supported by one or several green initiatives.

**Trigger** – A trigger, defined by the Merriam-Webster Encyclopaedia (2011) is something that acts like a mechanical trigger in initiating a process or reaction. However, in this
thesis a trigger is equated with an incentive that “triggers reaction” and influences LSPs to start adopting green initiatives.

**Driver** – As mentioned earlier in section 1.4, a driver is not equivalent to a trigger in this thesis. According to the Merriam-Webster Encyclopaedia (2011), a driver is defined as something that provides impulse or motivation. The interpretation of a driver in this thesis is as follows: arguments (e.g. cost reduction, increased competitiveness or economic means of control) or influences from stakeholders (e.g. customers, employees or top management) that stimulate or drive the adoption of green initiatives and thus push LSPs’ green development processes to move further.

**Barrier** – The term barrier can be defined as something that impedes progress or achievement (Merriam-Webster Encyclopaedia, 2011). In the context of this thesis barriers can be arguments such as high investments costs, lack of financial resources or lack of customers interest, which hinder the process of adopting green initiatives within LSPs. Hence, it is worth mentioning that distinguishing between a driver and a barrier often lies in the eyes of the beholder. This aspect and how this may have influenced the empirical data collection has been taken into consideration in the analysis of the drivers and barriers.

### 1.6 Scope and Focus of the Licentiate Thesis

The main focus in this thesis concerns how different factors can affect the adoption of green initiatives among LSPs and how the adoption of green initiatives can be reflected in the service offering. As mentioned earlier, existing research from a LSPs’ perspective is not very well established, and especially not from a green context. Since LSPs are in the infancy phase of their green development, this leads to some limitations in the scope and focus of this research.

This study does not aim to give a comprehensive picture of LSPs’ green situation; instead it intends to give a “snapshot” of how it looks today. However, the case companies studied have been selected since they have shown a more proactive approach when it comes to integrating green thinking into the company, as well as adopting green initiatives. It is worth mentioning, that whether or not the green initiatives mentioned by the studied LSPs actually lead to a decreased impact on the environment and reductions of carbon emissions, will not be further explored and is outside the scope of this thesis.

Furthermore, this research does not aim to give a comprehensive spectrum of all the drivers and barriers that can possibly affect the adoption of green initiatives. Instead, it provides a selection of the most commonly mentioned and highlighted drivers and barriers in the literature, as well as those influencing factors stressed by the case companies, in order to allow an investigation of these factors’ impact on the adoption of green initiatives.

Moreover, the aim of this research is to create a link between the two fields, logistics and marketing, by explaining how the adoption of green initiatives can be reflected in the service offerings provided by LSPs. Therefore, this research intends to contribute to a
better understanding of the link between LSPs environmental work and their service offerings.

1.7 THE OUTLINE OF THE LICENTIATE THESIS
First, it is essential to clarify that this licentiate thesis is a compilation which include four different papers. Therefore, the main parts of this thesis (hereafter referred as the Thesis Frame), attempt to link these four papers to each other. This means that the Thesis Frame becomes more or less independent of the various papers. However, it is important to note that in some cases, it may be worthwhile to review the papers a little bit closer in order to get a more detailed picture of a particular area. However, in order to give the reader a quick overview of the structure of the licentiate thesis, this section will provide a brief review of the chapters included and their main contents, see Figure 3 below.

Chapter 1: Introduction
The thesis starts with a background that highlights and addresses how the logistics service providers’ industry has evolved during the last few years and in what way this industry has been affected by the ongoing green agenda in our society. This background leads then into the purpose and the research questions of the thesis. In addition, this chapter also presents the scope and focus of the study as well as definitions of central concepts and terms, and discusses how they will be used in this thesis.

Chapter 2: Theoretical Framework
This chapter begins with a brief presentation of literature concerning logistics offerings in general. This is followed by a presentation of green initiatives within the LSP industry as well as an identification of different kinds of influencing factors, such as drivers, barriers and firm characteristics, which may have some impact on the adoption of green initiatives.

Chapter 3: Research Approach
The third chapter describes the methodology of this study, and includes sections such as research design and research methods. The relevant research methods in this thesis are literature reviews, a case study and a questionnaire survey. For each of these methods, a detailed description is provided in order to inform the reader about how these methods have been applied in this study.

Chapter 4: Summary of the Appended Papers
As mentioned earlier in this section, the licentiate thesis is based on four papers. A summary of each of the appended papers is presented in this chapter in order to give the reader an insight into the different papers.

Chapter 5: Analysis
The analysis in this thesis is organised and structured according to the research questions developed that were mentioned earlier in this chapter. The analysis is mainly based on the findings from the presented papers above, but additional input from the comprehensive case study report (Appendix 2) and the questionnaire survey has inspired the analysis work.
Chapter 6: Conclusions and Further Research
This final chapter discusses and presents some main conclusions from this study. The contributions are presented as well as suggestions and directions for further research.

Appendices
The appendices attached to this licentiate thesis include first and foremost the four different papers. In addition, the case study report (including detailed descriptions of the 6 different case companies), the survey questionnaire as well as the interview guide can also be found among the appendices. In order to give the reader a quick overview of the appended papers, the title and the purpose of each paper is listed below.

- **Paper 1 – Developing Sustainable Logistics Services**
  This paper aims to present a framework for how to consider sustainability in the development of logistics services. In addition, the paper aims to develop a research agenda for further research needs regarding how logistics companies can include environmental aspects in their service offerings.

- **Paper 2 – Green Initiatives in the Transport and Logistics Service Industry: An Exploratory Case Study of Logistics Service Providers**
  The purpose of this paper is to explore and describe the awareness and adoption of green initiatives among LSPs, as well as identify drivers and barriers affecting the green initiatives undertaken by LSPs.

- **Paper 3 – Understanding Efficiencies Behind Logistics Service Providers’ Green Offerings**
  The objective of this paper is to indicate where green-labelled LSPs are positioned today in their development of green service offerings. Furthermore, the paper seeks to explain the underlying rationale behind the development of green service offerings.

- **Paper 4 – The Challenge and Adoption of Green Initiatives for Transport and Logistics Service Providers**
  Finally, the last paper aims to develop a base for further investigations into green initiatives carried out by LSPs, and analyse if the green initiatives implemented are dependent on the firm characteristics of the LSPs, as well as examining the drivers and barriers experienced.
Figure 3 The outline of the Licentiate Thesis.
2 THEORETICAL FRAMEWORK

This chapter presents at a general level the development of logistics offerings as well as suggestions for green initiatives to be undertaken by the LSP industry. Furthermore, the chapter also identifies some factors, i.e. drivers, barrier and firm characteristics, that may affect LSPs when adopting green initiatives within the company. Deeper theoretical briefings regarding the addressed areas in this Thesis Frame can be found in the appended Papers (see Appendices 4, 5, 6, 7).

2.1 LOGISTICS OFFERINGS IN GENERAL

As a result of increased globalization of businesses, in addition to increased pressure to achieve competitive advantages, the need of logistics services among manufactures and trading companies has increased significantly. The primary aim of this is for companies to be able to introduce products and service innovations more quickly to the market.

In general, the LSP industry can be described and ranged from several players that offer basic transport services to a few market leaders that offer a wide range and scope of logistics services (e.g. one-stopping shopping) and niche firms with a more diversified portfolio of interest (e.g. mentioned by Carbone and Stone, 2005; Larson and Gammelgaard, 2001; and Dobie, 2005).

In the logistics literature, several researchers have been studying the contents of logistics services and how different types of LSPs operate (e.g. Berglund, 2000; Bagchi and Virum, 1998; Murphy and Poist, 2000; Hertz and Alfredsson, 2003 and Lai, 2004). The service variety provided by LSPs mentioned in the literature is broad. For example, Yu et al. (2010) conclude that beyond traditional logistics functions like transportation and warehousing, a LSP can also provide other 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 fulfilment, marketing services, security services, project management, logistics information and IT, contract manufacturing and management of call centres. These listed examples demonstrate the width of the LSP industry’s offerings.

Even if several companies focus on standard solutions and economy of scale, many LSPs have taken initiatives to broaden the scope of their services (Murphy and Daley, 2001). This growing interest and development towards more customised services arise upon the desire to fully satisfy the increasing requirements of customers (Berglund et al. 1999; Mortensen and Lemonie, 2007) and the willingness to improve customer service levels (Daugerty et al., 1992). By the transformation of scope and characteristics of LSPs service offerings this has led to a development of new service strategies. These new service strategies are affected by the original capabilities base and this may have a strong influence on further development stages of the company (Evangelista, 2011). The trend towards more value-added services give LSPs the opportunity to differentiate their business towards their competitors (Evangelista, 2004), as well as strengthen the relationships with the customers (Skjoett-Larsen, 2000). It is a shared opinion that the ability to position the company and its services can help LSPs in directing the company’s
efforts and thus generate a strategic advantage (e.g. Juga et al. 2011; Hertz and Alfredsson, 2003 and Lai et al., 2002).

In a study conducted by Lai (2004), differences in service performance among different types of LSPs were examined. The results from the study singled out a number of logistics services and suggested that there are four types of LSPs. The first type was labelled *Traditional freight forwarders* due to its low capability to carry out value added and technology-enable logistics services. The second group, *Transformers*, which also was the largest of the LSP types, possessed a high level of capability in freight forwarding and technology-enabled logistics service and a medium level of capability to perform value-added logistics services. These actors also seemed to make an effort to expand their service offerings and move towards a more comprehensive LSP. The third type of LSP identified, *Full service providers*, had a high level of capability in all of the three logistics service factors, which suggested that they are comprehensive LSPs with the capability of providing a wide range of logistics services. The last and the smallest type of LSPs, *Niders*, showed a weak potential to carry out freight forwarding logistics services but possessed a higher level of capability to carry out value-added and technology-enable logistics services.

Due to the development towards more customised services, the pressure on the LSP industry has been characterised by more strategic influences in terms of market coverage, improving the level of service and increased flexibility regarding changing requirements of customers (Hertz and Alfredsson, 2003). For example, LSPs have lately faced new kinds of requirements from customers concerning green initiatives, and the following sections present how LSPs have responded and can be affected by these requirements.

### 2.2 Green initiatives within the LSP industry

Research in green supply chain management (GSCM) has significantly expanded over the last decades in connection to the growing importance of the environmental components in the management of supply chains. In general, the green supply chain (GSC) is a broad concept that includes different approaches by which companies work with their supplier and/or customers in order to improve the environmental performance of their operations. Two primary goals of GSC are identified by Lu et al., (2007, p. 4 317):

1) Consistently meeting specified environmental performance criteria among the participants in the supply chain and promoting responsible corporate environmental behaviour among all the players in the chain of products and services, and;

2) Helping suppliers to recognize the importance of resolving environmental issues and support them in installing their own improvement initiatives.

However, there is not an established definition of GSCM initiatives in the current literature and as indicated by Sarkis (2006), the boundary of GSCM is strictly dependant on the type and scope of initiatives adopted by companies participating in supply chain processes. For example, Zhu and Sarkis (2004) argued that in the literature, GSCM initiatives range from green purchasing to integrated green supply chains flowing from supplier to manufacturer to customer, and include reverse logistics. Furthermore, Eltayeb
and Zailani (2009) suggested a general classification of green supply chain initiatives organised into the following three categories: eco-design or design for the environment, green purchasing and reverse logistics. In addition, Porter and van der Linde (1995) advocate that investing in greening initiatives is both eco-friendly and business-friendly as it increases business efficiency through resource savings, waste elimination and productivity improvement. The authors also stress that such initiatives may also lead to major competitive advantages in innovation and operations.

This identification of green initiatives may also be relevant for the logistics transport industry. In the last few decades, LSPs have gradually transformed the scope of their service offering shifting from providing single-activity toward a business model based on offering a wider range of services (Ashenbaum et al., 2005). As result of this evolving process, LSPs are in the position of adopting both green transport and non-transport related initiatives or a mix of both altogether. Secondly, LSPs may adopt an approach based on designing an integrated package of initiatives to improve the environmental sustainability of service they provide to their customers.

Although the body of literature on GSCM is growing, little research has been conducted on environmental issues in the logistics service industry, but it seems it has expanded over the last few years (Wolf and Seuring, 2010). In the literature, there is not an explicit definition of green initiatives in the specific context of LSP; however two recent papers offer a categorisation of green initiatives. On the basis of the survey, Lieb and Lieb (2010) conducted a group of 28 CEO of large LSPs operating in the North American, European, and Asia-Pacific, where they clustered green initiatives into four categories: administrative, analytical, transportation-related, and a broadly defined “other” category. Similarly, Martinsen and Huge-Brodin (2010) grouped green initiatives into transport related measures (e.g. fuels, vehicle technology, mode choice, behavioural aspects, transport management), and beyond-transport initiatives (e.g. logistics system design, choice of partners, environmental management system, emissions and energy data) based on a review of general green logistics literature, a survey, and a scan of company homepages.

Adoption of green initiatives is a great challenge for logistics service providers that strive to develop and implement more green service offerings towards their customers. In order to get a better understanding of some of these challenges, the following two sections present different factors that may affect the adoption of green initiatives among LSPs.

2.3.1 Drivers and barriers for green initiatives

This section presents some previously identified drivers and barriers that may affect LSPs when adopting green initiatives. Some of the factors can both be viewed as a driver and as a barrier and also both have an internal as well as an external effect on the adoption of green initiatives.

In order to mitigate detrimental environmental effects, logistics and transport activities (e.g. hazardous goods) have become subject to more regulation. Transportation provides a good example as this activity causes a high rate of negative environmental impact such as pollution (McKinnon, 2006). According to Walker et al. (2008) government regulation and legislation is a major driver of companies’ environmental efforts. In addition, Wong et al.
(1996) highlight the importance role of government and their environmental strategies as well as how this influences the consumer behaviour. Government legislation was one of the biggest drivers of corporate sustainability investment according to a study conducted by Berns et al. (2009). However, compliance with environmental legislation is no guarantee of improved environmental performance; indeed it could also be seen as barrier due to weak enforcement (Shi et al., 2008), low levels of awareness and the absence of a central source of information (Balzarova and Castka, 2008). Also, Roth and Kåberger, (2002) stress the complexity to translate general environmental targets to specific requirements for a single company.

Another pressure that LSPs must consider from the sustainability point of view, relates to reduction of transportation costs due to rising fuel prices (van Hoek and Johnson, 2010). This encourages LSPs to implement sustainable cost-cutting initiatives such as the adoption of transport network optimization software. Many articles in the literature notice the desire to reduce costs as a common driver for environmental work (e.g. Walker et al. (2008), van Hemel and Cramer, (2002), Salomone (2008)). Companies that excelled in various green supply chain activities are often driven by a strong focus on cost savings, waste elimination and quality improvement (Walker et al., 2007). However, economical and financial aspects are often seen as barriers when companies try to meet the increased environmental demands from customers (e.g. Dahlman et al., 2008, Balzarova and Castka, 2008 and Shi et al., 2008). Lack of financial resources, difficulty to specify the expected results and translate them into economical terms, as well as low returns are some factors mentioned in the literature. In addition, according to a study aiming to identify the main barriers to the uptake of environmental technologies in the freight transport sector, it was shown that long investment periods were also cited as a barrier to the replacement of traditional technologies with more environmentally friendly ones (ETTAR project, 2007).

Other barriers, commonly mentioned in the literature regarding environmental work are technical knowledge and information. Technical knowledge can both be an internal and an external barrier and includes: limited in-plant expertise, lack of technical training, lack of access to external technical support (Shi et al., 2008), uncertainty regarding existing techniques and inability to eliminate some risks or effects (Post and Altman, 1994). Like technical knowledge, information can also be viewed both as an internal and external barrier when it comes to communicating and spreading environmental information and knowledge within the company as well as to its customers. In addition, information barriers can also include difficulties such as accessing and collecting appropriate environmental data (Post and Altman, 1994).

Environmental considerations can have an impact on several logistics decisions along the supply chain such as location, sourcing of raw material, modal selection and transportation planning (Wu and Dunn, 1995). Efforts towards greener logistics require the extension of traditional economic supply chain objectives to include ecological objectives. This increases complexity in the management of the logistics business, creating additional costs and limiting options. Managerial and organisational barriers are commonly mentioned in the literature in relation to the adoption of environmental initiatives. These barriers include management resistance to change (Shi et al., 2008), lack of understanding and awareness from the top management and attitudes of employees (Post and Altman,
However, management and employees can also be seen as drivers. According to Berns et al., (2009), employee interest in sustainability can enhance staff recruitment, retention and engagement and other employee-related issues. This can be seen as major benefits when addressing sustainability. Furthermore, operational and environmental improvements have found to be positively related to employee involvement (Walker et al., 2008).

The adoption of green initiatives is a great challenge for LSPs that are seeking to develop and implement more sustainable service offerings. In order to successfully integrate sustainability dimension into business processes, companies must connect the sustainability dimension to the business strategy and link these aspects to both short-term and long-term financial performance. Berns et al., (2009), for example, claim that most companies appear to lack an overall plan for managing sustainability and delivering results. In addition, Seidel et al., (2009) mention that implementing environmental work can lead to an opportunity to develop new innovations. In other words, LSPs may consider adoption of green initiatives within the company as well as in their service offerings as a potential source of revenue or cash flow.

Pressure from customers is seen as a dominant driver in the literature when implementing environmental work in the company (e.g. Foster et al., 2000 and Berns et al., 2009). Hence, in what ways and how much customers drive green supply chain management projects varies significantly (Walker et al., 2008). But as a result of increased investment in order to accomplish environmental objectives among manufactures and retailers, they may expect LSPs to improve the sustainability of their operations in order to support the environmental strategies of their customers. However, customers are also mentioned as a barrier in the literature and Shi et al., (2008) point out that market barriers can include such as lack of preferences and demands from customers as well as weak public awareness and pressure. Another source of pressure, affecting a LSP to implement environmental work, can come from competitors that already have started to adopt environmental policies. According to a study conducted by Salomone (2008), reasons such as greater competitiveness on the market and being able to exploit new market opportunities have some significance in motivating companies to integrate environmental aspects into their activities. Furthermore, companies may even aim to be the environmental leader on the market in order to win new market shares and Henriques and Sadorsky (1999) also stress other benefits such as be able to set industry norms and/or legal mandates as well as to have the ability to drive environmental innovation.

Pressure from suppliers can also be taken into account as driver when LSPs adopt green initiatives within their companies. In contrast, it turned out in a study conducted by Salomone (2008) that no firm cited pressure from suppliers as a driver for implementing environmental work. Walker et al., (2008) also claim that there is a lack of previous research that identifies suppliers as a key driver of environmental supply chain management practices. In addition, an increased pressure from investors can also be classified as a driver for companies to start implementing environmental work within the company (Walker et al., 2008).
Furthermore, LSPs may be concerned with how the company and its brand are perceived by the society and therefore be affected by, e.g., pressure from public authorities (Salomone, 2008) or negative media attention caused by environmental action groups (van Hemel and Cramer, 2002). As described, many different factors can influence companies in their greening, both as drivers and barriers. Although the identification of these factors is based on different companies, they appear as relevant also for LSPs.

### 2.3.2 Firm characteristics influencing on green initiatives

The influence of firm characteristics on the adoption of green initiatives undertaken by LSPs has been studied in recent literature. In general, size (in terms of both employees and turnover) is one of the most important firm characteristics expected to influence the adoption of green initiatives. The works of Lin and Ho (2008) and Ho et al. (2009) have shown that number of employee, company history, and capital size influence green initiatives taken by LSP companies.

Furthermore, Evangelista et al. (2010) indicate in their paper that there are some differences between small and large LSPs. For example, large 3PL companies show a higher level of awareness of environmental sustainability in comparison with smaller ones. This is particularly true for the strategic prioritisation of environmental issues and the role of customers in driving green initiatives. With reference to the adoption of green initiatives, the results reveal that large LSP companies tend to adopt a set of coordinated sustainable initiatives both in transport and beyond the transport area. A different approach has been detected between small LSPs that show a focus on reducing the environmental impact of transport activities only.

The literature does however neglect to analyse the relationship between green initiatives and other important firm characteristics such as the type of product shipped and type of service provided. Hence, the purchasing literature indicates that companies in different industries experience different hindrances and drivers which lead them to apply different practices (Zhu and Sarkis, 2006), suggesting that the drivers and barriers experienced by LSPs can be dependent on characteristics such as type of product and service provided.
3 Research approach

The purpose with this chapter is to describe the research approach taken for the research presented in this licentiate thesis. First, the overall research design is presented. This is followed by the selected research methods, which are literature reviews, a case study and a questionnaire survey. After that, the analyses of the research questions are discussed. This chapter ends with a subsection that includes the researcher’s reflections upon the actual research process, a brief presentation of the research project of which the research has been a part as well as the researcher’s contributions to the appended papers in this licentiate thesis.

3.1 Research design

In general, a research design is the logic that combines the data to be collected to a study’s initial research questions. Before deciding upon the most appropriate research design or data collection methods, the type of research to be conducted should be clarified. This is necessary since the existing knowledge within the research area affects the type of research that is conducted, which in turn influences the selection of suitable data collection methods (Yin, 2009). The research in this licentiate thesis is explorative in its nature. An explorative study is used in situations where limited prior knowledge and research exist, and aims therefore to find a basic understanding of the current scenario. This approach seems appropriate for this licentiate thesis since, as described in Chapter 1, LSPs are in the infancy phase of the development to adopt and integrate green initiatives into their business and service offerings. Therefore, there is a need for research which to investigates the current situation and the underlying mechanisms (in form of triggers, drivers and barriers) that influence the LSPs in their continuing work to adopt green initiatives.

Due to the explorative starting point of this licentiate thesis, the research approach has been inspired by an abductive reasoning described by Kovács and Spens (2005). Applying an abductive research process starts at the point where observations in the empirical research do not match prior theories, and an iterative process starts in an attempt to find new matching frameworks or to extend the theory used prior to the observation. In other words, this type of research approach aims to understand a new phenomenon and to suggest new theory in the form of new hypotheses or propositions. Therefore, the research design of this licentiate thesis takes its starting point in initial insights based from prior observations and knowledge, followed by an iterative process of travelling back and forth between relevant and emerging literature (literature reviews) and empirical data collected from case studies and a survey study. This was done in order to build up a knowledge base within the field with the aim to provide more generalised descriptions and potential explanations to the subject studied. The overall research design is illustrated below, see Figure 4.
3.2 RESEARCH METHODS

In this licentiate thesis, three different research methods has been used namely, literature reviews, a case study and a survey study.

As illustrated above in Figure 4, the first research method applied was a literature review which consisted of a structured review of the relevant literature. This research method has been used during the whole research process in either a structured or in a more iterative process. The second research method applied was case studies. This was followed by a survey study. The use of this survey in this licentiate thesis was partly to test and validate the findings from the case studies. Below, Table 1 shows which of the research methods are applied in each of the appended Papers.

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A more detailed description of the three different research methods used in this thesis is presented below.

3.3 LITERATURE REVIEW

Literature reviews play a critical role in doctoral thesis and journal publications, and are also highlighted for the potential role they could play in creating and building bodies of knowledge and informing policy and practice (Tranfield et al., 2003). One way to do this could be to conduct a systematic review. However, a systematic review should not be regarded as a traditional literature review since it differs from other review methods because of its distinct and exacting principles (Denyer and Tranfield, 2009). Even if a systematic review approach has not been applied here, the systematic review thinking has inspired some of the literature reviews conducted. These structured and more systematically inspired literature reviews, include careful selections of relevant keywords and well-documented information about the number of total and relevant hits.
Two more structured literature reviews have been applied in this thesis. Paper 1 is based upon the first of these. This review addresses service and product development with environmental considerations. Since no article in this search described the logistics company’s point of view, the main literature review was complemented with a second review to include the perspectives of the logistics companies. The reviews aim to describe the findings from these two areas separately, as well as to adapt the findings on sustainable product and service development to the setting of a logistics service provider.

The second structured literature review was necessary to develop a framework which describes which barriers and drivers an LSP could face in adopting green initiatives. Other literature reviews have also been carried out this research process. An iterative process was used for these reviews, where for example, a snowball approach of relevant references has been used.

The areas of literature taken up in the different papers as well as in the thesis’s frame of references are: green supply chain management, green logistics, general literature on the LSP industry and its development, and marketing and service literature, both with and without green considerations.

Disciplines from different fields, in terms of concepts, principles, methodologies and approaches, can be applied to various logistics issues, problems and opportunities (Stock, 1997). For example, the author stresses how the logistics field can be built on theories borrowed from other disciplines such as marketing (e.g. buyer behaviour and segmentation), business/management and psychology (e.g. perception, learning theory and network model). This approach of using marketing literature and concepts in order to fill the gap in the logistics literature can be appropriate since the research area studied here is close to the interface between logistics and marketing. However, the link between logistics and marketing has not totally been neglected in the existing literature. For example, Mentzer et al. (2001) highlight the importance of a close interrelationship between marketing activities and logistics activities, which in turn indicates that these two areas should not only be considered separately. Therefore, by applying marketing literature in a logistics context this could facilitate explaining underdeveloped areas within the logistics literature. Marketing literature may also serve as a platform to get a deeper understanding of the underlying mechanisms regarding LSPs’ approaches towards green initiatives reflected in the service offerings.

3.4 CASE STUDIES

Case research methodology is both appropriate and essential when there is a lack of theory or when theory exists but the environmental context is different (Stuart et al., 2002). One of the strengths of case research is that the method can be used in early, exploratory investigations where the variables are still unknown and the phenomena not well understood (Meredith, 1998) and it can also generate research ideas and hypotheses that are worth pursuing further (Handfield and Melnyk, 1998). Therefore, the case study approach seems suitable since the topic of this licentiate thesis is still in the understanding, discovery and description stage. Meredith (1998) also highlights that case studies can develop understanding, especially in a field where the subject matter is very complex. Both the novelty and the complexity criteria match the situation for LSPs and
their offerings in general, as well as for the existence of possible green service offerings. In the literature, case studies are described as based on any mix of quantitative and qualitative evidence and can include different kinds of data collection methods such as interviews; both structured and semi-structured, critical incident techniques, surveys, observations and focus groups (Fitzgerald and Dopson, 2009). In this licentiate thesis, the case studies are based on qualitative data and have mainly been collected through interviews.

### 3.4.1 Selection of cases

Since case-based research depends on investigative observations, the selection and number of firms studied is an essential and important step in the case study process. The selection of appropriate cases can facilitate controlling extraneous variation and also to help define limits for generalizing the findings (Eisenhardt, 1989). The decision whether to conduct a single case study or a multiple case study depends to a large extent on the aim of the research. Single-case studies can richly describe the existence of a phenomenon (Siggelkow, 2007) while multiple cases enable a broader exploration of research questions and also a clarification of whether the finding is idiosyncratic to a single case or consistently replicated by several (Eisenhardt and Graebner, 2007). Here, a multiple case study has been conducted with a set of six case companies. Yin (2009) argues that, in most situations, six to 10 cases should provide evidence to support or reject propositions, while Eisenhardt (1989) recommends four to ten cases, which means that the selection of six cases used in this licentiate thesis falls within these recommended ranges. All the case companies were LSPs, active on the Swedish market and the companies were selected on the basis of the following criteria:

- Some demonstrable ambition regarding green initiatives, and also certain external recognition for this (either from the news media or previous contact with the research community)
- Active on the same market, thus facing a similar environment with regards to market demands as well as rules and legislation for transport related to green issues. The choice of the Swedish market was selected due to the researcher’s familiarity with this market and ease of access to the case companies
- Varying size, profile, geographical coverage and also a varying range of logistics service offerings in order to give a width to the empirical data.

In order to demonstrate a study’s internal validity, a researcher needs to record evidence of other factors that might be alternative explanations for the observed patterns (Stuart et al., 2002). To maintain internal validity, the last criteria mentioned above (e.g. varying size, profile, geographical coverage) aims to outline if the patterns observed vary in terms of the scale and scope of the studied LSPs.

The selection process identified two medium sized LSPs with local/regional business and a wide range of transport and basic logistics services (localised in different regions); two small/medium size LSPs specialized in express deliveries (one independent and one, part of a larger Nordic corporation); and finally two large international LSPs with a wide range of service offerings (whose philosophy regarding the inclusion of environmental issues differ substantially). In order to encourage openness of response during the data
gathering process, it was agreed that company names would remain anonymous, and the
case companies were thereby labelled Alfa, Beta, Gamma, Delta, Epsilon and Zeta.

3.4.2 Descriptions of cases
This section provides a brief description of the different case companies. For further
information and a more detailed case presentation, see Appendix 2.

Company Alfa
Alfa is one of the largest transport intermediation companies in Sweden. The company
has about 140 subcontracted carriers who are also part owners in the company, which
leads to more than 500 people being employed in the entire concern. Over 90 % of Alfa’s
services cover the full range of those available within the transport market with the
exception of refrigerated transport. (Added services are offered as a complementary to all
transport services depending on the demand.) The customers of the company consist
mainly of industries and municipalities, but the company also has also end users as
customers.

Company Beta
Beta is one of the largest logistics and transport companies in the northern part of
Sweden. The company has approximately 260 subcontracted carriers, also part owners of
the company, and this gives a total number of 1000 employees in the entire concern. Beta
handles everything from gravel and industrial goods to sensitive consumer products and
temperature-sensitive foods. The operations mainly concern FTLs. Beta cooperates
closely with its customers to develop complete logistics solutions.

Company Gamma
Gamma is a franchise-based express transportation company with access to 700 vehicles
and an extensive air route network. The company provides systemised and customer-
specific door-to-door express delivery solutions for time critical and high value products
within the field of high-tech, automotive spare parts and medical equipment. Packages are
transported either by road or air depending on where they are headed, how large they are
and how urgent the delivery is. The main group of customers are businesses, but express
deliveries to private customers rarely occur.

Company Delta
Delta is a specialist in the express and delivery transport area and is part of the bigger
Nordic company active in the postal and logistics industry. Their range of service
offerings includes delivery, distribution, express and home delivery. The company offers
different kinds of transportation modes such as air, road or track. Delta works mostly
business-to-business, even though in some cases the company delivers directly to private
consumers.

Company Epsilon
Epsilon is part of one of the world’s leading logistics groups and offers integrated services
and customised solutions for managing and transporting mail, goods and information.
The company offers the whole spectrum of transportation modes such as air, road, track
and sea. The main customer target group consists of the metal- and telecom industries.
Company Zeta

Zeta is also a part of one of the world’s largest logistics companies and is able to provide land transport within Europe, global ocean- and airfreight and customised logistics solutions. The company offers everything from rail transport to parcel transport, and offers logistics services such as warehousing and goods handling. The company does not offer courier or mail freight. The split between inputs for industry and consumer products is about 50% each.

3.4.3 Case data gathering

The case descriptions are mainly based on semi-structured focused interviews, which according to Yin (2009) are suitable for explorative studies. These kinds of interviews are also recommended by Stuart et al., (2002) since they allow some flexibility regarding the data-gathering which ensures to uncover all of the pertinent data when companies with different characteristics and competences are being surveyed. During the interviews, a data collection guide was used (see Appendix 1), as is suggested by Yin (2009) in order to ensure the research reliability, especially in a multiple case study.

The data collection guide was divided into three parts, covering the following areas:

- A general picture of the company and the range of services offered;
- Factors (in form of drivers and barriers) affecting the company’s green initiatives and existence of green service offerings (the respondents were also asked to specify and to comment on the impact of each factor on a scale of 1 to 5, where 5 had the greatest impact, later translated into a scale with a range of low (1-2), medium (3), high (4-5)); and,
- How environmental issues can be integrated into the price picture of these green service offerings.

This was sent to each respondent in advance and suggested as an outline for the interview to give respondents an opportunity to reflect upon and look for answers to questions they knew less about. All of the respondents had good knowledge of the company’s environmental efforts and were either environmental managers or involved in and responsible for sustainability activities at the company. The information was obtained from telephone interviews with one representative from each company. Each interview lasted for at least one hour, and in some cases, further contact with the company’s representative was obtained through company visits, telephone and email. All the interviews were taped and transcribed and the respondents were given the opportunity to reflect and comment on the transcriptions, which three of the respondents did. According to Yin (2009) documenting the interviews can increase the study’s reliability and giving the respondent an opportunity to review the draft from the conducted interview can lead to strengthening the construct validity of the case studies.

Besides the interviews, secondary data such as information about the companies was collected from a variety of information sources including company reports and websites. This kind of information was used to enhance and explain the information collected during the interviews. In this way, information was triangulated across data sources,
which is an appropriate method suggested by Stuart et al., (2002) for ensuring the construct validity of the case study.

3.5 The Survey
In order to broaden the scope as well as strengthen the findings from the case study, the researcher planned to conduct a questionnaire survey. However, since collaboration with a researcher at University of Naples Federico II, Italy had begun at this stage in the research process, a joint decision was taken to construct a questionnaire survey together. This was done since the research area at the different sites seems to coincide, which awakened an interest to carry out a comparative study between Sweden and Italy. During the research process, a number of other European universities have showed interest and joined the study in order to conduct similar work in their own countries. Besides the two mentioned above the academic research institutes involved in this survey process are: Dublin Institute of Technology (Ireland), Heriot-Watt University (United Kingdom) and Tampere University of Technology (Finland).

3.5.1 Preparation of the questionnaire survey
The questionnaire is derived from the researchers’ earlier research projects based on case studies and literature reviews. Data and information collected through the questionnaire allow the identification of green initiatives, influencing factors (drivers and barriers) as well as the basic characteristics of the companies studied. Before launching the survey, the questions and answer alternatives were discussed with other academics and also pre-tested with potential respondents in Sweden, through a test-survey. This pre-test of the questionnaire resulted in some changes in wording and clarifications as well as the reduction of the number of questions since the questionnaire was perceived to be quite long and comprehensive.

3.5.2 Design of the questionnaire survey
For the Swedish market, a web-based survey was used. The questionnaire was created and was sent out to the respondents using the survey-tool Webropol. The web-based survey approach was chosen instead of the traditional mail or postal survey approach, since it speeds up and facilitates the data collecting process as well as being simple and less time consuming for the respondents. Grant et al., (2005) mention other advantages of using Web-based surveys such as observing recording question answers, providing support to the respondents if necessary, digitization of information which leads to savings in both time and money and also facilitating the process to send out reminders, if the response rate does not prove to be satisfactory.

The scope of the questionnaire is quite extensive in its nature (see Appendix 3) and allows for the identification of green initiatives, influencing factors (in the form of drivers and barriers) as well as firm characteristics of the companies studied. The questions included were drawn directly or indirectly from the researchers’ earlier literature reviews or results from case studies, which in turn, ensures the content and construct validity of the questionnaire. The design of the questions composed a mixture of closed and open-ended questions as well as different kinds of scales. The scales consisted mainly of a five-degree Likert scale, ranging from 1 (totally disagree) to 5 (totally agree). The questionnaire was divided into five sections with the following contents:
• **Company profile** – these questions addressing firm characterises were mainly of a classifying character. Aspects targeted were size (number of employees and annual turnover), geographical distribution, type of services provided and position in the supply chain.

• **Adoption of green initiatives and resources** – this section aimed to investigate the adoption of green transport and supply chain related measures, the involvement of the different functions of the company in green initiatives and the adoption of ICT applications to manage the environmental impact of transport and logistics operations.

• **Drivers of green logistics initiatives** – a variety of different arguments’ impact on adoption of green initiatives were addressed as well as the influence of different stakeholders.

• **Barriers to green logistics initiatives** – the barriers investigated were divided into internal and external barriers affecting the adoption of green initiatives.

• **Future prospect for adoption of green initiatives** – the respondents were also asked to answer questions about what green transport and supply chain initiatives they intend to adopt within a three years period.

The different sections above are quite broad due to the fact that the questionnaire was a joint construction as mentioned previously. Therefore the scope of the questionnaire does not fully correspond to the scope of this thesis and not all of the results from the questions in the questionnaire are analysed here. Instead, the results from the questionnaire survey are used in order to show similarities or dissimilarities with the results from the case study.

### 3.5.3 Sample profile and data collection

The population of this survey study involves LSPs operating on the Swedish market. Since it is not possible to reach the whole population on the Swedish market, a subset of the population, a sample, was targeted. No specific type of LSP companies was targeted (e.g. size or type of services). Forza (2002), stresses that to be able to generalise the answers of the total population the sampling process and the selection of a representative sample play a significant role. In order to get access to contact details for groups of LSPs, information from different types of interest organisation was used in this sampling process. Therefore, the targeted sample of respondents consisted of members in the interest organisations, Sveriges Åkeriföretag and Sveriges Transportindustriförbund.

A mail questionnaire was sent to 636 respondents, but since some companies were not eligible for the study, this figure decreased to 590 relevant respondents. Those respondents that were not eligible included companies where the address was wrong (returned), and these respondents were therefore excluded as not relevant. The survey was launched in early June, 2011 and the response period extended to end of September 2011. During this period, four reminders were sent out to the respondents in order to increase the response rate, and by the end of the period, 74 respondents had filled in the questionnaire (a response rate of 12,5 %).

Regarding the response rate, as high response rate as possible is of course desirable, but usually rates are in the neighbourhood of 20% (Lambert and Harrington, 1990) and
studies have been published in operations management journals with response rates ranging from 10% to 20% (Flynn et al., 1990). In this thesis, a response rate of 12.5% with 590 useable answers can be considered as relatively good and enough for the purpose of this thesis. However, the amount of missing data is relatively large, but during the response period, some respondents declined to participate in the study due to the fact that the content of the questionnaire did not reflect the company’s activities, and some respondents even claimed that limited time prevented them from answering the questionnaire.

3.6 ANALYSIS UNIT AND ANALYSIS OF THE RESEARCH QUESTIONS

One of the significant components of a research design is the unit of analysis (Yin, 2009), which comprises the main entities analysed in a research study. Furthermore, Dubé and Paré (2003) stress the importance for researchers to specify the unit of analysis in order to make it easier for the reader to understand how the case study relates to a broader body of knowledge. The unit of analysis of this licentiate thesis is twofold and include the adoption of green initiatives as well as the effect this can have on the service offerings. Hence, the unit of analysis can be a description of how one single company has undertaken the adoption of green initiatives and the effects of this adoption of the service offering, or it can include descriptions of multiple companies. In this study, as mentioned in section 3.4, focus has been on six different LSPs and their adoption of green initiatives. However, it is important for researchers to decide whether the individual, company, division or corporate level should be selected, as the unit of analysis depends upon the research questions (Flynn et al., 1990).

Before continuing the description of the analysis of the research questions, let us quickly recap what these questions are. As described in Chapter 1, the four research questions of interest for this thesis are:

RQ1: How can different triggers initiate the adoption of green initiatives?

RQ2: How can different drivers and barriers affect the adoption of green initiatives?

RQ3: How can firm characteristics affect the adoption of green initiatives?

RQ4: In which ways can the adoption of green initiatives be reflected in the service offering?

Now, when the research questions and the units of analysis have been presented, the link between the four appended papers and the research questions can be clarified, as can be seen in Table 2 below. All the research questions relate to two or more Papers and in the cases when the content of the Papers is not directly related to the different research questions but still gives some enriching input, this has been illustrated with an (X). Furthermore, even if two of the four Papers are based on the case study, additional input from the case report to the research questions has been added in order to further strengthen or fill out the areas, which have not been included or emphasised in the Papers.
Table 2 The link between the research questions and the appended Papers.

<table>
<thead>
<tr>
<th></th>
<th>Paper 1</th>
<th>Paper 2</th>
<th>Paper 3</th>
<th>Paper 4</th>
<th>Case Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ 1</td>
<td>X</td>
<td>X</td>
<td></td>
<td>(X)</td>
<td></td>
</tr>
<tr>
<td>RQ 2</td>
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<td>X</td>
<td>(X)</td>
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<td>X</td>
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<td>RQ 3</td>
<td></td>
<td></td>
<td>(X)</td>
<td>(X)</td>
<td>(X)</td>
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<tr>
<td>RQ 4</td>
<td>(X)</td>
<td></td>
<td></td>
<td>(X)</td>
<td></td>
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</tbody>
</table>

The analysis in this thesis frame has been structured around and divided into the four research questions presented. Moreover, the analysis for each of the research questions is based on those Papers that can contribute to finding an answer to that particular research question, as illustrated above. As described in Chapter 1, the focus of the first three research questions is mainly the adoption of green initiatives by LSPs, while the fourth and last research question concerns in which ways the adoption of green initiatives can be reflected in the service offering, see Figure 5 below.

Figure 5 The main objective for each of the Research Questions.

The analysis has been carried out in a chronological order and therefore starts with Research Question 1. The first step of the analysis aims therefore to find out how different triggers can affect LSPs adopting of green initiatives, which in turn also can provide an understanding of why they choose to start adopting green initiatives. Input for this analysis comes first and foremost from Paper 1 and Paper 2, but additional input has also been provided by the case report. Paper 1 identifies six different main aspects that may influence a LSP to start adopting green initiatives. These aspects are solely derived from the literature. Paper 2, on the other hand, is empirically based and identifies some of the triggers for LSPs to start to adopt green initiatives. Note, however, that triggers here, are equated with the main incentives mentioned in Paper 2. The analysis aims to compare the literature findings from Paper 1 and the empirical results from Paper 2 in order to analyse how different triggers can initiate the adoption of green initiatives undertaken by LSPs.

Research Question 2, which can be seen as the second step of the analysis, aims to provide how different drivers and barriers can affect the adoption of green initiatives. Different drivers and barriers that may influence the adoption of green initiatives have been found in the literature, and the main empirical input to this question is provided by the case report to six different LSPs. The analysis is divided into two parts; namely drivers and barriers. Tables were developed to summarise the impacts of these drivers and
barriers in order to enable comparison across the data. This approach is recommended by Yin (2009) who also states that this can facilitate the highlighting of possible patterns that could emerge from findings. However, the main focus of the analysis has been to find out how these drivers and barriers affect the adoption of green initiatives among the studied LSPs. The results of the analysis of the case study have been compared with the results from Paper 2. Furthermore, the results from Paper 4 have also been compared with the result of the analysis, and similarities and differences have been emphasised.

Note, however, that the results of the survey have been updated and include more responses than the results presented in Paper 4. In addition, the drivers and barriers studied in the survey are basically those that are found to be relevant in the case study. However, a few minor changes have been made in the way that these have been formulated and the survey has also been expanded with some additional drivers and barriers.

The aim of the third research question is to investigate how firm characteristics can affect the adoption of green initiatives. The main input to this question is Paper 2, which present some differences between small and large LSPs when these adopt green initiatives. Moreover, the results obtained from Research Question 2 enabled further identification of how firm characteristics can affect the adoption of green initiatives. Furthermore, additional input and examples has also been provided from Paper 4.

As mentioned earlier, Research Questions 1-3 focus on the adoption of green initiatives, while the aim of Research Question 4 is to find out in which ways the adoption of green initiatives can be reflected in the service offering. The analysis of this research question may be considered to be of a more descriptive character due to the fact that the selected LSPs are in an early phase of their adoption of green initiatives and thus have no elaborated approach for how this should be reflected in their service offerings. The main input to this analysis is provided by Paper 3. The analysis process of Paper 3 can be illustrated by the three different steps of data analysis presented by Miles and Huberman (1994) namely: data reduction, data displays and conclusions drawing. Data reduction refers to the process of sharpening and organizing the data, while data displays allow the researcher to concentrate on a reduced set of data, which in turn, helps to show patterns. The last step calls for further analysis in the data displays, which in turn facilitates the seeing of further conclusions. The results from Paper 3 are compared with the literature findings regarding the green service offerings presented in Paper 1.

3.7 THE RESEARCHER’S OWN RESEARCH PROCESS
This subsection aims to give the reader a view of my own research process, including the path and the decisions taken which led to my research area, the research project to which I belong and my contributions to the papers appended to this thesis.

3.7.1 The path to the research area
I started as a PhD student for almost two and a half years ago. These years have been full of lessons and experiences, both in terms of my own research process and also what it actually is to be a PhD student. I have realized that working as a doctoral student should rather be classified as a lifestyle than a “normal” job. It was during my time as a student
on the MSc Programme, Industrial Engineering and Management at Linköping University, that my keen interest in becoming a PhD student arose. My economics specialisation was within supply chain management and industrial marketing, so the fact that my research would be within the logistics area was already a natural choice when I was a student. However, my interest in marketing got me started to think whether it was possible to combine these two areas and integrate them within my own research.

In a relatively early phase of this process, I started to take an interest in the service offerings provided by LSPs and identified it as the missing link to combine logistics and marketing in my own studies. Today's transport system is largely based on responding to market demands, where customers' desires for more diverse services are becoming more common. However, the demand for service offerings to fulfil environmental requirements does not seem to increase to the same extent. This may due to a variety of reasons, such as lack of interest, unwillingness to pay extra for these kinds of service offerings and also perhaps a lack of knowledge of what is it possible to do. Therefore, my growing interest in considering environmental issues in the development of logistics services led to a conference paper. This paper (which is called Paper 1 in this thesis) was based on literature reviews and compared sustainable service and product development research with literature about development of offerings provided by LSPs. The findings of the paper became a framework based on different main aspects, which either directly or indirectly could affect the service offering from a green perspective. Hence, in order to get a deeper understanding how these aspects could affect LSPs’ efforts to greening their business as well as their service offerings, led to Paper 2. Since the awareness and knowledge of environmental impact is increasing among society, this trend is also reflected to some extent in today’s businesses. In order to investigate the current situation within the LSP industry, a case study including six LSP companies active on the Swedish market was conducted. Some outcomes of this case study, together with a similar study conducted in Italy and Spain resulted in Paper 2. This paper focuses on green awareness among LSPs as well as the identification of different kinds of drivers and barriers affecting the adoption of green initiatives. Paper 2 is concerned with the green development within LSPs on an overall company level and does not reflect the effect of the service offering. Therefore, in order to take a step further, Paper 3 was written. This partly aimed to seek the underlying rationale behind the development of green service offerings among LSPs. In contrast to Paper 2, this paper was solely based upon the Swedish case study.

In order to broaden the scope and also to validate the findings from the case studies, a decision was taken to conduct a questionnaire survey. Originally, this questionnaire survey was only intended for the Swedish market, but after interest was expressed by other international researchers, (as mentioned in section 3.5), the questionnaire survey has been and is planned to be launched in other European countries as well. The preliminary findings from the questionnaire survey (mainly based on the Swedish results but also on a few Italian respondents) resulted in a conference paper, presented as Paper 4 in this licentiate thesis. This paper concerns different drivers and barriers affecting the greening of LSPs’ activities, and also raises the question whether firm characteristics may affect an LSP’s adoption of green initiatives. Not only does Paper 4 to some extent, validate the prior findings from the case studies but it also provides a basis for further research.
Finally, writing this section about my own research process, which for the reader is perhaps perceived to be quite straightforward and chronologic, reminded me that this process was not always without complexity. For example, early in the process I focused my research on different price models which took green aspects into account, but since LSPs had not reached this stage in their green development and perhaps never will, this focus received less attention in my research.

3.7.2 The research project

The research presented in this dissertation, is partly the result of a three years long research project in which I was involved for two and a half years in the department of Logistics Management, at Linkoping University. The research project, funded by the Swedish Governmental Agency for Innovation Systems, VINNOVA, is titled *Competitive business models to meet future demands on sustainable logistics systems – a research project aiming at more proactive logistics firms*, and involved collaboration with Swedish actors on the logistics market as well as other international universities.

The primary aim of the research project was to increase the knowledge of how the impact on the environment by transportation of goods may be affected by a wider understanding of the logistics system boundaries, and also by a new way to manage as well as new roles in the logistics system. The research project focused initial by three main areas namely:

- Future business models and new roles for proactive logistics companies
- Evaluation of the environmental aspects of the company's logistics system from a business perspective
- Control and monitoring of the logistics system’s environmental performance

My research mainly focuses on the first part of the research project but also tends to touch on the second part of the research project. The main objective of the first part is to examine how an expanded logistics system, which includes activities, processes, decisions and responsibility mainly carried out by shippers today, could give better conditions for creating more effective systems. These changes in form of *what* can be changed and *who* will be responsible to perform these changes may increase the potential for logistics companies to develop new services and also take new roles in the logistics system. Even though the research project involves efforts from several researchers both from my own research group and other international universities, this thesis is based on the my own research and the contributions from other researchers are acknowledged below.

3.7.3 The researcher's contribution to the Papers

All the appended papers in this licentiate thesis have been written together with at least one senior researcher. In general, even if the authors responsible were equally familiar with the content of the paper, the contribution of the different authors varied for each of the papers. Therefore, the following text outlines my main contributions for each of the papers appended here.

The initiative of Paper 1 came from me and the paper was conducted together with my supervisor and co-author Maria Björklund. The overall outline of the Paper was jointly discussed although I was mainly responsible for this process. In addition, I was
responsible for the first parts of the paper including the introduction, methodology and theoretical framework with some guidance and support from my supervisor. The content of the analysis and the discussion were a joint product even if Maria Björklund was responsible for completing it.

As mentioned earlier in section 3.7.1, Paper 2 is based on two conferences proceedings and was a joint initiative between the responsible authors, myself, my supervisor Maria Huge-Brodin, Pietro Evangelista and Edward Sweeney. My main contributions are half the theoretical framework and half of the empirical basis including all the Swedish case companies. However, I have more or less contributed to all the different sections of the paper since I was responsible for combining the two conference proceedings into one paper including first and foremost an introduction, the research design, theoretical framework and empirical basis. Furthermore, I also contributed to a first draft of the analysis and made suggestions for the discussion part of the paper.

As in Paper 2, my involvement in Paper 3 relates to all parts of the paper. I was responsible for writing a draft of the first parts of the paper up to the analysis section. The outline and the main part of the analysis work were then done in discussion with my co-author Maria Huge-Brodin. The analysis section was divided into two parts where I was responsible for compiling the first part. Like the analysis, the conclusions were done in collaboration between Maria Huge-Brodin and myself.

Paper 4, beside myself involved the following authors, Maria Björklund, Maria Huge-Brodin and Pietro Evangelista. The paper is based on a questionnaire survey for which I had the main responsibility. I also wrote the introduction and methodology section and provided input to the analysis as well as to the conclusions even though it was Maria Björklund who did the analysis work.
4 SUMMARY OF THE APPENDED PAPERS

This chapter presents a summary of each of the four appended papers in this licentiate thesis. The summary presents the aim of the study and the focus is on the main results and contributions of the paper. For further information and the papers in their entirety can be found in Appendices 4, 5, 6 and 7.

4.1 PAPER 1 DEVELOPING SUSTAINABLE LOGISTICS SERVICES

The increasing awareness of environmental impacts on our society among the public, is resulting in increased demands on governments and industries to actually respond and act to these issues. This in turn can lead to higher demands for “green” products, more stringent environmental regulation by the governments, and also a more environmentally responsible business management (Facanha and Hovath, 2005; Srivastava, 2007). This is of specific interest to logistics companies, whose core business is often an environmental impact in itself. Due to the increased demands from society as well as to strengthen their position on the market, logistics companies need to take into account of environmental aspects into their services. Therefore, in order to acquire a comprehensive picture of what this can involve, the purpose of this paper is as followed;

To present a framework for how to consider sustainability in the development of logistics services. In addition, the paper also aims at developing a research agenda for further research needs regarding how logistics companies can include the environmental aspect in their service offerings.

The paper was based on a literature review that had its origin in sustainable service and product development literature. This was compared with literature about the development of offerings for logistics companies. The results from the literature studies were then analyzed in order to identify a research agenda and to present a framework that included aspects of sustainable service offerings of relevance from a logistics company perspective.

From the first literature review in the paper, six main aspects affecting the development of sustainable services and products were identified, namely: customer and market, collaboration (internal/external), business management and strategy, ICT, means of control and competence and knowledge. Furthermore, the extent of their relevance in the development of environmentally sustainable services for logistics companies is considered in the framework developed, see Table 3 below. The framework aims to show why these aspects should be considered, how the aspects affect the development of the offering, and how these aspects can be visualized in the offering.
### Table 3 Framework of environmentally sustainable services for logistics companies.

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Benefits (Why involve)</th>
<th>Considerations in the development of the offering</th>
<th>The offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer &amp; market</td>
<td>Identify attractive services</td>
<td>Customer demands as starting point</td>
<td>Diversified &amp; customised offers</td>
</tr>
<tr>
<td></td>
<td>Focus on the “right” aspects</td>
<td>Early integration of marketing</td>
<td>Pricing the green service offering</td>
</tr>
<tr>
<td></td>
<td>Develop wanted services</td>
<td></td>
<td>Customer segmentation</td>
</tr>
<tr>
<td>Internal Collaboration</td>
<td>Knowledge exchange &amp; spread</td>
<td>Use of cross functional teams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficient problem solving</td>
<td>Include environmental experts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved supplier development</td>
<td>Identify collaborations risks</td>
<td></td>
</tr>
<tr>
<td>External Collaboration</td>
<td>Shared data &amp; knowledge</td>
<td>Collaborate with suppliers</td>
<td>Show awareness</td>
</tr>
<tr>
<td></td>
<td>Improved sustainability performance</td>
<td>Collaborate with customers</td>
<td>Show willingness to collaborate</td>
</tr>
<tr>
<td>Business management &amp; strategy</td>
<td>Cascade sustainability throughout the organisation</td>
<td>Integrate strategic, tactical &amp; operational level cross the company</td>
<td>Hard to visualise in the offering but might be done with the use of certain certifications and standards</td>
</tr>
<tr>
<td></td>
<td>Increase the environmental benefits</td>
<td>Support from top management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Common language” among employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Achieve corporate commitment</td>
<td>Increased trustworthiness</td>
<td></td>
</tr>
<tr>
<td>ICT</td>
<td>Enable customisation</td>
<td>Internal measuring</td>
<td>Provide customised offerings</td>
</tr>
<tr>
<td></td>
<td>Meet customer demands</td>
<td>Collect and store environmental data</td>
<td>Display/measure environmental impact</td>
</tr>
<tr>
<td></td>
<td>Control of environmental impact</td>
<td></td>
<td>Facilitate collaboration</td>
</tr>
<tr>
<td></td>
<td>Support development of new offerings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Means of control</td>
<td>Stimulate development</td>
<td>Focus on outcome not method</td>
<td>Use labelling/standards in the offering</td>
</tr>
<tr>
<td></td>
<td>Economical advantages</td>
<td>Focus/select e.g. standards</td>
<td>Trustworthy &amp; informative offerings</td>
</tr>
<tr>
<td>Competence &amp; Knowledge</td>
<td>Strengthen skills &amp; knowledge</td>
<td>Training &amp; development</td>
<td>Knowledge as part of the offering</td>
</tr>
<tr>
<td></td>
<td>Facilitate increased innovation</td>
<td>Adjust knowledge needs to strategy and ambitions</td>
<td>Trustworthy offers</td>
</tr>
<tr>
<td></td>
<td>Maintain &amp; keep competence</td>
<td>Identify potential knowledge exchange with extern</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved performance</td>
<td></td>
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</tbody>
</table>

The applicability and generalization of the presented framework can be seen as a source of inspiration for both researchers and logistics companies. The findings should be considered as conceptual, and the paper also presents a research agenda for the main aspects identified in the framework and consequently provides a basis for further empirically based research.
4.2 Paper 2 Green Initiatives in the Transport and Logistics Service Industry: An Exploratory Case Study of Logistics Service Providers

The impact of business operations on the natural environment has become one of the main areas that society and governments have paid more attention into. This in turn has led to a growing pressure on managers to react and deal with green issues, not only within their own firms, but also for their supply chain partners (Vachon and Klassen, 2006). Environmental research specific to LSPs have been more or less neglected, despite the fact that LSPs have assumed a more critical role in supply chain orchestration and management. Therefore, in order to generate more knowledge and understanding of the green initiatives undertaken by LSPs, the purpose of this paper is to:

Explore and describe the awareness and adoption of green initiatives among LSPs, as well as identify drivers and barriers affecting green initiatives undertaken by LSPs.

This has been done through a multiple case study approach, which investigates eight cases of LSPs operating in Sweden, Italy and Ireland (four Swedish, two Italian and two Irish). The analysis undertaken in this article was divided into the following objectives:

- analyse awareness of the importance of sustainability in LSPs companies;
- analyse the adoption of green initiatives by LSPs;
- identify drivers affecting the adoption of green initiatives by LSPs; and,
- identify barriers to the adoption of green initiatives by LSPs.

Furthermore, the case companies were divided into two categories; large and small firms, in order to enable the identification of the influence that firm size may have on the adoption of green initiatives. Based on the analysis and the findings of the cases, a set of propositions was derived from each of the four objectives.

Awareness of green initiatives

Awareness of the importance of green issues is well demonstrated among the case companies. The case companies gave a unanimous picture of why LSPs consider adopting green initiatives in the first place, and stated that customers and brand image were their two main incentives. Another interest finding concerned the role of top management as a main incentive. The LSPs that identified top management as a main incentive for adopting green initiatives also had a stronger focus on more long-term strategic priorities. Two propositions were derived from the findings and analysis of this objective:

- Proposition A: As top management embraces green initiatives, the long-term strategic priority accorded to green initiatives increases.
- Proposition B: As employees initiate green improvements, the short-term priority accorded to green initiatives increases.
Adoption of green initiatives
A common picture among the studied cases is that many green initiatives directly involve transportation in a variety of ways. In relation to ICT solutions, it emerges that LSPs do not widely use technology to support green initiatives. Furthermore, the level of ICT adoption is still low, especially in small companies. Two propositions was suggested in order to try explain the differences in the adoption of ICT to support green initiatives:

- Proposition C: The larger the LSP, the higher the tendency to use more sophisticated ICT tools to support green initiatives.
- Proposition D: The wider the service offering, the higher the tendency to use more sophisticated ICT tools to support green initiatives.

Drivers affecting the adoption of green initiatives
The prominent drivers of green initiatives among the case companies were the managerial driver and the employees, and discussion concerning the impact of these drivers on adoption of green initiatives resulted into two propositions:

- Proposition E: As employee engagement increases, the adoption of green initiatives increases.
- Proposition F: As managerial support for green initiatives increases, the resistance from employees decreases.

Competitors were not seen as a major driving force among the case companies. However, since competitors are often mentioned as a driver in the literature and might therefore advance the development of green initiatives further, a more future-oriented proposition was formulated:

- Proposition G: As pressure from competitors increases, the adoption of green initiatives increases.

Environmental legislations and regulations were also identified as significant drivers among the case companies. Another significant driver identified in the Paper were customers (at least among the Swedish case companies). Based on additional findings and analysis, this generated into two propositions:

- Proposition H: As green legislation and regulation increases, customer engagement increases.
- Proposition I: As green information from LSPs increases, customer engagement increases.

Barriers affecting the adoption of green initiatives
Lack of customer/market support, as well as financial barriers, proved to have a significant impact in the investigations. Other barriers mentioned were for example, lack of information and competences in the area of green logistics, and also a certain resistance within the actual organisation regarding green initiatives. This led to the following propositions:
- Proposition J: As collaboration with customers increases, long-term commitment and the willingness to share costs increase, and financial barriers to green initiatives decrease.

- Proposition K: As the level of ICT adoption increases, the knowledge level of green issues among employees and customers increases.

4.3 Paper 3 Understanding Efficiencies Behind Logistics Service Providers’ Green Offerings

Due to the increasing importance of green management over the past decade, LSPs need to make more efforts in green issues in order to deliver products and services in more environmentally friendly ways. The ability of green management to integrate green issues into logistics service offerings has involved more and more LSPs and will probably attract even more managerial attention in the logistics industry in the future (Lieb and Lieb, 2010). Hence, this will be a challenge for LSPs, and it is clear that there is a lack of both knowledge and research in this area. Therefore, the article takes an LSP perspective, with the purpose of:

*Indicating where green-labelled LSPs are positioned today in their development of green service offerings and furthermore to explain the underlying rationales behind the development of green service offerings.*

This article is based on a multiple case study of 6 LSPs, active on the Swedish market and the goal was to build an explanation about the cases and develop ideas for further study. The analysis was based on 6 new service development dimensions derived from the literature, and the analysis process was divided into two steps:

- an analysis of the service dimensions per se, describing green service offerings and identifying factors affecting these among the case companies; and
- cross-case analysis of each of the six cases, resulting in the identification of patterns across the service dimensions and suggesting explanations for these patterns.

As mentioned above, the first step analyses the six dimensions of new service offering development, and relates the case findings mainly to this six-dimensional model. The results of the first analysis are summarised in Table 4, below.
The second step of the analysis presents the patterns, which were identified when the different dimensions were combined within the cases, and explanations for the empirically generated patterns are sought in literature on efficiency in organisations. However, due to the fact that LSPs could be seen in an early phase of the green development process, three different patterns that reflected the current behaviour and anticipations among the case companies could be discerned. The different patterns and their overall focus are:

- **Focus and abide versus network and explore** – focuses on the strategic standpoint of the greening of LSPs activities and the competitive awareness of the development in the logistics market.
- **Internal focus for general “spread” versus broad engagement to target specific customers** – involves customer orientation and transferring and sharing green knowledge and competences.
- **Top-controlled passiveness versus bottom-up exploration of technology** – concerns how green activities are managed and controlled within the company and the investment of resources.

Lin and Ho (2008) stress that research needs to determine the potential factors that will influence the willingness to adopt green innovations for service sectors. In general, the analysis in this article gives a broad picture in which settings, and the strategies adopted to address green development for the company and service offerings differ slightly among the case companies. The study presented offers some tentative explanations, but to
enhance a deeper understanding, future research needs to focus on barriers and drivers as well as on how different stakeholders influence the greening of LSPs.

4.4 PAPER 4 THE CHALLENGE AND ADOPTION OF GREEN INITIATIVES FOR TRANSPORT AND LOGISTICS SERVICE PROVIDERS

The level of initiatives needed to develop and introduce new products and services to provide shippers with green transport and logistics options differs among LSPs. For that reason, this study aimed to increase the knowledge of how LSPs face the challenge of greening their operations according to their own business and its context characteristics. Therefore, an important point of departure is to understand the underlying mechanisms in the form of drivers and barriers, as well as the firm characteristics that affect companies in their work to green their operations. The purpose of the paper is as follows:

To develop a basis for further investigations of green initiatives carried out by LSPs and analyse whether the green initiatives implemented are dependent on firm characteristics of the LSPs, as well as on the drivers and barriers experienced.

This paper is based on a questionnaire survey and investigates a sample of LSPs operating on the Swedish and Italian markets. Due to a delayed launch of the questionnaire, only a limited number of valid completed questionnaires were collected before the deadline for this paper. Therefore, the Italian and the Swedish answers were treated as one single group. The preliminary analysis aimed to identify the largest drivers/barriers as well as common green initiatives, see figure 6. T-tests were applied in order to identify statistical differences between the means. Furthermore, step-wise regression analyses were performed in order to identify significant relationships between the initiatives implemented (dependent variables) and the barriers and drivers (independent variables).

Figure 6 Analysis model

Drivers to greening logistics/initiatives
The role of different stakeholders’ influence in driving LSPs to develop and implement green initiatives was investigated. The results showed that top management and customers were seen as the strongest drivers whereas insurance companies and experts were shown to have a minor role. Furthermore, a variety of different reasons were also identified to support and drive the implementation of green initiatives among LSPs. All the reasons studied perceived a quite similar and high influence. However, the highest means were identified for reasons such as increasing firm’s competiveness, improving
customer relationship, improving brand image as well as customer service. This in turn indicates the importance of the customers in implementing green initiatives among LSPs.

**Barriers to greening logistics/initiatives**
The barriers investigated, to implementing green initiatives, divided into internal and external, seemed in general to be less important than the drivers. The external barrier with the highest mean was lack of economic incentives while negative impact on the customer supply chain as well as lack of ICT vendors received the lowest means. Cost for investments and an uncertain payback period were experienced as the largest internal barriers towards the implementation of green initiatives and the lowest mean was identified for external ICT skills.

**What influences the green initiatives?**
In order to identify the influence from the strongest contingency factors (barriers and drivers), a regression analysis was conducted. However, no barriers were included in this analysis due to their relatively low influences. The results from the regression analysis indicated that customers do seem to have an important and significant influence on the implementation of green initiatives, see figure 7 below.

![Figure 7 Regression analysis of strong drivers and green initiatives](image)

As mentioned earlier, the paper provides, a basis for further analysis to investigate whether for example different green initiatives are adopted by different LSPs. This can be achieved by classifying a number of firm attributes (e.g. size, geographical distribution, range of service offerings, the level of ICT adoption) and correlating these attributes to the green initiatives adopted and the type of drivers and barriers affecting these companies. Furthermore, a higher response rate than the presented response rate in this paper can also make it possible to carry out a factor analysis in order to group the barriers and drivers experienced, as well as the initiatives implemented.
5 ANALYSIS

The analysis of this Thesis Frame is a joint analysis of the four appended Papers but additional input also comes from the comprehensive report of the case study (see Appendix 2) as well as additional results from the questionnaire survey. The chapter is divided and structured according to the four research questions presented in Chapter 1. The analysis of each of the research questions starts with its position in the research process as well as its main input, and ends with a concluding remark.

5.1 HOW CAN DIFFERENT TRIGGERS INITIATE THE ADOPTION OF GREEN INITIATIVES?

The first research question considers how different triggers can initiate the adoption of green initiatives. The position of this research question in the analysis and its main input is illustrated in Figure 8, below.

As can be seen in the figure, the main input for Research Question 1 is based on results from Paper 1 and Paper 2, although the papers have slightly different approaches to concern this specific area.

As mentioned earlier in Chapter 3 and Chapter 4, Paper 1 is based on literature reviews, which combine the two areas: development of green service offerings and development of logistics service offerings. By combing the experience from these two fields, six different main aspects were identified, as well as the benefits of and insights into how these main aspects can be considered in the development of green service offerings for LSPs, see Table 5.
Table 5 The identified framework in Paper 1.

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Benefits (Why involve)</th>
<th>Considerations in the development of the offering</th>
<th>The offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer &amp; market</td>
<td>Identify attractive services</td>
<td>Customer demands as starting point</td>
<td>Diversified &amp; customised offers</td>
</tr>
<tr>
<td></td>
<td>Focus on the “right” aspects</td>
<td>Early integration of marketing</td>
<td>Pricing the green service offering</td>
</tr>
<tr>
<td></td>
<td>Develop wanted services</td>
<td></td>
<td>Customer segmentation</td>
</tr>
<tr>
<td>Internal collaboration</td>
<td>Knowledge exchange &amp; spread</td>
<td>Use of cross functional teams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficient problem solving</td>
<td>Include environmental experts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved supplier development</td>
<td>Identify collaborations risks</td>
<td></td>
</tr>
<tr>
<td>External collaboration</td>
<td>Shared data &amp; knowledge</td>
<td>Collaborate with suppliers</td>
<td>Show awareness</td>
</tr>
<tr>
<td></td>
<td>Improved sustainability performance</td>
<td>Collaborate with customers</td>
<td>Show willingness to collaborate</td>
</tr>
<tr>
<td>Business management &amp; strategy</td>
<td>Cascade sustainability throughout the organisation</td>
<td>Integrate strategic, tactical &amp; operational level cross the company</td>
<td>Hard to visualise in the offering but might be done with the use of certain certifications and standards</td>
</tr>
<tr>
<td></td>
<td>Increase the environmental benefits</td>
<td>Support from top management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Common language” among employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Achieve corporate commitment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased trustworthiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT</td>
<td>Enable customisation</td>
<td>Internal measuring</td>
<td>Provide customised offerings</td>
</tr>
<tr>
<td></td>
<td>Meet customer demands</td>
<td>Collect and store environmental data</td>
<td>Display/measure environmental impact</td>
</tr>
<tr>
<td></td>
<td>Control of environmental impact</td>
<td></td>
<td>Facilitate collaboration</td>
</tr>
<tr>
<td></td>
<td>Support development of new offerings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Means of control</td>
<td>Stimulate development</td>
<td>Focus on outcome not method</td>
<td>Use labelling/standards in the offering</td>
</tr>
<tr>
<td></td>
<td>Economical advantages</td>
<td>Focus/select e.g. standards</td>
<td>Trustworthy &amp; informative offerings</td>
</tr>
<tr>
<td>Competence &amp; knowledge</td>
<td>Strengthen skills &amp; knowledge</td>
<td>Training &amp; development</td>
<td>Knowledge as part of the offering</td>
</tr>
<tr>
<td></td>
<td>Facilitate increased innovation</td>
<td>Adjust knowledge needs to strategy and ambitions</td>
<td>Trustworthy offers</td>
</tr>
<tr>
<td></td>
<td>Maintain &amp; keep competence</td>
<td>Identify potential knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved performance</td>
<td>exchange with extern</td>
<td></td>
</tr>
</tbody>
</table>

As illustrated in Table 5, the presented framework consists of the three columns apart from the main aspects identified. The first column, Benefits (Why involve), is of a broader perspective and has therefore a more indirect effect on the green service offerings, while the last two columns, Considerations in the development of the offering and The offering have a clearer and more focused approach on the way in which green considerations could be taken into account and be included in the service offerings. However, since the first research question concerns how different triggers can affect the adoption of green initiatives, the analysis of this section will continue to focus on the main aspects identified and the first column. It is worth mentioning however that green initiatives should not be
compared with green service offerings in this thesis. Green initiatives are viewed from a broader perspective including issues such as environmental management systems (EMS), environmental certifications (e.g. ISO 14001), emissions off-set programmes, setting a GHG emission reduction target and eco-driving training. Hence, these green initiatives may in turn have an indirect as well as a direct effect on the green service offerings. However, a more detailed and developed analysis of this subject will be addressed later in this chapter in relation to Research Question 4.

As mentioned above, this analysis focuses on the six aspects identified Customer & market, Collaboration (internal and external), Business management & strategy, ICT, Means of control and Competence & knowledge as well as on the benefits generated and the reasons to involve each of these aspects in the business from a green perspective. Therefore, these benefits and reasons identified may in turn be seen as possible triggers for adopting green initiatives. Hence, as pointed out in Paper 1, these six different aspects may perhaps not represent a comprehensive picture, and the findings should be considered as conceptual although the aspects can provide a basis for further empirical based research.

On the other hand, the empirical base and connection to Research Questions 1 can be found from the results in Paper 2, whose theoretical base has been inspired and partly been based on the aspects presented above. One part of this paper aims to analyse the awareness among LSPs today of the importance of green initiatives. The identified triggers, referred to in Paper 2 as the main incentives, that influenced awareness as well as the adoption of green initiatives among the case companies studied can be summarized by:

- Customer
- Brand image
- Competiveness
- Top management
- Cost reductions

The following analysis will focus on these triggers and compare them to the aspects identified in Paper 1 in order to give a closer description of how these triggers might initiate the studied LSPs’ adoption of green initiatives, starting with the customers. Customers were frequently mentioned among the case companies studied in Paper 2 as well as in the wider case study (see Appendix 2) as having a significant impact on their increased awareness about sustainability. Not surprisingly, in Paper 1 customers were also found to have a central role, as one of the main aspects Customer and market, and customers’ needs and demands were identified as an important starting point for integrating green thinking and adopting green initiatives within a company.

Furthermore, the literature in Paper 1 suggests that in order to improve environmental performance, companies need to identify and understand the functionality required in order to meet the customers’ needs and also in order to extend the companies’ scope as well as skills regarding this issue (Pujari et al., 2003; Coley and Lemon, 2007; Maxwell et al., 2006). This situation could also be relevant for LSPs, and the results in Paper 2 indicate that there is a need to improve relationships with customers as well as a desire to
be involved in a more green strategic partnership with them. One of the consequences of being part of a strategic partnership could be that it might lead to more customized solutions. In the green service offering literature referred to Paper 1, the importance of avoiding “one size fits all” when developing green service solutions is highlighted, and customisation and contextualisation are mentioned as critical issues meeting many sets of different needs (Evans et al., 2007). However, as mentioned in Paper 1, the knowledge about the extent to which green service offerings can be customized and the benefits of customizing these are lacking in the literature. Another issue, which it is relevant to consider when entering into a strategic partnership is the choice of customers to collaborate with. The results in Paper 1 stress the importance of segmenting customers, and suggest some guidelines regarding how to segment customers from a green perspective (environmental awareness, ambitions and willingness to pay).

Another trigger, mentioned by the case companies in Paper 2, was brand image. The companies sought to improve their brand image through their engagement with green initiatives. Some of the case companies specifically mentioned a desire to be a “good” company, both for society and for employees, and to take responsibility proactively as a result of the contribution of transport to environmental degradation. Moreover, one of the case companies also highlighted its specific aim to profile the entire company’s operations as “logistically sustainable”. Brand image was not specifically brought up in Paper 1, but this trigger has nevertheless a clear correlation to the main aspect, Business management and Strategy. As mentioned in Paper 1, integrating green aspects into business management and strategy is not considered to be fully addressed within the logistics literature, even if this is as important for LSPs as for any other service provider. Therefore, a more green profile of the brand image could facilitate the visualization of the integration and adoption of green thinking and initiatives within the company. In addition, a green proactive approach to the brand image might also lead both internally as externally into a more trustworthy communication of environmental issues.

Furthermore, in Paper 2 the aim to improve the company’s competitiveness was also found to be a trigger for adopting green initiatives. This trigger is not explicitly mentioned in Paper 1, but the adoption of green initiatives may create an opportunity to strengthen a company’s competitiveness in the market. As stated in Paper 2, investments in adopting and improving green initiatives may not only lead to new customers and market shares but may also, as highlighted by one of the case companies, be necessary in the future to simply retain existing customers. The role of green initiatives and their impact on companies in the future can be difficult to predict. However, one case company showed a certain green progress by its stressed desire to become an “industry shaper” with regard to sustainability as well as to other dimensions of its work. Additionally, the strategic priority accorded to green issues can serve as an indicator on a company’s level of adoption of green initiatives. All the case companies discussed in Paper 2 mentioned some level of strategic priority (either long-term, short-term or both) regarding green initiatives. The smaller case companies highlighted the importance of having both short- and long-term perspectives, and as one case company stated: “it is not realistic to view environmental aspects and develop strategies and goals from a purely short-term perspective”. This is in line with the results from the first literature review in Paper 1, which dealt with sustainable service development literature. Strategic commitment and the
inclusions of green aspects into existing business systems and strategies are needed to fully integrate sustainability into a company’s activities and later on, for the development of the services and products (Waage et al., 2004). Benefits achieved from this could be a more effective cascading of sustainability throughout the company’s activities (Maxwell et al., 2006), but the integration of, for example, sustainable service development as one element of the existing corporate strategy, will require new forms of thinking in existing structures and systems (Baumann, 2002).

This in turn, as stressed by Charter and Clark (2008), leads to an increased need to have a clear vision, objective and strategy, supported by a driving force from the top of the company. The top management’s role as a trigger is also identified among the case companies in Paper 2. As stated above, a successful adoption of green initiatives, as well as the integration of green considerations into the business strategy, will not occur without clear leadership, resources commitment and active support from the company’s top. This in turn, leads to an increased pressure on the top management of LSPs when trying to integrate green thinking at the strategic, tactical and operational level within the company to provide sustainable solutions that benefit all stakeholders.

Finally, the last trigger identified, cost reductions, was not as prominent as the other triggers mentioned in Paper 2. Only two case companies indicated that cost reduction were an influencing factor. One possible explanation to its less importance could be that overall there is already a great focus on reducing costs and at the same time improve performance within the transport and logistics industry. Some of these cost reduction and improvement in performance may have already a reduced impact on the environment, even if this was not the company’s original purpose. Besides, as acknowledged by some of the case companies in Paper 2, there are no large cost savings for LSPs themselves, instead it is their customers that stand to save money.

To summarize, the above analysis identifies some possible triggers and the most prominent were Customers, Brand image, Competiveness and Top management. Furthermore, the analysis suggests how the impact of these triggers can affect LSPs when adopting green initiatives in different ways. Customers can, for example, affect the adoption of green initiatives regarding the type of service offerings provided, the segmentation of customers and the strategic partnership possibilities. Brand image and competitiveness can affect how LSPs choose to profile the company as well as how they develop strategies regarding green initiatives. Top management was also mentioned as significant, and this trigger can affect the way in which green thinking and initiatives are integrated at the strategic, tactical and operational level within the company.

5.2 HOW CAN DIFFERENT DRIVERS AND BARRIERS AFFECT THE ADOPTION OF GREEN INITIATIVES?

The second research question aims to identify how different drivers and barriers can affect the adoption of green initiatives. The position of Research Question 2 as well as its main input is illustrated in Figure 9, below.
Paper 2 deals with different drivers and barriers identified among the case companies studied, while Paper 4 identifies drivers and barriers found from the results by the questionnaire study. The analysis of Research Question 2 is divided into two parts; it begins with how different drivers can affect the adoption of green initiatives and is then followed by a section that analyses how different barriers can affect the adoption of green initiatives.

5.2.1 How can different drivers affect the adoption of green initiatives?

One way to identify how different drivers can affect the adoption of green initiatives can be by investigating the role and influence of different stakeholders. Another way can be to investigate the different reasons that drive the adoption of green initiatives. In order to investigate the impact of different drivers on the adoption of green initiatives, the analysis has been divided into the impact of different stakeholders and the reasons identified that drive the adoption of green initiatives. The following analysis starts with the impact of different stakeholders on LSPs when these adopt green initiatives.

How can different stakeholders affect the adoption of green initiatives?

As a starting point, the results of the impact of the different drivers on green initiatives from Paper 2 are highlighted. Hence, Paper 2 includes not only Swedish-based LSPs (SWE A, SWE B, SWE C and SWE D, which in this licentiate thesis are equivalent to Alfa, Beta, Epsilon and Zeta) but also Italian- and Spanish-based LSPs. Since the analyses in this thesis frame focus primarily on the Swedish market, the following analysis concerns the Swedish case companies and is also extended into two more case companies; Gamma and Delta (a comprehensive description of the case companies included can be found in Appendix 2). However, the results of Paper 2 will nevertheless be used as support to identify any similarities or differences with the updated analysis of the Swedish-based LSPs.

The analysis starts with the drivers identified and studied in Paper 2, including: Customers, Competitors, Government legislation, Management and Employees. Furthermore, the list of different stakeholders in this analysis is extended with Society, Suppliers and Investor/owner, which also were investigated in the case study. The results of these different stakeholders’ impact on the adoption of green initiatives among the six Swedish-based case companies are presented in Table 6 below.
Table 6 The impact of different stakeholders among the studied case companies.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Alfa</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Epsilon</th>
<th>Zeta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Competitors</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Government legislation</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Management</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Society</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Investor/owner</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Starting with the customers, Table 6 shows that this driver does seem to have a significant impact on the adoption of green initiatives among the studied case companies. This is in line with the literature that highlights pressure from customer as a significant driver when adopting green initiatives (Foster et al., 2000).

However, this driver showed to have a less impact in Paper 2, since customers’ impact was rated low among the Italian and Irish case companies. Even if customers were seen as an important driver among the case companies studied, the findings suggest that there is a certain lack of customer support and willingness to invest in and pay for green initiatives. Hence, the overall perception among the case companies is that customers’ interest has increased and the specifications of green requirements have become more realistic over the years. The interest among customers is high, especially among public authorities and companies that have an aggressive sustainability profile. Furthermore, customers from the industry sector are considered to have fewer and lower green requirements than customers from the food industries. A possible explanation to this can be that these customers are closer to the end consumers and therefore feel a higher pressure. The case company, Zeta, stated that its larger customers always have some kind of sustainability requirements, such as ISO certifications or special kinds of transport modes, while requirements from smaller customers are not so clear. Even if the green requirements have become more realistic, Zeta stated that there are still problems due to the diverse of green requirements and difficulties to fulfil these requirements. In order to avoid these problems, some case companies are showing an interest in working more closely with their customers when it comes to green initiatives, and one case company, Delta, stated: ‘We have to work together with our customers in order to get the best effect’. The findings and the reasoning above indicate that the case companies studied are taking their customers seriously and want to meet their demands in terms of green initiatives.

In Paper 2, competitors were not seen as a major driver among the studied case companies. One possible explanation is the fact that many LSPs are still in the initial phase of their development in terms of a green profile and thus sense no pressure from their competitors. However, market research does exist to some extent to benchmark how competitors operate with their environmental work. The fact that competitors can be seen as drivers is underlined by Salomone (2008), who states that they can have a significant impact on motivating companies and bringing the green initiatives’ development further to exploit new market opportunities and win new market shares. Some of the case companies believed they are quite far ahead of their competitors when it comes to adopting green initiatives, and in order to maintain that position, they strive to be aware of their competitors’ green situation.
The results indicate that even if the case companies don’t sense any competition from their competitors today, this situation may change in the future and to have good sustainability work might even become a competitive advantage.

According to Walker et al. (2008), government regulations and legislation are major drivers of companies’ environmental efforts. However, the perception of government legislation’s impact varies slightly among the case companies. Government legislations are always present in the background and must of course be followed; otherwise there is a risk of losing customers. Hence, compliance with environmental legislation is no guarantee of improved environmental performance. Instead, it can be seen as a barrier due to weak enforcement (Shi et al., 2008), low levels of awareness and the absence of a central source of information (Balzarova and Castka, 2008). This is partly in line with the general perception of government legislation among the case companies. The case companies state that there are not many legal requirements and that existing requirements are often a bit vague and complicated and therefore difficult to understand. As mentioned in the literature, governments want companies to become greener, but it is not always without complexity to translate general environmental targets to specific requirements for a single company (Roth and Kåberger, 2002).

Despite the vague and complicated legal requirements, the findings indicate that the studied case companies are taking the governmental legislations seriously and one case company, Zeta would even support more and stricter environmental legislation.

One of the most prominent drivers found in Paper 2 was management, which is also in line with the results among the case companies. In the literature management is commonly mentioned as a barrier in relation to the adoption of green initiatives. Reasons provided include managements’ resistance to change (Shi et al., 2008) and lack of understanding and awareness from the top management (Post and Altman, 1994). The management is not seen as a barrier among the case companies studied but instead, all the case companies state they have good support from the management and board of directors when it comes to adopting green initiatives. However, in those cases where pressure has not directly come from the top management, it has been a little bit more difficult to persuade the top management to invest in green initiatives. This indicates that management’s support and role as an initiator does affect the case companies studied and also reflects the current and future approach to adopting green initiatives within a company.

Likewise as in Paper 2, employees’ involvement also proved to have a significant impact among the studied case companies. Furthermore, the significant impact of the role of employees’ interest and involvement in adopting green initiatives is also highlighted in the literature (e.g. Berns et al., 2009). Some reflections and comments from the case study regarding the impact of this factor are that it has increased over time due to public awareness about environmental issues, that the level of employees’ environmental awareness and knowledge are measured within the company every year and that the employees’ involvement in green issues is significant, since some case companies stated a desire to be viewed as an attractive workplace as well as profile the entire company as a green sustainable LSP. This view of integrating green thinking thorough the entire company and involving the employees in this process is especially highlighted by case
company Beta. Beta characterized itself as a more goal-oriented rather than top-down oriented organization, and stated the following: “We work a lot to increase personal responsibility and willingness to contribute to the whole company. We think this is a winning concept.”

Other possible drivers that were investigated among the studied case companies were society, suppliers and investors/owners. Even if the studied case companies did not feel any direct pressure from society, there was a desire to be viewed as a responsible green company and not receive bad publicity from the media and thus risk destroying the brand image. As found in the literature (e.g. Walker et al., 2008) the pressure from suppliers was not emphasised among the case companies studied. Instead, they considered themselves to have the more active role in pushing for the adoption of green initiatives. When it comes to investor/owner, the influence of this driver has increased. The management has noticed that environmental issues are important, which has generated into increased pressure and set targets.

In addition, the influence from different stakeholders was also investigated in the questionnaire study, and the result was presented in Paper 4. The results from different stakeholders impact when adopting green initiatives is illustrated in Table 7, below. Hence the analysis has been updated as mentioned in section 3.6. As can be seen in the table, the results from the questionnaire study are more or less in line with the findings from the case studies above.

Table 7 Stakeholders’ impact on the adoption of green initiatives.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitors</td>
<td>60</td>
<td>2.8</td>
<td>1.38</td>
</tr>
<tr>
<td>Customers</td>
<td>61</td>
<td>4.2</td>
<td>1.12</td>
</tr>
<tr>
<td>Top Management</td>
<td>61</td>
<td>4.4</td>
<td>0.92</td>
</tr>
<tr>
<td>Transport/Logistics Suppliers or partners</td>
<td>59</td>
<td>3.3</td>
<td>1.25</td>
</tr>
<tr>
<td>Transport/Logistics Equipment Suppliers</td>
<td>59</td>
<td>3.0</td>
<td>1.32</td>
</tr>
<tr>
<td>Employees</td>
<td>61</td>
<td>3.4</td>
<td>1.29</td>
</tr>
<tr>
<td>Experts (academics/consultant)</td>
<td>56</td>
<td>2.3</td>
<td>1.35</td>
</tr>
<tr>
<td>Trade bodies</td>
<td>59</td>
<td>3.1</td>
<td>1.41</td>
</tr>
<tr>
<td>Government and public bodies</td>
<td>56</td>
<td>3.2</td>
<td>1.50</td>
</tr>
<tr>
<td>Owner/shareholders</td>
<td>61</td>
<td>3.5</td>
<td>1.48</td>
</tr>
<tr>
<td>Insurers</td>
<td>53</td>
<td>2.1</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Influence from the top management received the highest mean, and the t-test showed that this was a significantly higher mean than all the other drivers with the exception of customers. Furthermore, the high mean of customers showed a significantly higher influence than that of most other stakeholders apart from top management.

To summarize, the influence of different stakeholders seems to play a significant role in driving LSPs to develop and adopt green initiatives. The most prominent drivers seem to be customers and top management. The significant role played by customers may not be so surprising since without customers’ interest and willingness to pay, it is hard to do business. Besides, in order to get the best results from the adoption of green initiatives it may be necessary to cooperate more closely with the customers. The importance of a supportive and committed top management may not either be revolutionary in itself, but
when it comes to incorporating green initiatives, something which can be seen as a change within the company, the top management’s support may be crucial for how successfully the change will be integrated into the company and received by employees. Therefore, the environmental awareness and the willingness to change among the employees may also be relevant when integrating and adopting green initiatives within the company.

How can different reasons acting as drivers affect the adoption of green initiatives?
The reasons that have been investigated as acting as drivers among the case companies concerned first and foremost cost savings and potential source of revenue. Table 8 shows their impact when green initiatives are adopted among the case companies studied.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Alfa</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Epsilon</th>
<th>Zeta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost savings</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Potential source of revenue</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

When it comes to cost savings, it is hard to avoid the fact that this driver both with and without environmental concerns need to be taken into account. In the literature, cost savings are often mentioned as a common driver and Walker et al. (2008) noticed that companies that excelled in various green supply chain activities were partly driven by a strong focus on cost savings. Hence, one case company, Delta, stated that the company did not adopt green initiatives just in order to save money, but that, cost reductions were viewed as a positive side effect. Furthermore, the case companies stressed that it is their stakeholders (e.g. customers and suppliers) that make the largest cost savings. However, Zeta stressed that this driver needs to be taken into account because without a focus to ensure its customers’ cost reductions, the company would risk losing customers and market shares to competitors.

Regarding potential source of revenue, Seidel et al. (2009) mention the opportunity to develop new product ranges for environmental concerns. This in turn can attract new customers, and companies may look at adopting green initiatives as a potential source of revenue or cash flow. From the findings in the case study, one LSP, Delta, states that it would probably have lost customers if the company had not invested into green initiatives. Hence, the overall perception among the studied case companies regarding adoption of green initiatives is that it can be a way to win new customers as well as to retain existing customers. Furthermore, the case companies see the potential, and hope that environmental issues will become more important in the future and also that customers will start to show more interest and willingness to pay for green initiatives. This indicates that the adoption of green initiatives is not a temporary trend, instead the studied case companies are taking this problem seriously from a more long-termed perspective.

Paper 4 presents some additional identified reasons that act as drivers that may influence the adoption of green initiatives among LSPs, see Table 9.
As can be seen in the table, most of the reasons studied are thought to have a rather similar and high influence on companies adopting green initiatives. *Improve brand image* received the highest mean although this driver was not significantly higher than *Improve customer relationships* and *Increase firm’s competitiveness*. Furthermore, the driver *Increase firm’s competitiveness* also received a high mean but was not significantly higher than *Improve brand image* and *Improve customer relationships*. Regarding *Improve customer relationships*, this driver had a significantly higher mean than all the other drivers with the exception of *Improve customer service*, *Increase firm’s competitiveness* and *Improve brand image*.

To conclude, the above analysis indicates that the adoption of green initiatives can be seen as a way to retain and increase the company’s competitiveness, and according to the survey results, increased competitiveness and an improvement of the brand image seem to be significant when LSPs adopt green initiatives. As was shown in the previous analysis, customers do seem to be significantly and by adopting green initiatives the LSPs studied aim and strive to win new customers. Improved customer relations were also something that was significant in the survey results. These reasons relates to the driver Potential source of revenue. Regarding cost savings, it is clear that to some extent this driver both with and without green concerns affects the studied LSPs since in general, transport is often viewed with a great focus on cost reductions (Stank and Goldsby, 2000). The impact of cost reductions is not perceived as the strongest driver (as also the survey results indicated) when adopting green initiatives but as indicated in previous analysis, cost savings have to be taken into account otherwise the company risks to losing customers and market shares.

### 5.2.2 How can different barriers affect the adoption of green initiatives?

The analysis of how different barriers affect the LSPs studied when these adopt green initiatives, has been divided into internal and external barriers.

**Internal barriers affecting the adoption of green initiatives**

Based on the observations from the LSPs studied in the case study regarding internal barriers illustrated in Table 10 below, it is shown that financial and economic barriers may have an impact for adopting green initiatives.
Table 10 The impact of internal barriers among the studied case companies.

<table>
<thead>
<tr>
<th>Internal</th>
<th>Alfa</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Epsilon</th>
<th>Zeta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial &amp; economical</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Technical</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Information</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Organisational</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Furthermore, the significance of financial and economical barriers, with large investment costs and long payback periods were also identified in Paper 2. Many articles in the literature also point out financial issues as barriers when companies try to meet the increased environmental requirements (e.g. Dahlman et al., 2008, Balzarova and Castka, 2008 and Shi et al., 2008). The small case companies, Alfa and Beta, highlighted the problem that environmental solutions are much more expensive and their financial support is needed, for example from local government to make these investments possible, while the large case companies, Epsilon and Zeta, stressed problems such as low returns and difficulties to specify the expected results and profit. In turn, these problems can have a negative impact when it comes to justifying investments in green initiatives. Among the specialized case companies, Gamma and Delta, this barrier was noticeable, but not to such a great extent as in the other cases. Another contributing factor, apart from the problems mentioned above that may have an impact on why financial barriers are perceived as significant among the studied LSPs, could be that the transport business is a low margin industry.

Technical barriers may also have a significant impact when green initiatives are adopted since four of the six studied case companies stated that this barrier as high. This barrier can be seen both as an internal and an external barrier and as described in the literature can include a lack of technical training, lack of access to external technical support (Shi et al., 2008), uncertainty among existing techniques and inability to eliminate some risks or effects (Post and Altman, 1994). How and in what way this barrier affects the studied case companies can partly be linked to the development and research within the automotive sector. More specifically, the case companies mentioned reasons such as a limited number of environmental friendly vehicles on the market, limited access to refuel these vehicles, hard to find alternative solutions, technology development that is too slow as well as uncertainty among existing solutions. The problems of uncertainty and difficulties regarding finding green technologies solutions on the market may slow down the green development process and can also have a negative influence on LSPs when it comes to justifying investments within their own company. Another technical issue brought up by some of the case companies was the difficulties to measuring and calculating carbon emissions from the transports. The lack of a standardized method and the weak robustness of these calculations may have negative influence on LSPs, since customers may perceive these figures not accurate enough and therefore be unwilling to pay extra for these kinds of service offerings. By that, it is evident that technical and financial and economical barriers tend to go hand in hand and might even reinforce each other.

Like the technical barrier, the information barrier can both be an internal and external barrier, and based on the results from the case study this barrier, seemed to affect the case companies studied adopting green initiatives. This barrier was not very much highlighted in Paper 2, even though ICT systems were seen to be not as supportive and flexible as the
companies would like regarding green information. This issue concerning inadequate IT-systems is also mentioned among some of the case companies, especially with regard to estimating emissions. The information barrier seems to have a lower impact among the small case companies since they perceived their IT-systems to be sufficient to meet the required need. This situation may be different to that found in a large company. Zeta, for example, stated that due to the large customer base and no standardised green offerings, information could be a problem.

Furthermore, as mentioned in the literature, information barriers can also include difficulties to access and collect appropriate data (Post an Altman, 1994). The difficulties to absorb information about the sustainability impact as well as explain and interpret the information in an objective manner, are also stressed by some of the case companies. In addition, one case company, Gamma, expressed an overall fear of scaring customers off if there is a lack of an entirely reliable data and information base. However, due to efforts to decrease this barrier Gamma has noticed a tendency among its employees and partners to accept the situation. These in turn have identified advantages such as attracting new customers and gaining competitive advantages in price comparison with competitors. This in turn indicates that information sharing and communication may have an impact on how well the adoption of green initiatives is received within the company as well as how it perceived by customers, since the level of green knowledge is probably not much higher among customers. And as case company, Beta stated: “We want to educate our employees so they can support our customers and everyone in the organisation should know where we are standing when it comes to sustainability issues”.

Regarding organisational barrier, the perception of its impact varied among the studied case companies and was not identified as a distinctive barrier in Paper 2. Issues concerning this barrier identified in Paper 2 as well as in the case study were lack of understanding and interest in the organisation, different processes in different parts of the company and lack of competence in the area of green logistics. Different methods and approaches, as well as problems with information and cultural differences regarding work with green initiatives concerned first and foremost the large case companies with different functions and global units within the organisation. The reasoning above indicates that organisational resilience is correlated with information dissemination, which in turn shows the relevance for LSPs to be clear about the incentives of adopting green initiatives and approaches used within the company.

In addition, the impacts of different internal barrier were also investigated in Paper 4 and the results are as shown in Table 11 below.
The results reveal that the largest internal barriers experienced by the surveyed LSPs are **High investments costs** and **Uncertain payback period**. Furthermore, the barrier **High investments cost** showed a significantly higher mean compared to all barriers other than **Uncertain payback period**, which in turn, had a significantly higher mean than most of the other barriers studied (with exception of **High investments cost**, **Lack of organisational/human resources** and **High ICT running cost**).

To conclude, the above analysis investigates some different internal barriers and strives to describe how these affect the adoption of green initiatives among the LSPs studied. The analysis indicates that even if two or more case companies highlight the same barrier, there can still be a variation among the different LSPs about how this barrier will affect the adoption of green initiatives within the company, for example when it comes to informational and organisational barriers. This was also found regarding the financial and economical barriers, which from the results from the case study as well as the survey also seems to be a significant barrier when LSPs adopt green initiatives.

### External barriers affecting the adoption of green initiatives

The external barriers investigated among the case companies concerned policy and market barriers and the impact of these barriers experienced among the studied case companies are shown in Table 12, below.

<table>
<thead>
<tr>
<th>External</th>
<th>Alfa</th>
<th>Beta</th>
<th>Gamma</th>
<th>Delta</th>
<th>Epsilon</th>
<th>Zeta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Market</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

As mentioned in the Chapter 2, **policy** barriers can be described as a weak enforcement of environmental regulations, an absence of economic incentive policies (Shi et al, 2008) low awareness of environmental legislation and also an absence of a central source of information on environmental legislation (Balzarova and Castka, 2008). The perception of the impact of this barrier slightly varied among the studied case companies. Some case companies, Gamma and Epsilon, did not state that policy was a major barrier, since they perceived that no demands are made. But those case companies that mentioned policy as a barrier expressed issues such as questioning set requirements and decisions from government within the company. In addition, some laws and policies require a lot of paper work, which takes a lot of time and leads to extra difficulties as well as pressure to
follow these requirements, even though the company has no resources for it. This reasoning suggests that the role of the government may be essential when it comes to encouraging the green movement by setting clear standards and requirements and providing approaches for companies about how these requirements will be achieved.

*Market* barriers as described in Chapter 2, can consist of lack of preferences and demands from customers, as well as weak public awareness and pressure from society (Shi et al., 2008). This barrier seemed to have some impact when most of the case companies adopted green initiatives. One aspect of how this barrier affects LSPs mentioned by Alfa is bad publicity from society, since the transport industry has been negatively labelled as the largest emitter of carbon emissions, and this view is considered difficult to wash off. This in turn can explain why, as identified earlier in this chapter, the LSPs mentioned that improved brand image was a trigger as well as a significant driver for adopting green initiatives.

Even though customers were singled out as a prominent driver, they were also mentioned as a barrier among the studied case companies. Likewise, the lack of customer/market support emerged as a clear barrier in Paper 2. As stated in Paper 2, if customers were willing to pay extra for greener services or at least share the cost of the investment in green solutions, then such services would probably reach the market sooner. But as noticed by one LSP in the case study, Alfa, today these kinds of investments are made in pure goodwill or by a company’s own driving force without any financial gains. Another aspect stressed by one of the case companies, Zeta, is that even if customers have green requirements, the variety and different nuances of these requirements cause problems for LSPs. The case company pointed out that perhaps trade associations could do more in order to reduce these market barriers. In addition, one case company, Beta, mentioned another problem related to requirements from customers. Due to the fact that many customers have separate purchasing and environmental and quality departments, this leads to misunderstandings and risk some sustainability issues never to be discussed and result in the end with requirements unreasonable to achieve. Hence, this may be an organisational barrier but it is also a problem that may affect many companies, and therefore shows the importance of integrating green thinking into the whole company.

Noticeably, the two specialised case companies, Gamma and Delta, did not identify the market barrier as strongly as the other case companies, which in turn can be explained by their overall business strategy. Express deliveries are a bit contradictory towards green thinking but also their customers’ requirements might be slightly different to those of the other case companies.

Moreover, in addition to these previously mentioned external barriers, Paper 4 investigated additional external barriers that may have an impact on LSPs adopting green initiatives, see Table 13.
Table 13 External barriers affecting the adoption of green initiatives.

<table>
<thead>
<tr>
<th>Barriers</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited access to technology that reduces environmental impact (e.g., vehicles, aerodynamic features)</td>
<td>65</td>
<td>2,91</td>
<td>1,34</td>
</tr>
<tr>
<td>Lack of customer interest</td>
<td>71</td>
<td>3,2</td>
<td>1,36</td>
</tr>
<tr>
<td>Lack of customer support</td>
<td>66</td>
<td>3,3</td>
<td>1,34</td>
</tr>
<tr>
<td>Negative impact on customer supply chain</td>
<td>63</td>
<td>2,4</td>
<td>1,20</td>
</tr>
<tr>
<td>Lack of transport/logistics suppliers’ or partners’ interest</td>
<td>68</td>
<td>2,9</td>
<td>1,32</td>
</tr>
<tr>
<td>Lack of transport/logistics suppliers’ or partners’ support</td>
<td>66</td>
<td>2,8</td>
<td>1,30</td>
</tr>
<tr>
<td>Lack of economic incentives</td>
<td>67</td>
<td>3,5</td>
<td>1,18</td>
</tr>
<tr>
<td>Lack of clear regulations</td>
<td>65</td>
<td>3,3</td>
<td>1,30</td>
</tr>
<tr>
<td>Lack of ICT vendors selling specific product supporting green logistics</td>
<td>63</td>
<td>2,5</td>
<td>1,12</td>
</tr>
<tr>
<td>Lack of standards (including ICT standards)</td>
<td>60</td>
<td>3,1</td>
<td>1,27</td>
</tr>
</tbody>
</table>

The largest barrier, **Lack of economic incentives**, has a mean of 3.5, which is significantly higher than most other external barriers (except for **Lack of customer interest**, **Lack of customer support**, and **Lack of clear regulation**). Furthermore, the barrier, **Lack of customer support**, also proved to have a significantly higher mean than most of the barriers apart from **Lack of customer interest**, **Lack of clear regulation** as well as **Lack of economic incentives**.

To summarize, as in the analysis concerning internal barriers, financial issues involved in the adoption of green initiatives seem to be evident both in the cases studied, where the LSPs mentioned customers’ unwillingness to pay, as well as in the survey, where lack of economic incentives received the highest mean. The analysis also indicated that not only are customers seen as a significant driver, but they also are mentioned as a barrier among the LSPs studied. This finding is also indicated by the results from the survey, where lack of customer support was singled out as a significant barrier. Regarding environmental legislation, the studied LSPs mentioned problems such as absence of these kinds of regulations and that the few existing regulations are too vague or unclear. Lack of clear regulation also received a relatively high mean in the survey, even if it was not possible to show any statistical significant.

### 5.3 How can firm characteristic affect the adoption of green initiatives?

In order to obtain a fair and a more comprehensive picture of the current green situation of LSPs during the research process Research Question 3 has become more and more prominent. The position of Research Question 3 as well as its main input is illustrated in Figure 10, below.
Research Question 3 aims to investigate how firm characteristics can affect the adoption of green initiatives. As mentioned in the literature, firm characteristics can have an impact on the adoption of green initiatives within companies. Hence, the analysis of research question 3 may not be considered as exhaustive, but nevertheless regarded as interesting. Focus has been on those firm characteristics that were singled out from the earlier analysis in this thesis frame and also reflected upon in some of the Papers. The two most interesting firm characteristics which this analysis aims to examine more closely, are: the size of the company and the type of service provided.

In the literature, the size of the company is noticed to be one of the most prominent firm characteristics and research has shown that the number of employees, company history and capital size do influence initiatives undertaken by LSPs (e.g. Lin and Ho (2008) and Ho et al. (2009). The results from the previous analysis, as well as findings from Paper 2 and Paper 4 suggest that among the LSPs studied there are some differences between small and large companies. The differences identified are not only that the perceived impact of various drivers and barriers in some cases might vary between small and large LSPs, but also the fact that a common identified driver or barrier may affect small and large LSPs in different ways.

One barrier, which has been identified as significant for both small and large LSPs but in a slightly differed way for the two groups, was the financial and economical barrier. Paper 4 showed that cost for investments and an uncertain payback period were the strongest barriers identified. One explanation to this may be that most of the respondents in the survey were SMEs and these companies may experience and financial issues as a stronger barrier than a larger company. This in fact might be true, and the findings from Paper 2 show that this barrier was relevant for all the studied LSPs. In agreement with the results of Paper 2, the analysis presented in section 5.2.2 indicated that financial barriers are significant both among small and large LSPs. However, this barrier affected the two groups in different ways. The small case companies, Alfa and Beta, highlighted problems such as green solutions being much more expensive and that for them, financial support is needed from for example local government in order to make these investments possible. The large case companies on the other hand, stressed problems such as low returns and difficulties to specify the expected results and profit. This in turn can lead to difficulties when it comes to justifying investments for green solutions within the company even if they can be afforded.
This problem within the larger LSPs is somewhat contradictory to the results in Paper 2 that indicated that three out of four large LSPs stated top management as a main incentive (which is mentioned as a trigger in this licentiate thesis) when starting to adopt green initiatives. This finding suggests that green initiatives are embraced at a high level within larger companies while green awareness is also derived from a lower level within smaller companies. Moreover, the large LSPs in the case study also mentioned good support and pressure from the top management. Hence, due to the above analysis, one might wonder, despite good intention how much is the top management really willing to invest into the adoption of green initiatives.

Another interesting finding in Paper 2 concerned the strategic priority accorded to the adoption of green initiatives. While green aspects were considered mainly as a strategic and long-term priority, three out of the four small LSPs also focused on the short-term perspective. One explanation for this might be that smaller LSPs in general are more keen to meet customer’s immediate requirements than a larger company that perhaps instead focuses on building longer-term strategic market positions. Furthermore, it was also shown in Paper 2 that the LSPs that claimed that top management was a trigger (most large LSPs) for adopting green initiatives also had a stronger focus on more long-term priorities.

Moreover, another issue that showed to be different between small and large LSPs was the information barrier especially regarding IT-solutions. The result from Paper 2 showed that the smaller LSPs used more simple self-developed tools, while the larger companies often with a wider range of service offerings tended to use more sophisticated software and applications, especially in the transportation area. In the literature, recent research has focused on the ICT adoption among LSPs (see for example Marasco, 2008) and utilization of ICT has increasingly been considered as one success factor (Langley et al, 2005). Despite this, Evangelista and Sweeney (2006) stress that there still is a lack of ICT expertise and insufficient financial support among LSPs, especially among small- and medium-sized firms. Hence, as is shown in the analysis in section 5.2.2 the information barrier seems to have a lower impact among the small case companies since they perceived that their IT-systems are more or less sufficient to meet the required need. The larger case companies perceived that their ICT systems were not as supportive and flexible as the companies wished for, especially with regard to estimating emissions. This issue was however mentioned by some of the other case companies as well. Another big problem mentioned by the large case companies were difficulties with information sharing and spreading both within the company and to customers. Paper 2 also highlighted this issue, and stressed that due to different processes in different parts of the company there is a need for information dissemination. This may be true for all companies, but the large ones are perhaps more vulnerable to difficulties regarding information spreading than small companies.

In the literature, there is a lack of research investigating the connection between adopting green initiatives and other relevant firm characteristics besides size. Hence, from a broader perspective, the purchasing literature for example indicates that companies in different industries experience different hindrances and drivers, which lead them to apply different practices (Zhu and Sarkis, 2006). This in turn suggests that the drivers and
barriers experienced by LSPs can be dependent on characteristics such as type of product and service provided. The analysis in section 5.2.2, showed that the two specialised LSPs, called Gamma and Delta in the case study, did not experience financial barriers to be as significant as the other case companies did. This could be due to reasons such as either no recent large investment or no difficulties to justify investments regarding green solutions within the company. Furthermore, the two specialised LSPs did not identified market barriers as strongly as the other case companies. This in turn can be explained by the fact that these companies’ overall business strategy with express deliveries is a bit out of line with green thinking, and this makes these actors less affected by different pressures from the market than the other LSPs. In addition, these actors’ customers and their requirements might also be slightly different than those of the other case companies. For example, the main reason to use express services is not the fact that these services are viewed as having a less negative impact on the environment.

In line with the reasoning above, another interesting firm characteristic, besides type of service provided, can be the company’s customer base. As mentioned in the earlier analysis, customers are perceived as a main driver for adopting green initiatives. But the analysis also showed that customers from different industries put various pressure and requirements on LSPs regarding green solutions. For example, as mentioned earlier in the analysis, customers from the industry sector are not as advanced as customers from the food industries when it comes to have more detailed green requirements. This in turn, can be explained by the fact that these customers are closer to the end consumers and therefore feel a higher pressure. Previous analysis also indicated that there might be a difference between small and large customers’ requirements as well. For example, Zeta mentioned that larger customers always have some kind of green requirements such as ISO certifications or special kinds of transport modes, while requirements from small customers are not so explicit.

To conclude, as mentioned at the beginning in this section, the analysis of Research Question 3 should not be considered exhaustive; instead it suggests some examples of firm characteristics that might affect LSPs when adopting green initiatives. Not only does the size of the company seem to play an influential role but also the type of services provided and the type of customers seem to influence LSPs adopting green initiatives. The discussion above indicates that firm characteristics play an important role regarding how drivers and barriers may affect the adoption of green initiatives. From a longer perspective, these firm characteristics may also have a significant impact on the further development and strategic direction regarding green initiatives undertaken by LSPs.

5.4 IN WHICH WAYS CAN THE ADOPTION OF GREEN INITIATIVES BE REFLECTED IN THE SERVICE OFFERING?

The purpose of the fourth and the last research question is to find out in which way the adoption of the green initiatives can be reflected in the service offering. The main input for this research question comes from Paper 3 but the results of this paper have also been compared with the literature findings from Paper 1. The position of Research Question 4 is illustrated in Figure 11, below.
As mentioned earlier in section 3.6, the analysis of this research question may be considered to have a more descriptive approach. Despite the fact that the studied case companies have been selected due to their proactive approach to green initiatives, they are still in an early phase of their adoption and thus have no elaborated approach to how this should be reflected in their service offerings.

Starting in the literature, Paper 1 provided a framework that was partly used in order to analyse Research question 1 (see section 5.1). However, the analysis for this research question focuses on the parts of the framework which show how the six aspects identified can be considered in the development of the offering and how these can be visualized and reflected in the offering from a green perspective, see Table 14 below.

Table 14 Parts of the framework presented in Paper 1.

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Considerations in the development of the offering</th>
<th>The offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer &amp; market</td>
<td>Customer demands as starting point</td>
<td>Diversified &amp; customised offers</td>
</tr>
<tr>
<td></td>
<td>Early integration of marketing</td>
<td>Pricing the green service offering</td>
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<td></td>
<td></td>
<td>Customer segmentation</td>
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<td>Collaboration</td>
<td></td>
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<tr>
<td>Internal</td>
<td>Use of cross functional teams</td>
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<tr>
<td></td>
<td>Include environmental experts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify collaborations risks</td>
<td></td>
</tr>
<tr>
<td>External</td>
<td>Develop methods to handle risks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaborate with suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaborate with customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduce the collaboration early</td>
<td></td>
</tr>
<tr>
<td>Business management</td>
<td>Integrate strategic, tactical &amp; operational level cross the company</td>
<td>Hard to visualise in the offering but might be done with the use of certain certifications and standards</td>
</tr>
<tr>
<td>&amp; strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT</td>
<td>Support from top management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internal measuring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collect and store environmental data</td>
<td></td>
</tr>
<tr>
<td>Means of control</td>
<td>Focus on outcome not method</td>
<td>Use labelling/standards in the offering</td>
</tr>
<tr>
<td></td>
<td>Focus/select e.g. standards</td>
<td>Trustworthy &amp; informative offerings</td>
</tr>
<tr>
<td>Competence &amp; knowledge</td>
<td>Training &amp; development</td>
<td>Knowledge as part of the offering</td>
</tr>
<tr>
<td></td>
<td>Adjust knowledge needs to strategy and ambitions</td>
<td>Trustworthy offers</td>
</tr>
<tr>
<td></td>
<td>Identify potential knowledge exchange with external actors</td>
<td></td>
</tr>
</tbody>
</table>
The results of Paper 1 are now going to be compared with the empirical findings presented in Paper 3. However, this comparison concerns first and foremost the first analysis of Paper 3, which is mostly empirically driven and is divided according to the six dimensions describing a service innovation suggested by den Hertog et al. (2010). These six dimensions are the following:

- New service concept or service offering
- New customer interaction
- New value system/business partners
- New Revenue model/pricing
- New service delivery system; organisational, personal and culture
- New service delivery system; technological

The first of the dimensions mentioned namely, New service concept or service offering, can be connected to the first aspect found in Table 14, Customer & Market. The literature presented in Paper 1, described the importance of diversify and customizing green service offerings. However, the Paper also stressed the importance of knowledge regarding the extent to which these services can be customized but the benefits to customizing these services are not discussed. Paper 3 showed that none of the studied LSPs stated that they offered any specific green logistics service at present. This in turn can be explained by the fact that in general, logistics service offerings have become more customised, due to varying and different logistics needs from different kinds of companies (Hertz and Alfredsson, 2003). Instead, some LSPs studied offered separate green choices connected to their general service offerings, while others tried into integrate green thinking throughout the company and its service offerings. Therefore, the LSPs studied were characterized as either offering green choices or a full integration of green thinking in the company and its service offering.

New customer interaction can also be linked to the aspect Customer & Market as well as to the aspect Collaboration (external) in Paper 1. As shown in the earlier analysis of this Chapter, the role of the customer as a driver seems to be significant when LSPs adopt green initiatives. Paper 1 suggested how customers can be taken into consideration and thereby be reflected in the service offering. For example, by more interaction with customers, LSPs can increase their understanding of their customers’ business, needs and demands, and thereby support their innovation and the development towards more diversified logistics solutions and to a segmentation of customers (based on green awareness, ambitions and willingness to pay). The empirical input from Paper 3 showed that interaction with customers varied among the LSPs studied even with regard to the regular services provided. This is however also reflected to some extent in how they interact about green issues. Furthermore, the analysis in Paper 3 suggested that LSPs could be categorised on the basis of whether they interact on green issues with all customers – the market in general – or a specific customer segment with a special interest.

In the way it is described in Paper 3, the third dimension, New value system/business partners, can be connected to the aspects Competence & knowledge as well as Collaboration (external) in Paper 1. The literature presented in Paper 1 suggested that there is a need for collaboration with partners as well as an identification of potential knowledge exchange
with external actors regarding green initiatives. This in turn may be reflected in the service offering with the provision of more trustworthy service offerings and the offering of green knowledge or education as part of the service offering. Among the LSPs studied, some highlighted networking with other companies and organisations as a valuable source for input and ideas, while others just want to keep an overall picture of their competitors’ situations. Therefore, from the findings of Paper 3, how LSPs cooperate with external partners in order to exchange green knowledge can be categorised on the basis of: networking with competitors as well as others (such as authorities and research institutions) versus staying aware about the surrounding competition.

The fourth dimension, New Revenue model/pricing, is only slightly touched upon in Paper 1. However, the aspect Customer & Market, reflects how the adoption of green initiatives can be reflected in the pricing of the service offering. Moreover the Paper also stressed that there is a lack of methods for how to integrate green issues into the pricing of service offerings. In line with these results, Paper 3 showed that in general, there were few traces of price models among the LSPs studied that take green issues into account. Hence, another interesting finding in Paper 3 was that some LSPs see the cost caused by green investments as a way to increase market shares through increased value, while others are careful to keep track of the competitors’ pricing in order to meet the market prices. This led to the LSPs being categorised either by existence of price models or motives to invest in green aspects.

New service delivery system; organisational, personal and culture can more or less be related to the aspects Business management & strategy and Collaboration (internal) presented in Paper 1. As mentioned in Paper 3, it was noticed that organisational encouragement and the quality of human resources have positive influences when green innovations are adopted among LSPs (Lin and Ho, 2008). The results from Paper 3 showed the significant role of employees as co-creators of green value, as well as the importance of a driven and committed board. The importance of offering employees training and education to increase their green awareness and knowledge, as well as the significance of a supportive top management, are also highlighted in Paper 1. This in turn led to the observation that enforcement of green initiatives among the studied LSPs was either done from an employees’ perspective (bottom-up) or from a management and board perspective (top-down). However, this can be hard to visualise in the service offering, but Paper 1 suggested that the use of green certificates and standards might make it easier to include and facilitate a trustworthy communication of green initiatives as part of the offering.

Furthermore, Paper 1 stressed the relevance of functional co-ordination and collaboration when green aspects are included in the service offering. However, this was not mentioned in the logistics literature part of the Paper. The results in Paper 3 showed that some LSPs worked more broadly and created a common awareness within the company (broad penetration), while in others companies, different departments adopt different roles (functional specialisation).

The sixth and last dimension, New service delivery system; technological, can perhaps not surprisingly be connected to the aspect ICT, especially since Paper 3 primarily focused on ICT development for this dimension. In general, ICT is described as an important tool in
the customization and differentiation of the offering (see for example Dobie (2005) and van Hoek and Chong (2001)) as well as in the collaboration with customers (e.g. Bourlakis and Bourlakis (2005) and Mortensen and Lemoine (2007)). In addition, Paper 1 suggested that ICT can be an important facilitator in the inclusion of green aspects into the service offering and that ICT can be used to customize these kinds of offerings. The empirical findings in Paper 3 showed that all case companies had systems in place that to some extent supported their green needs. Clinton (2008) stated that in general, it is important for LSPs to continually invest in ICT in order to meet increasing customer demands. However, the results of Paper 3 of LSPs ambitions of ICT investments for the near future seemed to differ slightly. While some wanted to develop quite fast to meet increasing customer requirements, others processed more slowly but in a moderate pace while some even took a more wait and see approach where no specific action was taken or further investment mentioned. Based on the results of Paper 3, LSPs were categorized with regard to the adoption and development of technology focusing on ICT as fast, slow or awaiting.

The analysis above presents a broad picture of the current status of the greening process of the LSPs studied, where context and approaches to address and adopt green initiatives, as well as how these reflect on the service offering differed among the case companies. Regarding the dimensions studied (in Paper 3) and main aspects (in Paper 1), one dimension can be seen to have a more direct reflection on the service offering, namely New service concept or service offering while the others have a more indirect impact and therefore are not reflected or visualised very much in the service offering.

Furthermore, despite the fact that this is an early phase of LSPs’ greening process from the second part of the analysis in Paper 3, it can be discerned that there are three different patterns that reflected the current behaviour and the anticipations among the LSPs studied. These were:

- **Focus and abide versus network and explore.** This pattern focused on the strategic standpoint of the greening of LSPs’ service offering as well as the competitive awareness of the development of the logistics market.

- **Internal focus for general “spread” versus broad engagement to target specific customers.** The second pattern involved customer orientation and segmentation related to how transferring and sharing green knowledge and competences was organised within the company.

- **Top-controlled passiveness versus bottom-up exploration of technology.** The third and last pattern concerned how green initiatives are initiated as well as managed and controlled within the company in relation to the company’s attitude towards green investments.

To conclude, as pointed out in the beginning of this section, the analysis of the fourth research question can be considered to be a little bit more descriptive due to the fact that the adoption of green initiatives and how this reflects on the service offering is still in an early phase among LSPS. Although the analysis indicates that some LSPs are more advanced than others, there is, as mentioned in Paper 3, an overall tentativeness concerning the future green process. Even though all of the selected LSPs have adopted
green initiatives, there seem to be differences in how LSPs act and reason. The
differences in LSPs’ reaction and adoption of green initiatives can possibly be explained
by the nature of the LSPs businesses. However, the identified patterns did not separate
the LSPs studied in similar ways why it is hard to generalise it to firm characteristics.
Finally, the green approach selected and the ways LSPs choose to react and adopt green
initiatives will in the end also most likely be reflected in their service offerings.
6 CONCLUSIONS AND FURTHER RESEARCH

This chapter begins with a concluding discussion based on the findings from the different research questions with the aim of answering the purpose of this licentiate thesis. Thereafter, the contribution of this thesis, both of academically and practical relevance, is discussed. The chapter finishes off with a conclusion about further research suggestions within the thesis’ area.

6.1 CONCLUDING DISCUSSION

Based on the analysis, it is reasonable to suggest that adoption of green initiatives not is viewed as a short-lived trend among the studied LSPs, or as an established practice. Instead, it can be described as a potential business opportunity. In the long run, adopting green initiatives may have a positive effect on the company’s image and brand. On the other hand, if LSPs remain inactive in regards of adoption to green initiatives, it can increase the risk of being exposed of criticism and negative press, as well as increase the fear of lagging behind competition. As turned out in the analysis, the studied LSPs have commenced to adopt green initiatives since they experience the future pressure, understand the consequences and realize the necessity in order to respond to the increasing and more global competition. In the literature, this is identified as a main aspect for a business change (Lemoine & Skjøtt-Larsen, 2004).

The findings provide descriptions of how different factors can affect the adoption of green initiatives among LSPs and also how the implementation of green initiatives can be reflected in the service offering. The following section strives to answer the different research questions in a chronologic order.

Starting with the triggers, they provide an increased understanding of what it all comes down to when LSPs start to adopt green initiatives. Here, a trigger is viewed as an incentive that starts the adoption of green initiatives among LSPs. Possible triggers have been analysed and discussed in order to sort out how they can affect LSPs when starting to adopt green initiatives. It turns out that customers do seem to play a significant role as triggers for LSPs adopting to green initiatives. According to the studied case companies, the customers’ curiosity regarding green initiatives have increased during the recent years, even if the findings suggest that there is a certain lack of customer willingness to invest in and pay for green initiatives. Top management decisions are another identified trigger for LSPs to start adopting green initiatives. As highlighted both in the literature as well as noticed by some of the case companies, a successful adoption of green initiatives and integration of green considerations in the business strategy will not occur without a clear and active support from the company’s top management.

Furthermore, increased competiveness and increased brand image are also mentioned to act as triggers. Notably, even if increased competiveness seems to act as a trigger, the role of competitors as a driver affecting the adoption of green initiatives are neither stressed in the case study, nor being identified as a significant driver in the survey study. On the other hand, there is a general fear among the studied LSPs that if they do not start to adopt green initiatives customers will probably choose and favour other LSPs with a more
“green” profile. As a consequence, the company could face the risk of losing market shares. One of the case companies even states that it wants to act before too many customers demand green offerings. By doing so, the company could create an advantage of having a superior standing among competitors, in addition to being a role model by adopting green initiatives.

Furthermore, a variety of different drivers have been investigated with focus on how these can affect the adoption of green initiatives among the studied LSPs. Most of the studied drivers seem to some extent to affect the adoption of green initiatives among the case companies. Hence, it turns out that many of the triggers that “started the adoption of green initiatives” also play a significant role as drivers in the further process as well. For example, customer and top management both have been mentioned as strong drivers. By adopting green initiatives, LSPs strive to win new customers and there is also a desire to improve customer relationships. It is also suggested that the clearer the customers state their green demands the easier it becomes for LSPs to respond to them. Regarding the top management, the analysis indicates that the engagement and support from top management can be crucial for how successfully the adoption of green initiatives are integrated into the company and received by the employees. The employees are not identified as a trigger but employees’ involvement turns out to be an affecting driver when adopting green initiatives. The employees’ involvement regarding green initiatives has increased over recent years and efforts are made among the LSPs to increase green awareness and knowledge among employees. The conclusion is that among LSPs their employees can be considered as an essential driver and resource when adopting green initiatives.

Besides from how triggers and drivers affect the adoption of green initiatives among the studied LSPs, different barriers and their influence on adoption of green initiatives have been studied. As for the drivers, all different barriers may to some extent affect the adoption of green initiatives among the studied LSPs. However, based on the findings from the case study as well as the results from the questionnaire survey, financial and economical barriers have shown to be crucial when LSPs adopt green initiatives. Uncertain payback period, high investment cost, increased need for external financial support as well as difficulties to justify investment regarding green initiatives within the own company are examples of this mentioned barrier. In the survey study, lack of economic incentives was singled out as the most significant external barrier. In addition, the analysis does not only indicate customers as a significant driver affecting the adoption of green initiatives, but customers are also perceived as a barrier among the studied LSPs. The studied LSPs mention reasons such as lack of customer support, unwillingness to pay for green initiatives, and unclear and unreasonable green requirements from customers as examples of barriers. Lack of customer support was also highlighted in the result from the questionnaire survey.

Before proceeding to how different firm characteristics can affect the adoption of green initiatives, another finding worth mentioning is the role of government legislation. In the literature, government regulation and legislation is described as a major driver of companies’ environmental efforts (e.g. Walker et al., 2008). Some case companies mention it as a driver due to the fact that government legislations need to be followed in order for
the company to be able to act on the market and not risk losing customers. But at the same time, it was also perceived as a barrier due to the fact that there are few legal requirements, and these are often a bit vague and complicated. This concludes the importance of the government’s role in the further process of developing more and clearer green targets and requirements.

A further conclusion of the analysis is that size of the company and type of service offerings provided seem to play important roles when adopting green initiatives. Furthermore, type of customers also seems to affect LSPs in how different drivers and barriers are experienced within the companies. For example, the analysis interpreted that customers from different industries put various pressure and requirements on LSPs in regards to green initiatives and solutions.

Another interesting aspect emphasized in the analysis, originally presented in Paper 2, concerned the strategic priority of the adoption of green initiatives. While green aspects were stated as a strategic and long-term priority, three out of the four small LSPs also focused on the short-term perspective. A possible explanation to this may be that in general, smaller LSPs are more keen on meeting customer’s immediate requirements compared to larger company that instead rather focus on building longer-term strategic market positions.

The case companies presented in this study are only examples of different kinds of LSPs that adopt green initiatives. Hence as indicated in a portion of the findings from the analysis, different companies have different basic conditions and are therefore affected by different drivers and barriers in various ways when adopting green initiatives. In other words, it seems like firm characteristics are related to how certain drivers and barriers affect the LSP, which in the end also affect how green initiatives are adopted within the company. The thesis focuses on the firm characteristics singled out from the analysis, which also has been reflected upon in some of the previous papers. Hence, due to the fact that no statistical analysis has been done in this area, the results should be treated with some carefulness. Instead, the results should be regarded as suggestions of firm characteristics that may affect LSPs when adopting green initiatives.

From a more overall perspective, it does not matter what kind of business change or decision a LSP faces, the response to a new challenge will most likely depend on what kind of business the company are running, and what different requirements that the company itself and its customers may have. This implies that type of business as well as requirements from the LSP itself and its customers should not be ignored when it comes to adopting green initiatives. Different LSPs may have similar benefits by adopting green initiatives but how these are achieved depend on the LSPs specific firm characteristics in combination with its business context. Therefore it may require unique solutions adjusted for specific business conditions, as well as customers’ needs and requirements. As a result, the difference in LSPs’ adoption of green initiatives can therefore be reflected into the service offering.

The results from the different parts in the analysis taken together suggest that firm characteristics rather effect the adoption of green initiatives indirectly than directly. While
the analysis indicated how firm characteristics can moderate the effects of drivers and barriers, no patterns were identified regarding firm characteristics and the development of green service offerings. The development of green service offerings includes the internal work as well as the explicit service offering.

The analysis mainly focused on six different dimensions describing a service innovation suggested by den Hertog et al. (2010). For each of the different dimensions, a categorization was carried out based on how the studied LSPs reacted upon each of the investigated dimensions. The results indicated that the dimension, “New service concept or service offering”, had a more direct influence of the service offering whilst the other dimensions had a more indirect impact and therefore were not that clearly reflected or visualised in the service offering. Furthermore, despite the early phase of LSPs greening process, the analysis presented three different patterns that reflected the current behaviour and anticipations among the studied LSPs. These findings were also reflected in Paper 3. As already mentioned earlier, the differences in the studied LSPs reaction and adoption of green initiatives can partly be explained by the firm characteristics and the nature of the business. Hence, as suggested in the analysis, the selected approach and how LSPs choose to react and adopt green initiatives will in the end also be either directly or indirectly reflected in the service offering. This raises some questions to be further addressed: What is really a green service offering from LSPs? What explicitly is communicated to the customers as a service offering, or does it embrace the LSP company as a whole?

6.2 Contributions
The contributions of the findings of this licentiate thesis can theoretically both be linked to the logistics and to the service marketing research areas. More specifically, the contribution to the logistics area can be viewed both from a general logistics and a green logistics perspective, while the contribution to service marketing area primarily concerns new service development.

The logistics and transport industry has over the last year undergone fundamental changes, which have led to the fact that individual players have faced new challenges of strategic and structural nature (Persson and Virum, 2001). A recent challenge affecting this industry is the response to the negative impact on the environment partly caused by this sector. Therefore, the contribution of this thesis can be viewed from a general logistics perspective describing how some examples of LSPs react and respond to the market conditions and challenges regarding a business change, which in this case is the challenge to greening their companies.

When it comes to green logistics literature, most writing and empirical studies regarding sustainability in Supply Chain Management have originally focused on manufacturing companies (e.g. Eltayeb and Zailani, 2009; Hong et al., 2009 and Srivastava, 2007). Due to this, the licentiate thesis does make a contribution only by addressing the LSPs perspective, which primarily not has been in focus when it comes to green logistics research. As a consequence, since LSPs have been neglected in the prior research, the descriptions of the studied LSPs' greening status can be seen as a contribution by itself. Thus, the identification and investigation how different factors (mentioned in thesis as
triggers, drivers, barriers and firm characteristics) affect the adoption of green initiatives among LSPs offers additional information to the green logistics field. These results can for example be of special interest when it comes to determining potential factors influencing the willingness to adopt green innovations for the service sector, also mentioned by Lin and Ho (2008).

As stated in the literature review in Paper 1, there seems to be an absence of green aspects taken into account in the general logistics offering literature. A recent review of Rajesh et al. (2011) regarding service offerings provided by 3PLs, further proves that green aspects are neglected in these kind of literature. The results concerning customers’ increasing interest in green initiatives as well as the considerations on how the adoption of green initiatives can be reflected in the service offering may therefore put some additional insights to the general logistics offering literature.

Further, how the adoption of green initiatives can be reflected in the service offering can be relevant to the service marketing area, for example in the new service development literature. Mentzer et al. (2001) highlight the importance of close interrelationship between marketing activities and logistics activities, and the results from this thesis can be seen as an exemplification of the linked areas of service marketing and logistics. This study does provide empirically examples of the possibilities to link the development of logistics service offerings to new service offering, which should be considered as beneficial input to the focused area of green initiatives.

Finally, from a practical and managerial perspective, the identification and analysis of different drivers and barriers may be helpful for LSPs to evaluate their own greening situation. By the suggested patterns that reflect the current behaviour and anticipations towards a green approach, LSPs can match their own business and context with the different patterns and its alternative rationales. The findings should also be seen as an inspiration in the continuing work to integrate and adopt green initiatives into the company, and the service offering. In addition, the description of how LSPs respond to and act upon the challenges when adopting green initiatives will also be of valuable information for a variety of stakeholders. For example, it increases the knowledge among society and government regarding the current situation of LSPs today. From a customer perspective, the findings enhance the awareness among LSPs’ customers about their central and important role in the greening process. It also facilitates LSPs to convince their customers of the need to work together in order to overcome some of the stated barriers found in this licentiate thesis.

6.3 FURTHER RESEARCH SUGGESTIONS
In this section, based on the results from this study, some directions for further research are presented.

The research in this licentiate thesis has focused on examples of different LSPs and has strived to describe how different factors can affect the adoption of green initiatives and how green initiatives can be reflected in the service offering. Due to the relative small sample of case companies, it is not possible to make any generalised assumptions of the LSP industry. As mentioned in Chapter 3, a survey study has also been conducted. Hence,
the results from this survey study have only been used in this thesis in order to validate the results from the case study. Thus, it would be interesting to compare the results found in this study more circumstantially with the results derived from the survey study since this would enable a further generalisation of the current green situation of the LSP industry.

Moreover, since this study mainly focuses on LSP active on the Swedish market, it would of course be interesting to conduct similar studies in other countries in order to find out if and possibly how LSPs green situation differs between different nations. It would provide a basis for better understanding of this increasingly important area of logistics and Supply Chain Management. What is worth mentioning is also that, the research has been a study of a more “snap-shot” character of LSPs adoption of green initiatives. It would of course also be much interesting to conduct a similar study in some years from now in order to, in a retrospect, investigate the development of LSPs adoption of green initiatives.

Another area to further investigate concerns the question how LSPs will satisfy their customers’ demands regarding green requirements. Based on the findings in this study, customers’ needs and requirements are seen as a prominent driver of green initiatives among the LSPs, but at the same time these evolving requirements are perceived to act as a barrier. This indicates the need of further exploring how LSPs align their green initiatives with customer requirements. It would be appealing to add the perspective of customer in order to develop a better understanding of the broader dynamics of the green logistics market. By doing so, it would create a clearer view of the factors affecting the adoption of collaborative green initiatives between LSPs and their customers.

Based on the results in this thesis, it seems that LSPs are undergoing a challenging business change, where the traditional view focused on cost and service optimization has started to develop into an additional factor, green aspects, that needs to be taken into account. Therefore, it would also be interesting to study how the impact and relationships between these three factors are perceived and evaluated among LSPs’ customers in the purchasing process of transport services. Previous research has put green considerations at the bottom of the priority list (e.g. Björklund, 2005), however there are signals that this may not be case in the future.

The research in this thesis regarding how green initiatives can be reflected in service offerings opens up for a variety of further interesting research questions and directions. For example, it would be interesting to study the service development process in general among LSPs to increase the knowledge of what kind of aspects that influence this process. As Hertz and Alfredsson (2003) point out, to add customer value it is necessary to develop skills and competencies that are superior compared to customers. This leads to questions such as; what kind of green skills and competencies are developed within LSPs, how do they work in order to visualize this in the service offerings to their customers, and how do the customers perceive this?

Conclusively, a central question that needs to be addressed is if adoption of green initiatives is seen as a way to create value? And in such case, what kind of needs the
customers of LSPs strive to fulfil by using “green” service offerings, and how this influence the perceived value of such type of service offerings? Besides the service offering, the approach of how the adoption of green initiatives affects the relationship and collaboration between the LSP and its customers is an interesting aspect to investigate further. Can adoption of green initiatives result in an even more close relationship between LSPs and their customers, and what kind of business opportunities may this led to in the future?
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APPENDIX 1

INTERVIEW GUIDE
QUESTIONS TO THE LOGISTICS SERVICE PROVIDERS

The Respondent
- What is your position at the company?

The company in general
- Range of service offerings (i.e. different kinds of transport modes, consulting, value-added services)
- The company’s turnover? (on the Swedish market)
- The number of employees in Sweden?
- What is the geographical range of your company’s operations?
- What proportion of the turnover is based on consumer market customers? (percentage)

The company with regard to green initiatives
- What kind of green related service offerings does your company offer?
- How many full-time jobs within your company are dedicated to the environmental work (in Sweden)?

Drivers – internal
- Please indicate and comment, into which extent the following internal drivers influence your company when addressing environmental issues (1 = not at all, 5 = very much)
  - Cost savings
    1  2  3  4  5
  - Potential source of revenue or cash flow
    1  2  3  4  5
  - Employees involvement
    1  2  3  4  5
  - The ability to be an interesting long-term innovation opportunity (long-termed strategy)
    1  2  3  4  5
  - It’s the top of the business agenda (short-termed strategy)
    1  2  3  4  5
- Other internal drivers that influence your company when addressing environmental issues?

Drivers – external
- Please indicate and comment, into which extent the following external drivers influence your company when addressing environmental issues (1 = not at all, 5 = very much)
  - Government legislation
    1  2  3  4  5
  - Customers
    1  2  3  4  5
  - Competitors
    1  2  3  4  5
• Other external drivers that influence your company when addressing environmental issues?

**Barriers – internal**
• Please indicate and comment, into which extent the following internal barriers influence your company when addressing environmental issues (1 = not at all, 5 = very much)
  - Financial and economic barriers
    1 2 3 4 5
  - Technical barriers
    1 2 3 4 5
  - Information barriers
    1 2 3 4 5
  - Managerial barriers
    1 2 3 4 5
  - Organizational barriers
    1 2 3 4 5
• Other internal barriers that influencing your company when addressing environmental issues?

**Barriers – external**
• Please indicate and comment, into which extent the following external barriers influence your company when addressing environmental issues (1 = not at all, 5 = very much)
  - Policy barriers
    1 2 3 4 5
  - Market barriers
    1 2 3 4 5
• Other external barriers that influencing your company when addressing environmental issues?

**Pricing green logistics service offerings**
• In what way does your company work with different price models (taking the environmental issues into account) towards your customers?
  - Pros and cons?
• Why does your company use a certain type of price model (or not)?
• By working in this way, what are the potentials in the future?
• In what way would your company like to work with green offerings in the future?
CASE COMPANY PRESENTATIONS

This case report introduces and presents the six different logistics service providers (LSPs) studied in this licentiate thesis. In order to encourage openness of response during the data gathering process, it was agreed that company names would remain anonymous, and the case companies were therefore labelled Alfa, Beta, Gamma, Delta, Epsilon and Zeta.

The information in this report has mainly been obtained from telephone interviews with one representative from each company. Each interview lasted for at least one hour, and in some cases, further contact with the company’s representative was obtained from company visits, by telephone and by email. Besides the interviews, secondary data such as information about the companies has been collected from a variety of information sources, including company reports and websites.

Below, a general overview of each participating company is provided. In addition, different drivers and barriers affecting the adoption of green initiatives within the company are described. The companies’ green service offerings as well as how green issues can be handled and integrated into the price picture are also discussed.

In order to make it easier for the reader, the following list of drivers and barriers in Table 1 have been studied within each of the participating LSPs. The respondents were asked to specify the impact of each of factor on a scale of 1 to 5 (where 5 had the greatest impact), later translated into a scale with a range of low (1-2), medium (3) and high (4-5).

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<thead>
<tr>
<th>Drivers</th>
<th>Barriers</th>
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<td>Internalism</td>
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ALFA

Alfa is one of the largest transportation intermediation companies in Sweden. The company had an approximate turnover of 61.6 millions EURO during 2009 and has about 111 employees of whom two work full-time with environmental sustainable initiatives. Alfa has about 140 subcontracted carriers, who also are part owners in the company. This results in a total of more than 500 people employed in the entire concern.

The activities within the company are divided into three business areas; Building & Construction, Long-distance & Distribution and Transport Tank & Environment. The geographical reach is mainly local and regional.
Service offerings and customers
The major task of Alfa is to offer transportation intermediations. This includes sales in three business areas (which are mentioned above);

- **Building & Construction**: this business area includes machinery and vehicles for all types of contract works such as ground works, shift and transport operations.
- **Long-distance & Distribution**: includes major vehicles, such as cars with trailers for the transportation of bulk cargo, paper, agricultural transport and cement.
- **Tank & Environment**: consist of two subareas Sludge & Flush and Waste & Recycling. Sludge & Flush includes tank cleaning, the inspection of oil tanks and the transport of hazardous liquid waste and residues from various process industries and other industries. Waste & Recycling is a fast growing area and includes the transport and storage of hazardous waste.

Over 90 % of Alfa’s services cover the full range of the transport market. However, the company does not offer refrigerated transports. Added services are offered to all transport service offerings as a complement, depending on the demand. For example, in the business area Long-distance & distribution, the company offers short- and long-term storage as an additional service. Their customers range from industries and municipalities to end-users.

Drivers for the adoption of green initiatives
Table 2 illustrates Alfa’s perception of the impact of each of the internal and external drivers mentioned above, followed by additional comments regarding each of these drivers.

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<td>Investor/owner</td>
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Internal drivers
*Cost savings*: customers today are not willing to pay for environmental aspects of the transport. There is no profitability in a short-term perspective, and instead customers choose alternatives with lower prices. Hence, there are customers that take environmental issues into account but do not want to pay extra for these. *Potential source of revenue*: better environmental sustainable work may lead to new customers and market shares, but monitoring the money flow connected to environmental aspects today is weak and difficult to handle. *Employee involvement*: this factor has increased over time. Employees have begun to realize the importance of environmental work and also that it could
provide some future benefits. Environmental issues have become a matter of public interest and therefore there is a reason to become involved in this work. The ability to be an interesting long-term innovation opportunity and the top of the business agenda; Alfa believes that it is not realistic within the transportation sector to view environmental aspects and develop strategies and goals only from a short-term perspective. Alfa has both short- and long-term goals when it comes to its adoption of green initiatives. The time periods for the short-termed goals are at least one year, and the goals are monitored annually and the results of the work are publicly reported.

Other internal drivers
Alfa mentioned a powerful and driven board, who are interested in environmental issues and can see their importance, as another prominent internal driver. This could provide good support for implementing changes linked to the adoption of green initiatives due to the fact that the changes have a greater impact and are more likely to be received with trust and confidence by employees. It is also easier to show employees that working for the environment is not only good for the company but is also advantageous from a global perspective.

External drivers
Government legislation; there are some environmental demands from local authorities, and if these demands are not followed, Alfa risks not getting these kinds of jobs. However, the specifications of the requirements are quite often rather vague and complicated. This in turn leads to problems in understanding what these requirements actually mean. Furthermore, Alfa does not feel that these environmental requirements are followed up in a proper manner. Customers; business customers have more reasonable green demand than country councils. These demands are more business oriented and logical. Alfa perceives that customers are interested in and aware of the importance of environmental questions, but are not willing to pay for it. Competition; it is not a major driver, although they do engage in some market research exist in order to benchmark how their competitors operate with green initiatives. This is perceived as a good source of inspiration. Society; the brand is important in order to win new customers. The company is perhaps not mentioned in the media as much as their competitors, but Alfa chooses to focus on their performance rather than on marketing. Suppliers; are perceived as not taking any green initiatives due to the fact that these initiatives are associated with costs, which suppliers are not willing to pay for. Investors/owners; pressure and questions from investors and owners have recently increased, even though Alfa wishes they could be even more active.

Other external drivers
Alfa highlights networking with other companies and organisations in order to get inputs and ideas which thereafter could be implemented in its own company as another.

Barriers for the adoption of green initiatives
Alfa’s perception of the impact of the barriers studied is illustrated in Table 3, followed by additional comments on each of the internal and external barriers studied.
Table 3 Studied barriers affecting Alfa's adoption of green initiatives.

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<td>Policy</td>
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<td>Market</td>
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</table>

**Internal barriers**

*Financial and economic:* Alfa states that all green solutions are much more expensive than others, and financial issues are thus considered as a major barrier. *Technical:* there are some existing solutions which take green considerations into account, but not all of these solutions have been implemented or tested enough. This in turn can lead to difficulties when it comes to justifying these kinds of investments within the company. *Information* is not seen as a major barrier since Alfa states that the company has well-developed IT-systems that are used both within the own company and with their customers. Instead, the problems are more related to selecting the right kind of information. *Managerial:* this is not perceived as a barrier. Alfa states that it has good support from the board. *Organizational:* this factor is not perceived as a barrier either, but Alfa stress that there must also be a certain acceptance regarding the fact that there will always be opposition to change and reluctance to accept them.

**External barriers**

*Policy* is perceived to be a major barrier since Alfa feels the pressure to invest in something even though Alfa is against it. Hence legal requirements must be followed even if the company has no resources for meeting these requirements. *Market* is a significant barrier. For example, the transport industry has been negatively labelled as the largest emitter of CO$_2$, which Alfa perceives as a barrier and stresses the difficulties of washing this label off. Furthermore, Alfa highlights that green investments could be less difficult to justify if customers were more willing to pay for green initiatives. Alfa says that today these kinds of investments are made purely out of good will or as a result of a company's own driving force but without any financial gains.

**Other barriers**

*Technical development* is perceived as a barrier, especially when it comes to development and the research within the automotive sector.

**Green service offering and its pricing**

Alfa does not offer any concrete green service offering but instead, this is more or less integrated into different kinds of service offerings. For example, when Alfa offers consultation in projects, the company is also able to offer follow-ups regarding environmental impacts. The company also offers eco-driving instructions to the drivers if customers demand it. For each transport service offering there is an alternative option that is more environmentally friendly. The more environmentally friendly option may consist of better engines, alternative fuels or specific adjustments to the vehicle. Alfa is also able to offer its customers CO$_2$ declarations on their transport services. Alfa states that the
number of times they initiative the introduction of green service offerings to customers compared with those times when customers first take the initiative are more or less equal.

Alfa has no pricing model that takes sustainability concerns into account. Service offerings, which include more environmentally friendly vehicles, are priced in a similar way as for a non-environmentally friendly vehicle. The price of CO₂ declarations is often decided in agreement with customers and in some cases is included in the regular price. Usually Alfa offers these kinds of services free of charge in order to increase the value of the service offering. However, if customers require a more regular reporting, for example every week, an additional cost for this service would be discussed. Alfa is not entirely against having a more value-based pricing model because the company wants to have some kind of return on the resources used. Hence, the company does not believe that in the near future customers will pay extra for a green service offering. Therefore, Alfa has decided not to charge for these service offerings but instead, these are added as an extra value to existing service offerings. The representative of Alfa states:

“The problem is that there are very few customers who value and put sustainability at such a high level to even figure out a special price for these kind of service offerings.”

BETA

Beta is one of the largest LSPs in the northern part of Sweden. The turnover in 2009 was approximately 124.8 millions euro and today there are 94 employees. Three of these employees work full-time with quality, environment and education, and act as a supporting function to the different business areas. This function deals with continuous improvements in the form of certificates, networking with authorities and participations of different conferences. This is done in order to get inspiration for the company’s own operations. Beta has about 260 subcontracted carriers, who also are part owners in the company, which lead to that the total number of employees is about 1000 people in the entire concern.

The company is divided into five business areas: Facility and Contract, Thermo, Industry, Wood and Chip and Special. Beta handles everything from gravel and industrial goods to sensitive consumer products and temperature-sensitive foods. The geographical area is mainly the northern part of Sweden.

Service offerings and customers

A description of the different business areas follows below;

- **Facility and Contract**: includes services related to the construction and maintenance of roads, as well as the transportation of materials to building sites. This business area targets customers in the contract-, industrial- and construction-areas.

- **Thermo**: consists of refrigerated transports of food from wholesalers to stores, schools, kindergartens and nursing homes.
Industry; offers the efficient handling of materials, goods and materials that secure the entire logistics flow. This business area also provides handling for inventory management.

Wood and Chips; the main target is the wood-processing industry and Beta transports wood and chips that are used later to bio fuel.

Special; includes all transport operations with very demanding needs such as extremely long, high, wide or heavy freights. Beta also works with other carriers in order to cover sea, air and rail transport.

The operations of Beta mainly concern full-load goods, and the company’s main target is businesses. Furthermore, Beta works in close cooperation with its customers in order to develop complete logistics solutions.

Drivers for the adoption of green initiatives
The impact of the drivers studied and the ways in which these affect Beta’s adoption of green initiatives are illustrated and describe below.

| Table 4 Studied drivers affecting Beta’s adoption of green initiatives. |
|-------------------|-----------------|
| Drivers           | Impact          |
| **Internal**      |                 |
| Cost savings      | High            |
| Potential source of revenue | Medium |
| Employee involvement | High         |
| Long-term innovation opportunity | High |
| The top of the business agenda | High |
| **External**      |                 |
| Government legislation | High |
| Customers         | High            |
| Competition       | Low             |
| Society           | High            |
| Suppliers         | Medium          |
| Investor/owner    | High            |

Internal drivers
Cost savings is perceived as a major challenge within the company. Beta works a lot to improve logistics activities and strives to reduce costs for its subcontracted carriers, since it is the carriers that make the greatest environmental effort by reducing their fuel consumptions. Potential source of revenue; the company has clearly increased its turnover in recent years. This may not have been a direct result of the adoption of green initiatives, but Beta is convinced that it has been a contributing factor. The company would probably not have been where it is today without its efforts to improve the work with green initiatives as well as its investments in training and education and attempts to enhance skills both within the organisation and also among its subcontracted carriers. Employee involvement; Beta invests heavily in this driver in order to involve employees and increase the knowledge level regarding green thinking within the organisation. The company characterizes itself in general as a more goal-oriented organization rather than top-down. The significant impact of this driver for green initiatives can be demonstrated by the following quotation by the Beta representative:
“We work a lot to increase personal environmental responsibility and willingness to contribute to the whole company. We think this is a winning concept.”

Beta wants not only to establish a working climate where each business unit should feel responsibility and independence in order to solve various problems that occur regarding green initiatives but also transfer this approach to the company’s subcontracted carriers. The top of the business agenda; this driver is seen as important since it is related to business with the customers. Beta stresses that the company possesses a lot of knowledge that can be used to help customers to solve various problems, as well as to inform them what it is possible or not possible to do regarding green initiatives. By providing its customers with this information, unreasonable demands can be decreased, even if green requirements from customers have become more realistic nowadays.

**Other internal drivers**
Beta mentions another driver, namely education. The company continuously offers employees education in sustainability in order to increase the enthusiasm among its employees.

**External drivers**
Government legislation; this driver is always existed and must of course be followed. However, Beta feels that they had already done a lot in this field even before it became a legal requirement. Customers are seen as very important drivers. The specifications of green requirements from customers have become more realistic and Beta works a lot in partnerships with its customers and discusses what is most appropriate from a sustainable perspective. Regarding the specifications of green requirements, Beta can distinguish certain differences in customers from different sectors. For example, customers from food industries have more detailed green requirements than customers from the industry sector. A possible explanation to this could be that the former are closer to the end consumers. Competition; Beta is aware of and follows its competitors’ green development but this does not have a great impact on the company. Instead Beta concentrates on its own internal drivers. Society; Beta is very concerned about how the public views its business and has for example a website where it is possible to leave comments on how Beta conducts its activities. Suppliers, which in this case can be related to Beta’s subcontracted carriers are not perceived as a main driver instead all initiatives comes from Beta. This can be explained by the fact that Beat is the one who handles the contracts and possesses all knowledge required from customers. Hence, Beta tries to increase the skills of the carriers by offering various training programmes, which for example focus on customers and eco driving. This has been a successful concept. Beta has noticed a more positive attitude towards these programmes and has also noticed a reduction in fuel
consumption over the years, which can be explained by the training in eco driving.  

Investor/owner; the company has a committed board that focuses on sustainability issues. In addition, a new business plan is being developed which will include sustainability goals.

**Barriers for the adoption of green initiatives**

Table 5 shows the impact of the barriers studied, and how these influence Beta’s adoption of green initiatives is described below.

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<td>Policy</td>
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<td>Market</td>
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**Internal barriers**

*Financial;* the company is constrained by the limited supply of environmental friendly vehicles on the market. Beta has a special agreement with the local authority who supports the company with the financial part. Without this support, such green investments could not been made. Beta must in someway get a return on this because it is so much more expensive to invest in these kinds of vehicles. Another barrier is the lack of fuel for such vehicles. *Technical issues;* are perceived as a big barrier. It is difficult to find alternative technical solutions to improve the sustainability part of the business. *Information;* Beta stresses that communication with its employees and customers has improved. Furthermore, the company has also created an IT-system, which has gradually been improved. *Managerial issues;* are not perceived as a barrier. Instead, the top management agreed on and supported the fact that Beta started to adopt green initiatives. *Organizational barriers* can have a significant impact if the entire organisation with all its subcontracted carriers is taken into account. Beta highlights the importance of everyone in the company understanding the purpose and benefits of adopting green initiatives.

**External barriers**

*Policy;* Beta argues that politicians have supported the wrong things and these have not shown any results. One example is the initiative with ethanol, and when it comes to heavy vehicles there are no alternatives to fuel these. *Market;* many customers have an environmental and quality department that generate green requirements which are later handed over to the purchasing department. Beta stresses that separate departments, which do not communicate leads to misunderstandings and the risk that some green aspects are never discussed. Furthermore, this also leads to unreasonable requirements difficult to achieve. This is a problem that affects many companies. Instead, Beta tries to integrate green awareness and thinking into every business unit but it takes time. The goal is that the business units by themselves could manage certain green requirements from customers.
Green service offering and its pricing

Beta does not offer any concrete green service offerings, but instead tries to work sustainable into its businesses and develop partnerships with their customers. The company works with the innovation and development of its transports and tries to integrate those ecological aspects which exist naturally in sustainable and green thinking. However, Beta also tries to integrate economic and social aspects as well. Employees must have a willingness to contribute, but Beta also wants its customers to contribute to the company. Major decisions are made in consultation with customers in which both parties agree on the green requirements to be applied, for example how to measure environmental impact in order to give customers the information they need. The customers which Beta does not have partnerships with, are also perceived to have green requirements, but in the end, it all comes down to the price factor. However, the situation is a little bit different with customers with whom Beta has developed a partnership. Together with these customers Beta has focus on finding a long-term environmental solution that is suitable for both parties. The solutions identified should fit both the value-systems of Beta and of its customer.

Beta does not have any special pricing model that takes green considerations into account, instead these are viewed as an added value to offer its customers to increase the value chain and improve cooperation with its customers. This is a win-win relationship and the company hopes this will lead to potential new customers.

Beta measures CO₂ emissions from its vehicles every year and is able to check the fuel consumptions of each vehicle in its system. Recently, it has become quite common that customers want a figure for the CO₂ emissions consumed during a transport mission. However, the company has some problems with the system which supports these emissions calculations. In the future, customers may be able to get the emissions data from the system themselves, and Beta hopes that this will be possible in a few years.

Customers without any long contracts have to pay extra for CO₂ reporting for example, since it takes some time to compile these reports. In the case of larger customers, this service offering is already included in the price and is not classified as an additional cost as long as the customer does not change their requirements during the project. However, in the future it is possible that Beta will have to charge for these service offerings. The most likely scenario however is that these service offerings will be included in the price for customers with longer contracts and customers without any fixed contracts will probably have to pay extra for these service offerings. The way in which Beta looks at the adoption of green initiatives within its own company can be summarised by the following remark by the Beta representative:
We want to have close cooperation with our customers, to be engaged, creative and solution-oriented and try new approaches and methodologies. We want to educate our employees so they can support our customers and everyone in the organisation should know where we are standing when it comes to sustainability issues.

GAMMA
Gamma is a Nordic company that offers door-to-door express deliveries. The company is a franchise-based ground transportation organisation with access to 700 vehicles and to an extensive air route network. The turnover was approximately 28.8 millions EURO 2009. Gamma employs 85 people and approximately a half of one full-time job is connected to sustainability work.

Service offerings and customers
Gamma offers door-to-door express deliveries, throughout the Nordic region. The company provides systemised and customer-specific door-to-door express delivery solutions for time critical and high value products within high tech, automotive spare parts and medical equipment. Packages are transported either by road or air depending on the destination, size and urgency. The main group of customers consists of businesses and express deliveries to private customers occurs only rarely.

Drivers for the adoption of green initiatives
This section describes how the drivers studied affect Gamma’s adoption of green initiatives and the impacts of these studied drivers are illustrated in Table 6, below.

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<td>Investor/owner</td>
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Internal driving forces
Cost savings are not seen as a major driver for Gamma. Potential source of revenue; Gamma aims to adopt green initiatives in order to increase the factor “value for money” for customers. This is done in order to increase sales as well as attract new customers. Gamma views the adoption of green initiatives as a revenue opportunity. Employee involvement; the employees within the company are involved to some extent but are not
regarded a major driver. Long-term innovation opportunity; Gamma wants to be considered as a company on the cutting edge and works a lot to in order to achieve this. The top of the business agenda; this driver is not considered as significant at the moment.

**Other internal driving forces**

Gamma wants to be *product unique* in order to avoid price pressures and has therefore started to monitor and follow up its work with green initiatives.

**External driving forces**

*Government legislation*; there are already some government requirements regarding green initiatives, but Gamma wants to be prepared if green requirements and targets increase in the future. *Customers* are considered to be a significant driver and Gamma has conducted a survey in which the interest of CO₂ reporting among its customers was investigated. It turned out that interest is especially high among public authorities and companies which have an aggressive sustainability profile. *Competition*; there are some competitors who have started to adopt green initiatives, but according to Gamma, the overall picture is a bit disjointed. It is not an easy task and Gamma is also somewhat uncertain how to proceed further. *Suppliers*; are not considered a driver since there is no pressure at all from the company’s suppliers/partners. *Investor/owners*; Gamma has recently started to feel increased pressure from its owners, who have begun to shown interest and awareness of green initiatives.

**Other external driving forces**

Gamma also mentions that *political requirements* are an additional driver, since the company finds it interesting to follow what happens and if such requirements will increase in the future.

**Barriers for the adoption of green initiatives**

The impact of each of the studied barriers is shown in Table 7, followed by a description of how way these barriers affect Gamma’s adoption of green initiatives.

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<td>Market</td>
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**Internal barriers**

*Financial*; Gamma has not heavily invested in green initiatives so far, but the situation may change if decisions are taken to replace its vehicles fleet with more environmental friendly alternatives. This would probably be a progressive process. *Technical*; the company has met some technical problems especially when it comes to the monitoring of CO₂ emissions from its transports. *Information*; this is a significant barrier and Gamma has worked a lot with this. A lot of effort has been put into explaining the figures from the monitoring and estimations of CO₂ emissions, since people have no understanding of whether these are
low or high. Overall, it is difficult to really understand the impact of sustainability impact. Gamma states that it is a very subjective process, even if the company tries to be as objective as possible. However, the company sees a tendency among its partners that they have successively started to accept green initiatives. The partners have identified advantages with green initiatives such as attracting new customers and being less vulnerable to price competition with their competitors. However, Gamma states that the level of knowledge regarding green initiatives is not much higher among customers. The representative of Gamma stresses that the resistance to change regarding green initiatives can be linked to the following argument:

“The transport industry is masculine and traditional”

Managerial; it has not been an easy task to explain to the top management why adopting of green initiatives is needed and why it matters. The interest and desire to adopt green initiatives have been pushed from a bottom-up direction. However, this subject received more attention after Gamma presented its strategy to become “product unique” and showed the results from the survey it had conducted. Without the strategy and the customer survey, it would probably have been difficult to persuade the top management. Organisational; since Gamma recently started to adopt green initiatives, employees have not been affected to any great extent. This may change in the future, especially when it come to the green initiative of eco-driving. However, Gamma stresses that as long as there are incentives to save money, and when the benefits of the change become clear, there will not be any problem.

External barriers
Policy is not seen as barrier and when it come to the market barriers Gamma mentions that there just a few customers that have showed interest and expressed some green requirements.

Other barriers
The economic situation could be viewed as a barrier. Gamma claims that if a company has difficulties with its economic situation, it will probably not prioritize the adoption of green initiatives. The representative of Gamma states the following:

“We must be trustworthy, we cannot offer services if we cannot fulfil them. It is better to be a little bit more cautious in our statements and then actually keep them.”

Green service offering and its pricing
Gamma has no specific green service offering today. Customers turn to Gamma in order to get express deliveries and Gamma tries to do this in the wisest and most environmentally way possible. However, the company offers its customers CO₂ declarations but this service offering is not categorised as a green service offering but is part of its overall service offering. The background to the adoption of the CO₂
declaration is a customer survey. The result of the survey showed that the factor “value for money” was ranked lowest. Since Gamma is the price leader on the market and customers experience the company as an expensive alternative, it started to include added services into their overall service offerings in order to raise the factor “value for money”. Furthermore, Gamma stresses that the company has no intention to develop a green service offering or product, and the Gamma representative points out:

“I find it hard to believe that we will have a green profile”

Since Gamma wants to raise the factor “value for money”, they will not charge for the offered CO2 declarations which instead will be a part of the overall service offerings. Hence, Gamma states that the investment costs connected to the CO2 declarations have not been especially high since the company already possess a lot of transportation information in its existing IT-systems, and that these have been used in order to compile the CO2 declarations. Furthermore, the company states that it has improved the use of its IT-systems.

Even if sustainability is an important factor, the company still has to fulfil its requirements for the factors speed and reliability. One problem that may occur when it comes to not charging for CO2 reports is the fact that they may be then perceived to lack value. Due to the fact that Gamma has chosen the initial strategy of not charging CO2 declarations, it probably would give an ambiguous picture if the company in the future starts to charge for these reports. Gamma does not think that its competitors possess a similar information base and since Gamma is the price leader on the market, certain services should be included in the service offerings if customers chose to buy from them. However, Gamma cannot prevent its partners from charging for the CO2 declarations and the company has not actively informed its partners not to charge for this service offering. Gamma believes that the chosen strategy of not charging for green initiatives can be a way not only to attract new customers but also to raise the factor “value for money” for existing customers.

DELTA
Delta is part of a company active in the postal and logistics industry, and has the Nordic market as its geographical area. The company consists of nine business areas, of which Delta is one. Delta specialises in express and delivery transport and the turnover in 2009 was approximately 50.7 million EURO. The total number of employees is about 158 and approximately one of these employees work full-time with green initiatives. Delta consists of four different sub-areas Delivery, Distribution, Express (QuickPack) and Home Delivery.

Service offerings and customers
The range of service offerings offered by the four sub-areas (mentioned above) presents below;

- *Delivery*: offer flexible, fast and efficient deliveries to all local transportation needs.
Distribution; offer distribution services for planned and routine deliveries and routes.

Express (QuickPack); fast deliveries within Sweden or all over the world. Can offer different kinds of transportation modes such as air, road or track.

Home delivery; specialist in efficient home deliveries to consumers in all the Nordic countries.

Delta works mostly business to business, even though in some cases the company delivers direct to private consumers, especially in the sub-area Home deliveries.

Drivers for the adoption of green initiatives
Delta’s perception of the impact of each driver studied is shown in Table 8, followed by a description of how these drivers affect the adoption of green initiatives.

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Cost savings</td>
<td>Medium</td>
</tr>
<tr>
<td>Potential source of revenue</td>
<td>High</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>High</td>
</tr>
<tr>
<td>Long-term innovation opportunity</td>
<td>High</td>
</tr>
<tr>
<td>The top of the business agenda</td>
<td>High</td>
</tr>
<tr>
<td>Government legislation</td>
<td>Medium</td>
</tr>
<tr>
<td>Customers</td>
<td>High</td>
</tr>
<tr>
<td>Competition</td>
<td>High</td>
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<tr>
<td>Society</td>
<td>High</td>
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<tr>
<td>Suppliers</td>
<td>Low</td>
</tr>
<tr>
<td>Investor/owner</td>
<td>High</td>
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</tbody>
</table>

Internal driving forces
Cost savings; overall it is desirable to achieve cost reductions by choosing to adopt green initiatives. However, Delta does not adopt green initiatives just to save money but instead cost reductions are viewed as a positive side effect. Potential source of revenue; one of the reasons why Delta has started to adopt green initiatives is because the company wants to enhance their brand. Furthermore, Delta has the ambition to be viewed as a long-term sustainable company. The company wants the green approach to be a part of their profile. This will hopefully in turn lead to new market shares/customers. Delta believes that it would have lost customers if it had not started to invest and adopt green initiatives. Employee involvement; employees are partly viewed as a driver, but pressures mostly come from higher levels, since it is important for Delta to be viewed as an attractive workplace. Long-term innovation opportunity; from a long-term perspective the adoption of green initiatives is really important for Delta, because the company wants to be viewed as a sustainable company in the future. The top of the business agenda; Delta perceives itself better at investing and adopting green initiatives from a short-term rather than a long-term perspective. The company considers itself to be flexible and agile when it comes to meeting different kinds of problems from customers, as long as the results are profitable. This driver is therefore important due to the fact that it is linked to the business with customers.
Other internal drivers
Delta wants to be viewed as an attractive workplace and aims to create a good working climate. The company finds it important to show its employees that green initiatives are an important issue. Delta has quite a lot of young employees, who also find this important, and the company offers all of its employees’ environmental education in the form of an environmental “driving license”. Furthermore, the company’s drivers also receive training in eco-driving.

External drivers
Customers; Delta believes that the customers are its best driver and really appreciates demanding customers. But there are also customers that do not make any green requirements still Delta feels that customers today are more demanding regarding green initiatives than previously. The customers are perceived as important drivers and the representative of Delta states:

“We must work together with our customers in order to get the best effect.”

Competition; Delta believes they have come further than their competitors with regard to the adoption of green initiatives and the company wants to maintain that lead. Therefore, Delta tries to benchmark its competitors’ situation and how they are adopting green initiatives. Society; is seen as an important driver. Delta does not want to have bad publicity from social media because the company does not want to risk destroying its brand. Suppliers; suppliers are not perceived as a great driver even if it sometimes happens that suppliers make demands. Instead, Delta has the more active role when it comes to pushing its suppliers even they work together. Investor/owner; the owners put pressure on Delta and have set a target to reduce 30% CO₂ by 2015.

Other external drivers
Delta finds it important to work with green initiatives also from an ethic perspective. The company does not want to underestimate the importance of environmental concerns and instead strives to ensure that the impression they give is positive.

Barriers for the adoption of green initiatives
The impact of each of the barriers studied is shown in Table 9, followed by a description of the way in which these barriers affect Delta’s adoption of green initiatives.

<table>
<thead>
<tr>
<th>Barriers</th>
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<tbody>
<tr>
<td>Internal</td>
<td></td>
</tr>
<tr>
<td>Financial and economic</td>
<td>Medium</td>
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<tr>
<td>Technical</td>
<td>High</td>
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<tr>
<td>Information</td>
<td>High</td>
</tr>
<tr>
<td>Managerial</td>
<td>Low</td>
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<tr>
<td>Organizational</td>
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<tr>
<td>External</td>
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<tr>
<td>Policy</td>
<td>High</td>
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<tr>
<td>Market</td>
<td>Low</td>
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</tbody>
</table>
Internal barriers

Financial; Delta does not find it difficult to justify investments connected to the adoption of green initiatives but points out that when it comes to green investments it is more a question of finding smart solutions. Technical; the biggest problem when it comes to buying more environmental friendly vehicles, is the limited number of these on the market. They are hard to get and another problem is the limited gas stations where these vehicles can be refuelled. Delta also tries to measure carbon emissions, but does not find it an easy task. Information; the company has some problems with IT-support and its information systems, for example when it comes to CO₂ reporting. Delta has customers that demand CO₂ reporting. Managerial; this factor is not seen as a barrier as the company receives good support from the board of directors. Organizational; some employees cannot see the advantages of adopting green initiatives, although Delta does not see the organizational factor to be a barrier.

Other barriers

The company states that there are some problems with the legislation due to the fact that they cannot always buy the cars/vehicles it wants to because of the difficulties with refuelling.

External barriers

Policy; some laws and policies require a lot of paper work which takes a lot of time and leads to extra difficulties. Market; Delta states that it has suggested service offerings that had a positive effect on the environment but that customers have not been mature for these kinds of service offerings. Despite this, Delta does not see the market as a main barrier.

Green service offering and its pricing

Delta does not make a concrete green service offering. This is something that has been discussed, but Delta does not believe it can offer a green core product. Instead of marketing a concrete green service offering, the company has focused and worked with the brand in order to make it greener and more valuable for customers. On its homepage Delta wants to communicate that the company is a green brand/alternative and also suggests what kinds of positive green initiatives can be made within Delta. Examples can be more environmentally friendly transport alternatives, effective coordination of transports, bicycle messengers, more environmentally friendly transportation modes, education (e.g. eco driving and internal environmental training) and traffic safety.

When it comes to adoption of green initiatives, Delta believes that the first thing the company has to do is to start communicate the company's environmental policy and after that, gradually do more. Delta stresses that the company wants to be more confident before it starts to promote green service offerings. The company does not want to launch a green service offering and then not do anything about it. Delta wants to start to build up trust, both within the company and with their customers in order to be trustworthy.

Delta does not want to take charge of the green issues on its own but instead includes this in the agreement with the customers. However, the company has discussed this issue. Although Delta has received payment, for example from the county council that has
requirements for biogas cars. But generally, Delta stresses that the margins are not big enough to take extra charge for the environment that instead must find smarter solutions. Delta does not belong to the group of companies that thinks that customers make a lot of demands but are not willing to pay for them. Delta believes that it is better to find and keep new customers than charging more. The company wants to work more closely with customers in different kinds of project in order to find alternative solutions together, which will hopefully lead to a stronger cooperation and a better and a more trustful relationship. Delta does not believe that companies have to invent a lot of green service offerings and charge extra for them. Instead it is better to increase sales. The company is aware of the fact that there can be situations when Delta has to charge for green initiatives e.g. investments of environmental friendly vehicles, but the idea of charging more for green services is something Delta neither supports nor believes in.

**EPSILON**

Epsilon is part of one of the world’s leading logistics group. The company had a turnover of 530 million EURO in 2009 and has today approximately 4500 employees. Overall, approximately four employees work full-time concerning environmental sustainability in Sweden. The company is divided into four business units, which are presented below.

**Service offerings and customers**

*Express*; offers courier and express services to both businesses and end consumers.

*Supply Chain*; offers services such as customised solutions, inventory management, order fulfilment and transport.

*Global Forwarding*; focuses on air and ocean freight. It also offers customised solutions for industrial projects, customer management programs (CPM) and customs house brokerage.

*Freight*; offers flexible and customised services such as part loads and full loads by road, rail or intermodal transportation. It also offers trade fair services.

**Drivers for the adoption of green initiatives**

The impact of each of the drivers studied is illustrated in Table 10, followed by a description of how these affect Epsilon’s adoption of green initiatives.

<table>
<thead>
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<th>Drivers</th>
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<tbody>
<tr>
<td><strong>Internal</strong></td>
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<tr>
<td>Cost savings</td>
<td>High</td>
</tr>
<tr>
<td>Potential source of revenue</td>
<td>Medium</td>
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<tr>
<td>Employee involvement</td>
<td>High</td>
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<tr>
<td>Long-term innovation opportunity</td>
<td>High</td>
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<tr>
<td>The top of the business agenda</td>
<td>High</td>
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<tr>
<td><strong>External</strong></td>
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<tr>
<td>Government legislation</td>
<td>Low</td>
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<td>Customers</td>
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<td>Competition</td>
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<td>Society</td>
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<td>Suppliers</td>
<td>Low</td>
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<tr>
<td>Investor/owner</td>
<td>High</td>
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</tbody>
</table>
Internal drivers

Cost savings; this varies between the different business units within Epsilon but the cost factor is a big driver. Potential source of revenue; this is at the moment not a major driver. Employee involvement; Epsilon measures this factor. A questionnaire is sent out every year to all employees and the questionnaire is reprimanded if the company average is too low. The average of Sweden is generally low. Epsilon tries to talk about sustainability issues more with employees and to communicate better. A long-term innovation opportunity; this is important for the business unit which the Epsilon representative is responsible over but the other business areas within Epsilon show a somewhat lower interest in this driver. Every business areas within Epsilon is not particular driving which can be explained by different business cultures. The top of the business agenda; this driver is also important for the business area for which the representative is responsible but interest among the other business areas is not very high. The Epsilon representative states that its business area tries to see how everything is affected from a broad perspective and feels a great pressure from customers.

Other internal drivers

The transport industry is a big part of the carbon dioxide problem; therefore Epsilon feels that it has to take responsibility for this. This is a hot topic; emissions have increased and are therefore seen as an internal driver within the company.

External driver

Government legislation; is not seen as a major driver because there are not very many legal requirements for the transport industry. Epsilon states that if it was a requirement to make annual reports and audit reports the situation might be different. Customer; is a major driver. Epsilon wants to be ready and available when and if customers start demanding green initiatives. Competition; the company has a vision to be an “Industry shaper” and this vision includes also sustainability issues. Market shares are seen as very important. Society; this is not a major driver and Epsilon does not receive much media attention. Suppliers; the suppliers do not take any green initiatives but they are very keen to meet Epsilon’s requirements. Epsilon sees opportunities for cooperation with its suppliers, but this cooperation has not really started yet. Investor/owner; this driver has increased. It has been stated from the board that sustainability is an important matter and also that it is important to reach the set targets and goals.

Other external drivers

New market shares are an important driver for Epsilon. The company wants to win new customers by providing green initiatives. Research is another significant driver; Epsilon follows what is happening in research, at least in Sweden.

Barriers for the adoption of green initiatives

The impact of each of the barriers studied is shown in Table 11, followed by a description of how these barriers affect Epsilon’s adoption of green initiatives.
Table II Studied barriers affecting Epsilon’s adoption of green initiatives.

<table>
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<tr>
<th>Barriers</th>
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<tr>
<td><strong>Internal</strong></td>
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<tr>
<td>Financial and economic</td>
<td>High</td>
</tr>
<tr>
<td>Technical</td>
<td>High</td>
</tr>
<tr>
<td>Information</td>
<td>High</td>
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<tr>
<td>Managerial</td>
<td>Low</td>
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<tr>
<td>Organizational</td>
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<td><strong>External</strong></td>
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<td>Policy</td>
<td>Low</td>
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<tr>
<td>Market</td>
<td>High</td>
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</table>

**Internal barriers**

*Financial and economic:* is a big issue. For example, if a business area does not show profit, the existence of green service offerings and why these service offerings do not show more profit can be queried. This in turn can lead to difficulties in justifying investment in any further adoption of green initiatives. Another contributing factor is that the transport business is a low margin industry. *Technical:* the technical development is not as fast as Epsilon would like. *Information:* Epsilon has IT-systems but the existing systems are not flexible enough, at least from the perspective of sustainability. However, Epsilon is currently working and investing in these systems in order to overcome this information barrier. *Managerial:* is not seen as a barrier, Epsilon has good support from the top management. *Organizational:* Epsilon has high goals regarding the company’s green future but this process are restricted by the time factor. Everyone knows that adoption of green initiatives is needed and is important but the interest among employees regarding these initiatives varies.

**External barrier**

*Policy:* is not seen as a barrier since Epsilon perceives there is a lack of political requirements regarding green initiatives. *Market:* this factor is seen as a barrier particularly when it comes to customers’ lack of interest. The representative of Epsilon states the following:

> “Customers just want to listen and hear that we are working with green initiatives but do not want to be a part of it. We need customers that are willing to do something as well.”

**Other barriers**

*Global function:* that work with sustainability issues are considered to be as a barrier because there are different methods and approaches. This is a problem within large companies. Other problems are how information is handled and cultural differences. Different countries have different values and approaches while Sweden tries to look at sustainability on a global level.

**Green service offering and its pricing**

Not all business areas within Epsilon provide CO₂ declarations, for example, one of the business areas does not offer these declarations due to lack of customers interest. Epsilon mentions other service offerings which may reduce the carbon dioxide even if this is not
the main purpose of the service offering. Furthermore, the company also offers carbon-offset service offerings. Epsilon tries to communicate these service offerings in different ways to its customers but has noticed a problem. The sales people feel more comfortable about offering and selling CO₂ declarations than the other green service offerings.

When it comes to CO₂ declarations, Epsilon has a first draft of a pricing model. Customers get the annual report free but if they want more regular follow-ups, they have to pay extra. The interest in this service offering is low, but Epsilon hopes that this will increase in the future. The pricing model for CO₂ declarations is just a test and this service offering may eventually be free. But if this service becomes more comprehensive, Epsilon wants to charge extra for it. In the case of the carbon-offset offering, the pricing of this service offering differs among the different business areas. Overall, pricing models for regular services are complicated and hard to understand, not only for customers but also for Epsilon. Many different costs are added to the price and the pricing is often done in different ways. However, Epsilon has a special tool where customers can fill in their own data, such as destination and additional costs. It is possible to choose between different transport options and it is easy to understand. In the future, Epsilon wants to integrate sustainability aspects of the offering into the tool as well. Not only will customers then become more aware of the sustainability impacts of their transports, but it could make it easier for Epsilon to communicate its sustainability work with its customers, something which is lacking today.

In the future, Epsilon thinks it is important to have transparency to show what its customers actually pay for. Epsilon tries to observe its competitors and how they work with the pricing of sustainability aspects, but the company does not really have a good benchmark process for this. The company does not want to take a too low or high price when for example it comes to consulting services. Epsilon wants to make money from sustainability but not too much. But it is difficult to know how others competitors price their services. Epsilon considers itself to be well advanced in its green service offerings but is poor at communicating these services. The company hopes to overcome this problem with a new tool on the website. Epsilon wants to start to show its customers what the company has to offer.

Epsilon faces another barrier when it comes to customers, who prefer to go to a consulting firm that has sustainability expertise instead of using Epsilon, when they implement green initiatives. Customers are probably a little bit sceptical about the fact that Epsilon has started to offer additional service offerings, for example consulting services. Epsilon finds rather hard to market these kinds of services and to find a good pricing model. Epsilon has a lot of knowledge and information about its network and is able to make transport optimisations, but customers may question why these additional services have not been done before.

ZETA
Zeta is part of one of the world’s biggest logistics company. The company provides land transport within Europe, global ocean- and airfreight and customised logistics solutions. Zeta Sweden (hereafter labelled Zeta) had a turnover of approximately 1248 million euro in 2009. The company employs approximately 4000 people and 6000 other people are
included together with cooperative road carriers. Only one person works full-time with sustainability issues at Zeta but there are approximately 5-6 full-time jobs in this area if all the work done by different individuals is actually put together.

**Service offerings and customers**

Zeta offers everything from rail transport to packet transport. Rail transport includes in turn wagonload and combined transport. The company offers also all types of truckloads of palletized goods, and in some cases, long goods. Furthermore, Zeta offers logistics services such as warehousing and the handling of goods. Zeta does not offer courier services or mail freight. Zeta offers also consulting services such as transportation optimization, simulation and development of logistics (linked to the environment). This area is linked to green initiatives in terms of emissions calculations and project management in order to help customers develop and improve their environmental offerings. The split between inputs for industry and consumer products is about 50% each.

**Drivers for the adoption of green initiatives**

The impact of the drivers studied is illustrated in Table 12, followed by a description of how these affect Zeta’s adoption of green initiatives.

<table>
<thead>
<tr>
<th>Drivers</th>
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<tbody>
<tr>
<td>Cost savings</td>
<td>High</td>
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<tr>
<td>Potential source of revenue</td>
<td>High</td>
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<tr>
<td>Employee involvement</td>
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<tr>
<td>Long-term innovation opportunity</td>
<td>High</td>
<td></td>
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<tr>
<td>The top of the business agenda</td>
<td>Medium</td>
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<th>Drivers</th>
<th>External</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Government legislation</td>
<td>High</td>
<td></td>
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<tr>
<td>Customers</td>
<td>High</td>
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<tr>
<td>Competition</td>
<td>Medium</td>
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<td>Society</td>
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<tr>
<td>Suppliers</td>
<td>Low</td>
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<tr>
<td>Investor/owner</td>
<td>Medium</td>
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</tbody>
</table>

**Internal driving forces**

*Cost savings:* as a forwarder Zeta might not be able to make large cost savings but instead the focus should be on working to ensure its customers reduce their costs. Otherwise, the company risks losing market shares to its competitors. It is important to be prepared for this in the future. *Potential source of revenue:* Zeta’s incentive to adopt green initiatives is to win new customers. Furthermore, it can also be a way to retain existing customers. However, the company sees business potential here and hopes that green initiatives will become more important and that customers will be willing to pay for them. *Employee involvement:* this driver is very important. The employees of the company are involved in the adoption of green initiatives. Zeta works to profile the entire company as a green logistics service provider instead of just offering green service offerings. *Long-term innovation opportunity:* the company views green initiatives from a long-term perspective because it is stated from the top that green initiatives should not be viewed from a short-term perspective. *The top of the business agenda:* there is not much focus on this driver at the moment because the company has some concerns about which direction it should take regarding green initiatives.
Other internal drivers
When it comes to adopting green initiatives, Zeta stresses the need for a responsible green unit as well as for support, engagement and feedback from the highest levels within the company.

External drivers
Government legislation; has definitely a major impact, but Zeta does not perceive that there is so much legislation regarding green initiatives. Customers; this is difficult, because customers have different requirements which is not always possible to fulfil. Big customers have always some kinds of sustainability requirements such as ISO certifications or special kinds of transport modes, while requirements from small customers are not very clear. Competition; Zeta does not sense any competition from its competitors and considers itself to know what its competitors are doing in this field. Zeta does not think that any customers choose Zeta or one of its competitors just because of the adoption of green initiatives. This may change in the future and to adopt green initiatives may even become a competitive advantage. Society; Zeta aims of course to be a good company both for its employees and the community. The company perceives that it is doing enough but that it can be better. Suppliers are not really seen as a driver at all. Perhaps they should become more involved because if Zeta improves its adoption of green initiatives, this would probably generate more income for its suppliers. Investors/owners; there are some requirements from the owners, but they are not seen as a major driver.

Barriers for the adoption of green initiatives
The impact of the barriers studied is illustrated in Table 13, followed by a description of how these affect Zeta’s adoption of green initiatives.

| Table 13 Studied barriers affecting Zeta’s adoption of green initiatives. |
|---------------------------------------------------------------|-----------------|
| **Barriers** | **Impact** |
| Internal |  |
| Financial and economic | High |
| Technical | Low |
| Information | High |
| Managerial | Low |
| Organizational | High |
| External |  |
| Policy | High |
| Market | High |

Internal barriers
Financial; this factor is perhaps not the biggest barrier but still has a strong impact. Technical; is not one of the major barriers. Information is normally not a problem, but while Zeta has a large customer base and no standardised green service offering, information can be a problem. In addition, the company does not perceive that its IT-system is supportive enough, especially with regard to estimating emissions. Managerial issues; are not seen as a barrier. Organisation; Zeta has some problems when it comes to different functions within the company. The views on how to adopt and work with green initiatives vary within the company because each function has its own aims and ways of working with these.
External barriers

**Policy;** Zeta does not really agree with the different green requirements which means that their acceptance is not fully supported within the company. **Market;** this is a major barrier since customers have so many different requirements. There are as many requirements as there are customers. There is some customer consensus about the requirements but the different nuances among these requirements cause problem. Zeta stresses that trade associations can do more to reduce these market barriers.

Green service offering and its pricing

Zeta does not have any developed green service offering but instead the company profiles its network as a freight collective network. The company offers customised green solutions to customers who demand this. Zeta tries to target customers interested in these kinds of offerings, for example the automotive industry. Other customers, who are interested in green service offerings, are those who work with consumer products and also food industry, which is interested in environmental and emissions calculations and the use of more environmental friendly vehicles. The company perceives that it answers customers’ requirements quite well and promotes thoughts and ideas for improvements proposal certain selected customers. Zeta has a steady steam of environmentally sustainable projects, which indicates that this is a significant part of the development of logistics.

Zeta does not work with different price models for green initiatives Instead, the environmental aspect is added as an extra cost. For example, if Zeta invests in green equipment, this cost is included in the transport calculation. The representative of Zeta states:

“**How do you charge for a more environmentally sustainable transport solutions? We would like to work more with value-based pricing to our customers but the problem is what is it worth to customers?”**

As mentioned above, if Zeta has additional costs because the solution has a more environmentally sustainable orientation, these costs are integrated into the service calculation. These additional costs are not usually value-priced but are instead more cost-priced. This method is used because the company finds it difficult to estimate the perceived value for its customers. One reason for this problem is that there is no real market pricing regarding these kinds of service offerings. Zeta perceives that its customers are not willing to pay more for green initiatives although there are customers who want to pay for more environment friendly vehicles. Zeta has discussed the advantages and disadvantages of a more value-based pricing system for green initiatives, and the company has also conducted market research among its customers on this issue. The market research showed that customers will be willing to pay more for the environment in the future but not today. One reason for this could be that are no requirements for this today and also the fact that customers do not want to pay for something that nobody else does. Instead, the customers only experience a loss of competitiveness. The customers require information about their transports and think that
CO₂ declaration should be included in the service offering. Zeta feels that it cannot charge for this and instead, CO₂ declarations are seen as added value to its service offerings. Furthermore, Zeta has observed that its customers are not interested in green initiatives but that their customers in turn are interested and are willing to pay for these. Zeta stresses that there are a lot of green opportunities but that there is no money for implementation, especially when customers are not willing to invest as well. The company is met with suspicion from customers when Zeta suggests that they should split the investments costs. Instead the customers think that Zeta can take the entire investment alone.

As mentioned earlier, at the moment pricing models, which take green initiatives into account, do not exist within the company. Zeta finds this issue interesting but it is difficult to evaluate green initiatives and reach customers with this message. Perhaps government legislation could facilitate this problem and Zeta believes that tougher regulations, standards and monitoring could facilitate the process.
APPENDIX 3

THE QUESTIONNAIRE
SURVEY ON GREEN SUPPLY CHAIN INITIATIVES IN THE
TRANSPORT AND LOGISTICS SERVICE INDUSTRY

Informant title:
Entrepreneur or main shareholder or company owner
Chief Executive Officer
Logistics/supply chain manager
Environmental sustainability manager
Other (please specify)

SECTION 1 – COMPANY PROFILE

1.1 - Can you please indicate, among the following bands, the number of employees in the year 2010? (If your company belong to a corporate group, please answer to the unit/subsidiary in which you operate)

- 1-9
- 10-49
- 50-99
- 100-249
- 250-499
- ≥ 500

1.2 - What has been the annual company turnover in the year 2010? (If your company belongs to a corporate group, please answer to the unit/subsidiary in which you operate)

- < 2 M €
- 2-10 M €
- 10-20 M €
- 20-50 M €
- 50-100 M €
- > 100 M €

1.3 - What is the geographical scale of your company’s operations? (multiple choices are possible)

- Local
- Europe
- Regional
- Global
- National
1.4 - Which type of product results in the major contribution of your deliveries?

- 100% consumer goods
- more than 50% consumer goods
- about 50% of each
- more than 50% industrial goods
- 100% industrial goods
- Don’t know

1.5 - Which of the following ICT tools are used in your company? (multiple choices are possible)

- Electronic Data Interchange - EDI
- Wireless LAN
- Global Positioning System - GPS
- Radio Frequency Identification - RFID
- Bar code
- Enterprise Resource Planning - ERP
- Radio frequency
- Customer Relationship Management - CRM
- Local Area Network - LAN
- Other (please specify): ___________________

1.6 - Please indicate the level of ICT integration with other supply chain participants

(please rate where 1 = Not integrated at all and 5 = Fully integrated and automated)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our customers</td>
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<tr>
<td>Our customers’ customers</td>
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<tr>
<td>Suppliers of our customers</td>
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<tr>
<td>Other logistics service providers</td>
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</tr>
</tbody>
</table>

1.7 - What was the percentage of your turnover generated by each of the service categories listed below in the year 2010? (totally 100%)

<table>
<thead>
<tr>
<th>Logistics and transport services offered</th>
<th>Transport</th>
<th>Warehousing</th>
<th>Distribution (transport + warehousing)</th>
<th>Value Added Services (e.g. labelling)</th>
<th>SCM services (re-design and/or management customer SC)</th>
<th>Other</th>
<th>Total Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>(1+2+3+4+5+6)</td>
</tr>
</tbody>
</table>

SECTION 2 – ADOPTION OF GREEN INITIATIVES AND RESOURCES

2.1 - Does your company have any environmental office or department responsible for green initiatives?

- Yes
- No
- Don’t know

2.2 - Can you please indicate the percentage of full-time employees (or equivalent) on total company employees with environmental responsibilities or tasks? _____________ %
2.3 - The environment is part of our company’s overall business strategy:
- Yes, formal/explicit
- Yes, informal/implicit
- No, it’s not
- Don’t know

2.4 - Environmental concerns are considered in a high extent when implementing changes in our company’s logistics system: (1= totally disagree and 5=totally agree)

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
</table>

2.5 – Has your company currently adopted green logistics management initiatives?
- Yes
- No
- Don’t know

ATTENTION
If you answered YES to question 2.5, go ahead to point 2.6
If you answered “NO” or “DON’T KNOW” to question 2.5, go to SECTION 4

2.6 - For environmental reasons, our company has in a high extent adopted in the following transport related measures: (1= totally disagree and 5=totally agree)

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<thead>
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<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative fuels for transports</td>
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<tr>
<td>Modifications to vehicle specifications/design (e.g. aerodynamic features, low rolling resistances tires)</td>
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<tr>
<td>Eco-driving</td>
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<tr>
<td>Recurrent environmental pilot project</td>
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<tr>
<td>Switch to less energy-intensive transports modes</td>
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<tr>
<td>Greater use of intermodal transport</td>
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<tr>
<td>Measures to improve vehicle loading</td>
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<tr>
<td>Measures to reduce empty running</td>
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<tr>
<td>Transport planning management (e.g. route optimization)</td>
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<tr>
<td>Structural changes to your logistics system (e.g. number, size or location of facilities)</td>
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<tr>
<td>Offer documented emissions data</td>
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<tr>
<td>Other (please specify):</td>
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</tbody>
</table>

2.7 - For environmental reasons, our company has in a high extent adopted in the following supply chain related measures: (1= totally disagree and 5=totally agree)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable/green energy</td>
<td></td>
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<tr>
<td>Collecting information on energy use/carbon footprint</td>
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<tr>
<td>Reduction in the amount of packaging</td>
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<tr>
<td>Increase the amount of waste recycled</td>
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<tr>
<td>Environmental certification (e.g. ISO 14001)</td>
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<tr>
<td>Environmental Management System (EMS)</td>
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<tr>
<td>Emission off-set programmes</td>
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<tr>
<td>Setting a corporate GHG emission reduction target</td>
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<tr>
<td>Cooperation with our suppliers/partners in order to reach environmental targets</td>
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</tbody>
</table>
Cooperation with customers in order to reach environmental targets
Environmental education/training/information for employees
Environmental education for our customers and/or suppliers/partners
Other (please specify):

| 2.8 - The following ICT applications are **strongly** used in managing the environmental impact of our company’s transport and logistics operations (please rate where 1= totally disagree and 5=totally agree) |
|---|---|---|---|---|---|
| Transport management systems - TMS |  |  |  |  |  |
| Vehicle routing and scheduling |  |  |  |  |  |
| Transport simulation/planning |  |  |  |  |  |
| Tracking and tracing system |  |  |  |  |  |
| Inventory management |  |  |  |  |  |
| Warehouse management |  |  |  |  |  |
| Network/facility location configuration |  |  |  |  |  |
| Distribution planning |  |  |  |  |  |
| Purchasing and supply planning |  |  |  |  |  |
| Other (please specify):______________ |  |  |  |  |  |

| 2.9 - The following tracking & tracing functionalities are **strongly** used in managing the environmental impact of our company’s transport and logistics operations (please rate where 1= totally disagree and 5=totally agree) |
|---|---|---|---|---|---|
| Tracking of shipment documents |  |  |  |  |  |
| Tracking of containers |  |  |  |  |  |
| Tracking of pallets |  |  |  |  |  |
| Tracking of packages |  |  |  |  |  |
| Tracking of inventories |  |  |  |  |  |
| Tracking of full truck load |  |  |  |  |  |
| Tracking of and tracing is not used at all |  |  |  |  |  |

| 2.10 - The following professional functions are involved in a high extent with our company’s green supply chain initiatives: (please rate where 1= totally disagree and 5=totally agree) |
|---|---|---|---|---|---|
| Logistics/transport department |  |  |  |  |  |
| Supply chain department |  |  |  |  |  |
| Warehouse/terminals |  |  |  |  |  |
| Environmental department |  |  |  |  |  |
| Marketing department |  |  |  |  |  |
| Sales department |  |  |  |  |  |
| Top management |  |  |  |  |  |
| IT-department |  |  |  |  |  |
| Finance department |  |  |  |  |  |
| Purchasing department |  |  |  |  |  |
| Other (please specify): |  |  |  |  |  |
2.11 - Does your company measure the performance of green supply chain initiatives that are adopted?

Yes □
No □
Don’t know □

SECTION 3 – DRIVER OF GREEN LOGISTICS INITIATIVES

3.1 - The following stakeholder group(s) exert strong influence when adopting environmental logistics initiatives in our company: (please rate where 1 = totally disagree and 5 = totally agree)

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
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<th>5</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>Competitors</td>
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<td>Customers</td>
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<tr>
<td>Management</td>
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<tr>
<td>Transport/Logistics Suppliers or partners</td>
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<tr>
<td>Transport/Logistics Equipment Suppliers</td>
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<tr>
<td>Employees</td>
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<tr>
<td>Experts (academics/consultants)</td>
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<tr>
<td>Trade bodies</td>
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<tr>
<td>Government and public bodies</td>
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<tr>
<td>Owners/shareholders</td>
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<tr>
<td>Insurers</td>
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<tr>
<td>Other (please specify):</td>
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</tbody>
</table>

3.2 - The following arguments have a strong impact on decisions to adopt green logistics/supply chain initiatives in our company: (please rate where 1 = totally disagree and 5 = totally agree)

<table>
<thead>
<tr>
<th>Argument</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>Cost reductions for customers</td>
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<tr>
<td>Cost reductions for suppliers/partners</td>
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<tr>
<td>Cost reductions within my company</td>
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<tr>
<td>Improve customer relationship</td>
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<tr>
<td>Improve customer service</td>
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<tr>
<td>Increase firm’s competitiveness</td>
<td></td>
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<tr>
<td>Increase firm’s revenue</td>
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<tr>
<td>Increase ROI</td>
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<tr>
<td>Improve brand image</td>
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<tr>
<td>Reduce company risk</td>
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<tr>
<td>Other (please specify):</td>
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</tbody>
</table>

3.3 - The following arguments have a strong impact on decisions to investing in ICT to support green initiatives in our company: (please rate where 1 = totally disagree and 5 = totally agree)

<table>
<thead>
<tr>
<th>Argument</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce cost of transport and logistics operations</td>
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<tr>
<td>Improve internal control on environmental performance</td>
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<tr>
<td>Improve response to customer’s green needs</td>
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<tr>
<td>Improve overall quality of customer service</td>
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<tr>
<td>Improve competitiveness</td>
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</tbody>
</table>
SECTION 4 – BARRIERS TO GREEN SUPPLY CHAIN INITIATIVES

4.1 - The following internal elements are strong barriers when adopting green supply chain initiatives in our company: (please rate where 1= totally disagree and 5=totally agree)

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>High investments costs</td>
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<tr>
<td>Uncertain payback period</td>
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<tr>
<td>Lack of financial resources</td>
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<tr>
<td>Lack of organisational/human resources specifically devoted to manage such initiatives</td>
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<tr>
<td>Lack of knowledge/skills in-house</td>
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<tr>
<td>Lack of ICT skills internal</td>
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<tr>
<td>Lack of ICT skills external</td>
<td></td>
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<tr>
<td>High ICT running costs</td>
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<tr>
<td>Other (please specify):</td>
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</tbody>
</table>

4.2 - The following external elements are strong barriers when adopting green supply chain initiatives in our company: (please rate where 1= totally disagree and 5=totally agree)

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited access to technology that reduces environmental impact (e.g. vehicles, aerodynamic features)</td>
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<tr>
<td>Lack of customer interest</td>
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<tr>
<td>Lack of customer support</td>
<td></td>
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<tr>
<td>Negative impact on customer supply chain</td>
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<tr>
<td>Lack of transport/logistics suppliers’ or partners’ interest</td>
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<tr>
<td>Lack of transport/logistics suppliers’ or partners’ support</td>
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<tr>
<td>Lack of economic incentives</td>
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<tr>
<td>Lack of clear regulations</td>
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<tr>
<td>Lack of ICT vendors selling specific product supporting green logistics</td>
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<td>Lack of standards (including ICT standards)</td>
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<td>Other (please specify):</td>
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SECTION 5 - FUTURE: ADOPTED GREEN SUPPLY CHAIN INITIATIVES WITHIN THREE YEARS

5.1 - Within 3 years, our company plans in a high extent adopt the following transport related measures for environmental reasons: (please rate where 1= totally disagree and 5=totally agree)

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>Alternative fuels for transports</td>
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<td>Modifications to vehicle specifications/design (e.g. aerodynamic features, low rolling resistances tires)</td>
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<td>Eco-driving</td>
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<td>Recurrent environmental pilot project</td>
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<td>Switch to less energy-intensive transports modes</td>
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<tr>
<td>Greater use of intermodal transport</td>
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</table>
Measures to improve vehicle loading
Measures to reduce empty running
Transport planning management (e.g. route optimization)
Structural changes to your logistics system (e.g. number, size or location of facilities)
Offer documented emissions data
Other (please specify):

5.2 - Within 3 years, our company plans in a high extent to adopt the following supply chain related measures for environmental reasons: (please rate where 1 = totally disagree and 5 = totally agree)

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Don’t know</th>
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<tbody>
<tr>
<td>Renewable/green energy</td>
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<tr>
<td>Collecting information on energy use/carbon footprint</td>
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<td>Reduction in the amount of packaging</td>
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<td>Increase the amount of waste recycled</td>
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<td>Environmental certification (e.g. ISO 14001)</td>
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<tr>
<td>Environmental Management System (EMS)</td>
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<td>Emission off-set programmes</td>
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<td>Setting a corporate GHG emission reduction target</td>
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<td>Cooperation with your suppliers/partners in order to reach environmental targets</td>
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<tr>
<td>Cooperation with customers in order to reach environmental targets</td>
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<td>Environmental education/training/information for employees</td>
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<td>Environmental education for your customers and/or suppliers/partners</td>
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<td>Other (please specify):</td>
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