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# The Impact of 3PL's Green Initiatives on the Purchasing of Transport and Logistics Services: an Exploratory Study

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## **The impact of 3PL's green initiatives on the purchasing of transport and logistics services: an exploratory study**

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### **Abstract**

There is a lack of research investigating the interaction and reciprocal influences between the buyer perspective and the supplier of transport and logistics services. Studies on the buyer perspective analyse the selection criteria to buy 3PL services, while research focused on green 3PL services examine initiatives undertaken by these companies to provide more environmentally sustainable services. The objective of this paper is to fill this void through an explorative case study analysis on the environmental attitude of 3PL companies in order to derive relevant implications for buyer's behaviour. The results provide useful guidelines to buyers for understanding awareness, initiatives as well as drivers and barriers affecting 3PLs' sustainability initiatives.

**Keywords:** purchasing transport and logistics service, 3PL's environmental awareness, green initiatives, drivers and barriers to green initiatives, Swedish, Italian and Irish transport and logistics companies, case study analysis

### **Introduction**

Environmental sustainability is an area of increasing concern for policy makers, academics and businesses globally. Logistics provides a good example as it causes a high rate of negative environmental impact such as pollution from transport (McKinnon, 2006). Moreover, companies are continually forced to reduce, reuse and reapply packaging materials, by-products of production and obsolete items. Hence, environmental issues 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 the achievement of green logistics require the extension of traditional economic supply chain objectives to include environmental objectives. In the specific area of transport and logistics services this means that buyers (e.g. manufacturers and retailers) have to pay much more attention to how such services are purchased with a view to achieving their green logistics and supply chains objectives.

The recent evolution of the logistics service industry shows how third party logistics providers (further 3PLs) are playing a more critical role in the supply chain than in the past. This implies, that 3PLs are in a critical position to support efforts aimed at improving the environmental sustainability of supply chain operations. In consequence, manufacturers and

retailers need to meet this challenge in their purchasing of logistics services purchasing. As the green logistics market is also in an evolving phase there are clear mismatches between the market requirements and the offerings of 3PLs (Martinsen and Björklund, 2010).

Nevertheless, most of the literature (Srivastava, 2007) and empirical studies (Eltayeb and Zailani, 2009; Hong, et al., 2009) on sustainability in logistics and SCM have been directed towards the manufacturing companies perspectives. Surprisingly, environmental practices in 3PL services have only recently attracted the attention of researchers (Kassinis and Soteriou, 2003; Wolf and Seuring, 2010; Lieb and Lieb, 2010). As it is of crucial importance for companies purchasing logistics services to incorporate green considerations into their purchasing decisions, the purchasers' capability regarding sustainability issues is a key to competitive advantage of the company (Foerstl et al., 2010). Accordingly, the objective of this paper is to analyse the attitude of 3PLs to greening the services provided in order to derive implications for the buyer when sourcing transport and logistics services.

Following this introduction, the remainder of the paper is organised as follows. The next section reviews the literature to put in evidence the existing gap between the buyers and providers in the context of purchasing transport and logistics services. The third section portrays the research methodology applied. The fourth section, presents the findings of a qualitative case study analysis exploring respondent awareness, as well as drivers and barriers affecting 3PLs' green initiatives. Implications that may affect the buyer's behaviour are proposed and discussed in the fifth section. In the concluding section, a number of directions for future research are drawn.

## **Literature review**

The role of environmental sustainability in supply chain management (labelled as green supply chain management - GSCM) is gaining increasing interest among researchers and practitioners. This is due not only to the deterioration of natural environment, but also because companies have recognised possible competitive advantages associated with environmental awareness. It is generally perceived that green supply chain management promotes efficiency and synergy among business partners and their lead corporations, and helps to enhance environmental performance, minimize waste and achieve cost savings (Rao and Holt, 2005). This synergy is expected to enhance the company image, competitive advantage and marketing exposure. In fact, some companies are enhancing their competitiveness through improvements in their environmental performance (Bacallan, 2000).

In the context of GSCM, green purchasing has over the past decade received increased attention (Zhu and Geng 2001) and the strategic importance of introducing green aspects into purchasing practice has been recognised (Markley and Davis, 2007). In a wide reaching literature review, Walker (2009) concludes that previous research into GSCM has focused on manufacturing companies and their operations, including purchasing and supply, product design, production, distribution, environmental management and customer attitudes. Walker et al. (2008) reveal the relative lack of empirical research identifying the influence of suppliers as driving force for GSCM projects, and poor supplier commitment is considered as one barrier, among others, against developing green supply chain management practices. Although suppliers may not be the drivers, improved integration and cooperation in supply chains can support more effective management of environmental issues (Klassen and Vachon, 2003; Theyel, 2001; Vachon and Klassen, 2006), and specifically green procurement (Holloos et al., 2010). Moreover, Gimenez Thomsen et al. (2009) suggest that while supplier assessment has little immediate effect on environmental performance, collaborative initiatives have more direct influence. Nevertheless, the involvement of suppliers in innovative and green efforts cannot be pursued without an assessment of supplier companies that reflect their role in the supply chain.

This is particularly evident in the case of purchasing transport and logistics services from 3PLs. In order to meet the customer requirements, 3PLs have gradually transformed scope and characteristics of their service offering (Daugherty et al., 1992). For many 3PLs this evolution consisted of a transition from a single-activity toward a business model based on providing a wider range of integrated services (Ashenbaum et al., 2005). In this process, core service offerings are being commoditised (e.g. transportation), while value-added services and ICT capabilities are considered points of differentiation (Evangelista, 2011). This has given 3PLs a new potential role in customising the supply chain as a growing number of activities beyond transportation and warehousing can be carried out by logistics service providers (Cooper et al., 1998; Hertz and Alfredsson, 2003). In this evolving process, environmental sustainability is an area of increasing importance for 3PLs as their core activities have often a strong environmental impact as in the case of transport activities.

Research in the field of green logistics suggest several ways for companies to green their transport and logistics activities, including modal changes and intermodal solutions (McKinnon, 2010a; Woodburn and Whiteing, 2010), advances in technology solutions (McKinnon, 2010b), tools for assessing logistics' carbon footprint (Eglese and Black, 2010; Lieb and Lieb, 2010; McKinnon, 2010c; Piecyk, 2010), green transport management (Lieb and Lieb, 2010), and green logistics system design (Aronsson and Hüge-Brodin, 2006; Kohn and Hüge-Brodin, 2008; Harris et al., 2010).

However, the role of the 3PLs in the development of green logistics systems has been on the periphery of the scope of green logistics research (Wolf and Seuring, 2010). Some exceptions are the works of Lieb and Lieb (2010) reporting from a global survey about developments in the 3PL industry, and Wolf and Seuring (2010), which base their results on buying as well as supplying green transport and logistics services. The authors share the concept that information sharing between suppliers and buyers are crucial for greening the supply chain, and that a main driver for greening 3PLs is customer pressure. With regards to the 3PLs, there is still great potential for them to better utilise their physical, human and relational resources (Maack and Hüge-Brodin, 2010). While Lieb and Lieb (2010) notice a positive trend in acknowledging green aspects among 3PLs, Wolf and Seuring (2010) stress that there is very little evidence of concrete initiatives undertaken by 3PLs or spurred by their customers.

Unfortunately, the literature on purchasing transport and logistics services is quite limited. (Holter et al. 2008; Björklund, 2010). Single studies can be found, and Holter et al. (2008) presents a framework for the purchasing of transport services by small and medium sized enterprises (SMEs), which includes comparing bids, measurement and quantification of costs, services and transit times, as well as - at the heart of the frameworks - supplier management. Further, the main strategic decisions are the trade-offs between service/cost and between transit time/cost. Holter et al. (2008) also makes a distinction between transport purchasing, i.e. the process of negotiating the contract with the 3PL, and transport management, referring to the activities associated with transport operations, internal to the company as well as externally directed activities.

In consequence, purchasing green transport and logistics area is addressed to an even more limited extent. Research into green aspects from the buyer's point of view when sourcing transport and logistics services, is particularly focused on "green" as criterion for selecting 3PLs (Schmitz et al., 2010; Wolf and Seuring, 2010; Meade and Sarkis, 2002). In these papers the emphasis is on the buyer perspective and how buyers may identify specific green service attributes for selecting 3PLs. For example, Björklund (2010) has investigated how a large variety of contextual issues impact the purchasing of green transport. The author found that, amongst others, the customers of the purchasing organisation are seen as strong drivers for greener purchasing behaviour, while the lack of demands from customers hinders a greening

of purchasing of transport (ibid.). Here Björklund's results seem more encouraging regarding the 3PLs' role, than the general view on suppliers' role offered by Walker et al. (2008).

On the other hand, when considering the 3PL green perspective, existing papers focus on how environmental aspects may be used to develop service offerings (Isaksson and Björklund, 2010; Isaksson and Hüge-Brodin, 2010), document the extent to which 3PL companies have committed to environmental goals (Lieb and Lieb, 2010), or investigate the initiatives undertaken to reduce the environmental impact of transport and logistics and the role of the environment in the service strategy (Evangelista, et al., 2010).

This paper explores the gap between 3PLs and shipper regarding environmental initiatives, through the attitude of 3PLs to greening their services and the implications for the buyer's purchasing behaviour. The next section will describe in details the research approach used.

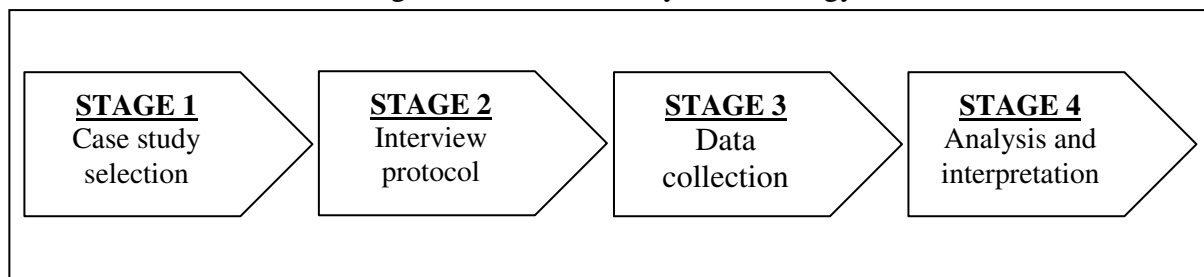
## **Research methodology**

In order to achieve the above objective a research design based on three different steps has been adopted. The first part of the research was based on an extensive literature review that has been summarised in the previous section, which was instrumental in designing the data collection guide. In the second step, a multiple case study analysis involving a set of logistics service providers has been carried out. The empirical analysis has explored a number of key issues concerning 3PLs' green offerings. In the last step, from the findings achieved we derived implications for buyer's behaviour when sourcing green transport and logistics services.

The case study investigation focused on the analysis of eight case studies. Given the lack of theory and empirical studies in this field, the case study approach appears to be a suitable research method. The case study approach with increasing application of multiple case studies is quite common in purchasing and supply management research (Dubois and Aurajo, 2007). One of the main benefits associated to the use multiple case studies is that the comparison of two or more case studies provide concepts that are relevant to an emerging theory and support explorative investigations. Yin (1994) argued that, in most situations, 6 to 10 cases should provide evidences to support or reject propositions, while Eisenhardt (1989) recommend 4 to 10 cases. Our selection of 8 cases falls well within these recommended frames.

The case companies are 3PLs operating in the Swedish, Italian and Irish logistics markets. In accordance with this approach, a specific methodology consisting of the following four phases has been adopted (see figure 1): 1) case study selection; 2) interview protocol; 3) data collection; and, 4) analysis and interpretation.

Figure 1: The case study methodology



### *1) Case study selection*

Eight companies were involved in the survey (four Swedish, two Italian and two Irish). The selection process has been organised into two steps. Firstly, a number of companies were identified on the basis of previous collaboration with researchers in each country. This allows the access to specific information concerning green initiatives and facilitates data collection.

In the second step, the following specific criteria have been used to select the companies to be included in the study: i) green initiatives in place (see table 3 for details); ii) firm size (small or large ones); iii) geographical reach of operations (local, national or international); and iv) range of service offered. Table 1 displays the main characteristics of the case companies. In relation to the first criterion, all the companies involved in the survey have a number of initiatives to green the service provided. A more detailed picture of the range and content of such initiatives are displayed in table 3.

Table 1: Main characteristics of surveyed companies

<b>Company</b>	<b>Size</b>	<b>Geographical reach</b>	<b>Service offering</b>
SWE A	Small	Local	Diverse road transport services, including distribution and heavy transportation
SWE B	Small	National	Express courier, by intermodal solutions of air and road
SWE C	Large	International	Air and ocean freight services
SWE D	Large	International	Wide range of transport and logistics services, covering all transport modes
ITA A	Small	International	Logistics services focused on warehousing, inbound and outbound logistics and distribution
ITA B	Large	International	Several transport services (mainly rail and sea) and specialised logistics services (automotive, container and production logistics)
IRL A	Small	National	Contract logistics and freight forwarding
IRL B	Large	International	Wide range of transport and logistics services, covering all transport modes

All companies take on the co-ordination of the transport and logistics network and most of them have outsourced pure transport operations.

### *2) Interview protocol*

The interviews with the 3PLs were conducted using a data collection guide. This interview tool included open questions relating to: 1) general company information; 2) awareness of the importance of the environment; 3) adoption of green initiatives; 4) drivers and barriers affecting the adoption of green initiatives undertaken by the company. The data collection guide was designed in a semi-structured way in order to ensure the necessary flexibility when companies with different characteristics and competencies are being surveyed. It was tested during a number of meetings with industry experts working in the green logistics field.

### *3) Data collection*

The data collection guide was sent out to the respondents in advance to allow them to familiarise with the topic. The respondents were generally interviewed by telephone although a number of them were interviewed face-to-face at the company site. Each interview lasted for about one hour. When possible, interviews involved the general manager and the operations managers in order to obtain both the strategic and operational perspective in relation to the role of the environment in selling services. All interviews were tape-recorded and transcribed. Additional information about the companies was collected from a variety of information sources including company reports and company web-pages. Such information was merged with information obtained from the interviews and stored in a case study database.

#### 4) Data analysis

The data were analysed through a cross-case analysis comparing evidence from the three sets of case company investigated (Swedish, Italian and Irish). The cases have been compared with each other in order to identify commonalities and potential patterns between them. The emerging patterns have been analysed and compared with the literature findings in order to identify potential explanations to differences and also to provide the basis for further research in this field. The analysis is aimed at transforming the results from the case study into challenges for buyers. These challenges are identified through a deductive analytical process.

#### Analysis and main findings

In this section, the results of the case study analysis are presented, while the implications for buyers are discussed in the following section. The section is divided according to: awareness of the importance of the environment; adoption of green initiatives; and, drivers and barriers affecting the adoption of green initiatives undertaken by the 3PL company interviewed.

#### Awareness of the importance of the environment

The awareness among the 3PLs regarding green supply chain initiatives is described in terms of the general prioritisation of environmental issues, and how the responsibility of greening operations is organised. The results are summarised in table 2.

Table 2: Awareness of environmental importance

Company	Priority	Responsibility
SWE A	Long and short-term	2 full-time employees with green responsibility (spread among more people). Supportive function
SWE B	Long and short-term	3 dedicated full-time employees for environment, quality and education. Supportive function
SWE C	Differs between business units	4 full-time employees with supportive function. 7 "champions" at Bus, working 1/3 of full-time employees
SWE D	Long-term, strategic	5-6 full-time employees, 1 dedicated, the rest as part of their ordinary duties
ITA A	Long-term, strategic	Multiple functions involved, Key person Operations Manager
ITA B	Long-term, but implicit	Green team, involving 3 employees managed by Operations/Quality manager
IRL A	Non strategic issue	No people involved
IRL B	Strategic priority	Cross-functional organisation

It was clear from the interviews, that all the companies were well aware of the importance of green issues, which supports Lieb and Lieb's (2010) findings. However, how they prioritised greening their operations differ. While green aspects were considered mainly as a strategic and long-term priority, three out of four of the small 3PLs focused also on the short-term perspective. One explanation for this might be that the smaller 3PLs in general are more focused on meeting customers' immediate requirements than building strategic market positions. This compares in some sense to the suggestions by Holter et al. (2008), where the small buyers feared to approach larger 3PLs, due to low "self-esteem".

A buyer needs to comprehend the priorities of its supplier. A strategically oriented buyer might meet difficulties when offerings from smaller 3PLs should be evaluated against offerings from large 3PLs. This mismatch regarding how the green aspects are considered could result in the buyer dismissing the offering from the small 3PL. On the other hand, the buyer could handle the mismatch in intents through a supplier development process between

the buyer and the 3PL, thus enhancing the awareness and longer-term commitment of green aspects with the small 3PL.

In general, it is a common feature among the companies that responsibility for green issues is distributed among many employees, across functions and business units. The Swedish cases all include at least one dedicated employee, focussing on green issues, while the other cases showed less dedication of organisational resources specifically to these issues.

From a buyer perspective, it might be beneficial to have a dedicated green resource with the potential supplier that can support the procurement process. On the other hand, the more the green issue is distributed among many, the more likely it is that buyers' questions on green offerings will be promptly and correctly answered during negotiation as well as under contract implementation.

It is also noticeable, that in relation to resources allocated to green issues, there are few differences between small and large companies. That might indicate that there is a minimum investment necessary to address green issues at all, no matter the company size. Company IRL A had no resources officially committed to green issues, in consequence with its non-strategic priority.

For a buyer, this might provide a useful insight. "Forcing" green initiatives upon a small 3PL might cause a rather high initial investment as well as operating cost for a 3PL that has not yet prioritised green issues. Therefore, an approach that involves a high degree of supplier development would be more fruitful (should that 3PL be the preferred supplier in other aspects), than simply forcing demands upon that company. The supplier development process could then imply a higher degree of co-creation of "green" value, which could lead to higher value for all parties involved. This is in line with the work of Yazdanparast et al., 2010.

#### Adoption of green initiatives

The green initiatives of the 3PLs are summarised in table 3, under the headings current green initiatives, ICT support, and future green initiatives.

Table 3: Green initiatives

Company	Current green initiatives	ICT supporting green initiatives	Future green initiatives
SWE A	<ul style="list-style-type: none"> <li>Eco-driving</li> <li>CO<sub>2</sub> declaration</li> <li>Better alternative offered for each transport</li> </ul>	<ul style="list-style-type: none"> <li>Self-developed ICT system</li> </ul>	<ul style="list-style-type: none"> <li>No planned initiatives</li> </ul>
SWE B	<ul style="list-style-type: none"> <li>CO<sub>2</sub> declarations</li> <li>Internal education</li> <li>Partnerships with customers</li> </ul>	<ul style="list-style-type: none"> <li>Self-developed ICT system supporting green reporting</li> </ul>	<ul style="list-style-type: none"> <li>Work with employees and customers</li> <li>Integrate awareness into every business unit</li> </ul>
SWE C	<ul style="list-style-type: none"> <li>CO<sub>2</sub> declarations</li> <li>Wide climate protection programmes</li> </ul>	<ul style="list-style-type: none"> <li>ICT system does not support green initiatives</li> </ul>	<ul style="list-style-type: none"> <li>Collaborate with suppliers</li> <li>Visualise green benefits</li> <li>Investing in ICT</li> </ul>
SWE D	<ul style="list-style-type: none"> <li>Emission calculations</li> <li>Customised solutions</li> <li>Environmental friendly vehicles</li> </ul>	<ul style="list-style-type: none"> <li>ICT system does not support green initiatives</li> </ul>	<ul style="list-style-type: none"> <li>No planned initiatives</li> </ul>
ITA A	<ul style="list-style-type: none"> <li>Follow the regulations for vehicles</li> <li>Intermodal solutions</li> </ul>	<ul style="list-style-type: none"> <li>RFID to support the green measures</li> <li>Self-developed software</li> </ul>	<ul style="list-style-type: none"> <li>Increase intermodality</li> <li>Environmentally friendly vehicles</li> </ul>



ITA B	<ul style="list-style-type: none"> <li>Choice of alternative transport modes</li> </ul>	<ul style="list-style-type: none"> <li>ICT system does not support green initiatives</li> </ul>	<ul style="list-style-type: none"> <li>No planned initiatives</li> <li>Adaptation of ICT systems</li> </ul>
IRL A	<ul style="list-style-type: none"> <li>Diverse transport initiatives</li> </ul>	<ul style="list-style-type: none"> <li>ICT system does not support green initiatives</li> </ul>	<ul style="list-style-type: none"> <li>Green fuel</li> <li>Solar panels</li> </ul>
IRL B	<ul style="list-style-type: none"> <li>Co-ordinated initiatives in transport</li> <li>Initiatives beyond transport</li> </ul>	<ul style="list-style-type: none"> <li>Network optimisation software</li> </ul>	<ul style="list-style-type: none"> <li>Coordinated transport initiatives</li> <li>Route optimisation software</li> <li>Solar panels</li> </ul>

For a buyer, the content of the service offering is at the heart of a supplier evaluation. The most important initiatives among the 3PLs are summarised in table 3. A common picture among the cases is that many green initiatives directly involve transportation in a variety of ways. This is in line with research stating that most of the CO<sub>2</sub> from logistics emanates from transport (McKinnon, 2006). However, as none of the case companies actually perform transport themselves but buy transport from transport providers, they have reduced control over the most critical element. This might impede their development of their service offering, building on the findings by Maack and Huge-Brodin (2010). From a buyer's perspective a consequence can be difficulties in obtaining adequate reports on transport-related environmental performance. It might also prove harder to influence the 3PLs offering the closer the offering is associated with transports.

In purchasing green logistics services, it is necessary to be aware of the supplier's skills in managing, measuring and quantifying the emissions of its transport providers. This is in line with the work of Holter et al. (2008). Based on the cases in this study, there are some variations between the cases regarding the measuring of emissions, however the differences are subtle. Basically, the 3PLs offer what is demanded by their most craving customers who, in turn, operate on an international market.

In relation to ICT solutions, it emerges that 3PL companies do not widely use technology to support green initiatives. The companies that use ICT solutions tend to adopt two approaches. On the one hand, there are small 3PLs using simple self-developed tools. On the other, large companies use more sophisticated software and applications especially in the transportation area. Despite the proliferation of logistics technologies, the level of ICT adoption by 3PLs is still low, especially in small companies. This situation has a negative influence on the level of technology adopted for supporting green initiatives. In addition, it seems that there is a gap between buyers' expectations for 3PLs' green ICT capabilities and their satisfaction with those capabilities.

The implication for buyers is that the level of technology in 3PLs may positively influence the purchasing of more green services when these services are supported by ICT applications that are able to reduce carbon emissions. This is the case with, for example, transport optimisation applications such as transportation management systems. Furthermore, as in the future the importance of ICT in transport and logistics sustainability will increase (European Commission, 2009), buyers should stimulate 3PL companies to invest in green ICT applications. This can be done, for example, by jointly investing in cross-industry technology platform that preserve existing ICT investments and limit costs.

Future plans vary considerably among the studied cases. While some of them have no plans at all, some want to continue and enhance their present line of work, while a few present new initiatives. The Irish companies stand out as those that plan to focus on energy cost savings through the use of solar panels, while the other 3PL solely (if at all) mentioned transport related activities.

### Drivers and barriers affecting the adoption of green initiatives

The background to the 3PLs' greening of their operations can be traced to different types of drivers, and in table 4 those that this study has identified are presented. The categorisation is based on the literature review.

Table 4: Impact of drivers on green initiatives

<b>Company</b>	<b>Customers</b>	<b>Competitors</b>	<b>Environmental legislation and regulations</b>	<b>Managerial</b>	<b>Employees</b>
SWE A	High	Low	High	High	High
SWE B	High	Low	High	High	High
SWE C	High	High	Low	High	High
SWE D	High	Low	High	High	High
ITA A	Low	No	High	High	High
ITA B	Low	Low	Low	High	Some
IRL A	Low	No	No	High	No
IRL B	High	No	Some	High	Some

The table displays drivers, where some of the 3PL indicated high impact. The impact of other stakeholders (e.g. suppliers, consultants and experts) was also investigated. None of them were mentioned as drivers with an impact on green initiatives by any of the studied companies.

The most prominent driver of green initiatives among the case companies was the managerial driver. This is often mentioned in literature (see, for example, Björklund, 2010), as well as the employees. These are internally based, and consequently build more on the present resources that a 3PL possesses. However, these dimensions are not orthogonally separated from the customers as drivers, as the customers influence 3PLs in different ways. The companies all showed distributed environmental responsibility, where customer demands can also be experienced implicitly through managers or other employees.

The inconclusive result on the customer drive, which according to previous research would have been more evident (cf Lieb and Lieb, 2010; Wolf and Seuring, 2010), can partly be explained by the perception of 3PLs that customer demands are low. For the buyer, this raises the requirements for clearly stated demands regarding green initiatives, in short as well as longer term. The longer-term requirements would probably increase the willingness to invest in green initiatives among the 3PLs. The patterns among the companies are rather vague and inconclusive regarding the impact of different drivers. One observation, though, is the slightly heavier impact on the upper half of the table (i.e. the Swedish 3PLs).

In order to understand the 3PL, any buyer of green logistics and transport services would need to understand what hinders the adoption of more green initiatives. How can a buyer relax those barriers, in order to support the greening of their transport suppliers? The barriers that the 3PLs have mentioned are presented in table 5.

The financial barriers for 3PLs are huge, with large investment costs and long payback periods. Some companies (SWE B, SWE D, ITA B) refer explicitly to market aspects relating to investment costs, i.e. if customers were willing to pay for greener services, or at least share the cost of the investment in green solutions, then such services would probably reach the market sooner.

Table 5: Barriers to green initiatives

Company	Financial	Technical	Market/ customers	Information	Organisational and Policy
SWE A	Green solutions expensive	Automotive sector	Lack of customer demand determines lack of investments	n.a.	Must invest due to policy, even if economically not good
SWE B	No investment without customer support	Alternative solutions not available	Many customers separate purchasing from environmental department	n.a.	Lack of understanding in the organisation
SWE C	Difficult to justify investment	Too slow development	Lack of customer interest	Technical systems not supporting environmental info	n.a.
SWE D	Customers do not want to share the investment	n.a.	Lack of consensus regarding solutions	IT systems do not support CO <sub>2</sub> declarations	Different processes in different parts of company
ITA A	Too high costs associated with green investments; too long pay-back period	n.a.	Lack of customer pressure for green initiatives	n.a.	n.a.
ITA B	The price competition prevents investment against unsure income	n.a.	Low willingness to use greener solutions	n.a.	n.a.
IRL A	High costs; too long pay-back period for investments	n.a.	Negative impact on the customer supply chain	n.a.	Lack of competence in the area of green logistics
IRL B	High costs	n.a.	Lack of incentives	n.a.	n.a.

The lack of customer/market support is a clear barrier in our investigation. Coupled with the somewhat inconclusive result on the customers as drivers for green initiatives, this result from the 3PL sector partly reflect that from the buying perspective (Björklund, 2010). This implies, that the customer's role is crucial for 3PLs in their development of green services, and the purchaser of transport and logistics services should seriously consider this. As well as buyers driving the adoption of green initiatives, lack of clear buyer communication and requests can constrain the development. It should also be noted that many respondents did not specifically identify barriers that can easily be categorised as 'technical', 'information' or 'organisational and policy'.

### Implications for buying transport and logistics services

Transport and logistics providers are key supply chain actors due to their supply chain role. This is also emphasised when it comes to green supply chain initiatives where 3PLs can contribute substantially to reduce the environmental impact of supply chain operations, specifically through reducing the carbon footprint associated with transport activities. From the shipper (manufacturers and retailers) point of view, this increases the importance of capable purchasing of green transport and logistics services.

In order for the shippers to take advantage of the 3PLs, they need to consider the 3PLs' general awareness regarding green initiatives. While some 3PLs maintain a long-term

perspective on green initiatives, this is not true for all, why sensitivity among shippers for this is necessary. Our research indicate, that smaller 3PLs show a tendency to focus more on short-term commitment, which need to be considered when evaluating bids from various 3PLs.

The buyer of a green logistics service from a 3PL should be aware of the fact, that the transport part of the service is seldom directly controlled by the 3PL, despite that the transport is the logistical activity that contributes most to environmental damage. In part this can be handled through a thorough declaration of what a buyer expects in terms of CO<sub>2</sub> reports, something which seem to differ relating to the actual customer requirements.

The results of the present study also suggest that the buyer's traditional approach to 3PL supplier selection needs to be innovated by incorporating new criteria such as the green awareness and level of green initiatives adopted by logistics providers.

Finally, the crucial role of the buyer of transport and logistics services is more or less confirmed by our research. More vaguely, the customer is one of the main drivers of green initiatives among the 3PLs, however the lack of customer requirements is unanimously indicated as a barrier towards the adoption of green initiatives. This indicates that the customer of the 3PL - the buyer in this paper - still has a long way to go before a greening of the supply chain is satisfied. On the positive side, there is the high potential that initiatives from buyers can really show direct results, in terms of greener transports and greener supply chains.

### **Future research directions**

This research is empirically based in the 3PL industry, and the results presented here are derived based on 3PL data. The next step in our research would be to further explore how the perceptions among 3PLs align with those of their customers - the buyers. Is the customer as the driving part equally considered on both sides? And how do buyers of 3PL services actually adjust to the 3PLs? Investigating the customer side would allow the comparison of our suggestions for buying behaviour with actual buying behaviour, and the result of such a comparison would inevitably show both matches and mismatches. The mismatches could provide clues to why the green logistics market is a slow starter.

Another area for future research in this field concerns the analysis of the impact of green initiatives undertaken by 3PLs on buyer's performance. A study of this kind could be of help in better orienting buyers' choices as the impact of green actions on profitability should increase in the future. The issue of incorporation of green considerations into the supplier selection processes of buyers relates to this. There is a need for firm evidence of the extent to which buyers are using green selection criteria and the impact of such approaches.

This research has generated a lot of useful insights and ideas about supply and demand in the logistics market, when it comes to green aspects. However, the sample is narrow, as a consequence of the selected research method, meaning that empirical generalisation through a wide reaching survey questionnaire study would enhance the level of knowledge about green logistics supply as well as green buying behaviour regarding transport and logistics services.

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