Sustainability reporting of logistics service providers in Europe

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Abstract: Logistics service providers (LSPs) can contribute to the creation of environmentally sustainable supply chains. This research examines which of the internal and external practices that LSPs claim to promote are actually of value in achieving sustainability across the logistics sector as a whole and in the relevant supply chains in which they operate. After an analysis of the literature, the authors draw up a list of relevant environmental concerns based on the global reporting initiatives (GRIs) database and propose a potential classification scheme for current practices of selected LSPs operating in Europe. Our research adds to current knowledge in the field by integrating environmental sustainability with LSP activities and constitutes a platform for benchmark analysis with a view to introducing sustainable practices.

Keywords: environmentally sustainable supply chain management; green logistics; LSP; logistics service providers; sustainability reporting; GRI; global reporting initiative.

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1 Introduction

The need to adopt environmentally sustainable behaviour expressed by companies has resulted in a growing body of studies on sustainability conducted by both research communities and practitioners. Today's business world can be seen as a series of networks in which companies are called upon to act jointly, thereby abandoning the traditional individualistic approach (Ford et al., 2003; Greenhalgh, 2001). Synergistically promoted actions highlight the importance of supply chains in which all actors are involved in achieving sustainability goals. However, companies require efficient tools for the introduction of sustainable practices which are frequently sector- and supply-chain specific. This means that different supply chain sustainability solutions can be applied to the various phases of product design, production and distribution. Yet, if the value chain is to be considered green, then management of the process of reverse logistics and closed loop supply chains must also play an important role (Hervani et al., 2005). For many years, logistics operators were considered to be responsible for negative externalities inherently deriving from their activities (Rossi et al., 2013). Nowadays the significant expansion of logistics outsourcing demands environmentally responsible behaviour promoted by logistics service providers (LSPs). Surveys of CEOs of large global LSPs indicate that they have made important commitments to environmental sustainability improvements over the past few years (McKinnon, 2015), as they can contribute to achievement of sustainable management of supply chains by adapting their practices to the assumption expressed initially by the Bruntland Report in 1978. In order to comply with the demands of sustainable development, LSPs can develop valid tools that are consistent with the concept of the 'triple bottom line' (Elkington, 1998), and communicate them through sustainability reporting systems. "In view of the sustainability challenge, environmental issues are increasingly taken into account" (Fransoo et al., 2014, p.2). This paper therefore focuses on green supply chain management (GSCM). Moreover, as a consequence of increasing customer awareness, companies are called upon to find ways to incorporate environmental issues into their supply chain practices (Seuring and Goldbach, 2006; Ciliberti et al., 2008; Chung and Wee, 2008; Coniato et al., 2012). Many actions which reduce the environmental impact of logistics, so-called 'green-gold' measures, also save money, avoiding the need to trade off economic costs against environmental benefits (McKinnon, 2015). The research question of the current study is: *what actions do logistics service providers report taking in relation to environmental sustainability in terms of both internal and external practices?*

The research aims to understand how LSPs are environmentally sustainable themselves and what they do to contribute to the sustainability of the specific supply chain in which they operate. Our study thus contributes to the growing body of literature on environmentally friendly practices in supply chains which are often globally dispersed. In its sustainability report, Deutsche Post DHL Group (DHL) sees logistics as a high-potential growth market. As a result, efforts to optimise all management processes are crucial for environmental protection. This paper is structured as follows: the theoretical background is presented in Section 2, while our methodology is described in Section 3. Section 4 presents our findings. The paper ends with a discussion and conclusion.

2 Literature review

2.1 *When supply chains are environmentally sustainable: GSCM*

Companies' practices can be divided into two categories: internal practices, which they conduct autonomously (Azevedo et al., 2011), and external practices, which involve both suppliers and customers (Zhu et al., 2013).

Recently, the latter have taken on increasing importance, as the role of supply chains has become more and more critical, given modern competition and performance requirements (Pagell and Wu, 2009). Companies face increased supply chain competition (Antai, 2011; Ashby et al., 2012; Christopher, 1992, 2005, 2010; Cozzolino, 2009; Liu et al., 2014; Massaroni and Cozzolino, 2012; Sahay, 2003) which requires them to adopt a collaborative approach and to act synergistically during value creation and entails somehow moving beyond traditional company boundaries (Rullani, 2010). As Preuss (2005) has stated, lasting environmental sustainability can be assured only if companies move beyond their own confines and establish relationships in order to benefit fully from environmental management. This supply chain perspective can contribute to optimising resources and operations and produce the greatest value at the lowest cost (Linton et al., 2007). Adding the fact that the supply chain covers all phases of the product lifetime, focusing on supply chains enables sustainable practices to be adopted more widely (Ahi and Searcy, 2013; Ashby et al., 2012; Linton et al., 2007). Integrating the environmental dimension into the supply chain context results in GSCM (Wu and Pagell, 2011). Generally, environmental sustainability relates to the footprint that companies leave behind as the result of their operations (Gimenez et al., 2012) in terms of reducing waste, pollution and emissions, improving energy efficiency and decreasing consumption of hazardous/harmful/toxic materials and the frequency of environmental accidents.

Green supply chain management (GSCM) means "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life" (Srivastava, 2007, p.54) and regards the overall optimisation of material and information flows along the value chain (Kumar et al., 2012). From a functional supply chain perspective GSCM can be seen as the sum of green purchasing, green manufacturing/materials management, green distribution/marketing and reverse logistics (Hervani et al., 2005). Andersen and Skojett Larsen (2009) offer the following list of proactive greening initiatives that impact supply chain management: design for disassembly, design for remanufacturing, use of sustainable raw materials, use of recoverable energy resources, use of environmentally friendly transport modes and focus on high capacity utilisation of transport modes and production facilities. Kumar et al. (2012) give the following indications for optimisation of transport metrics: transportation distance (minimise), average energy consumed per mile (minimise), container fill rate (maximise), inventory nodes (minimise).

According to Klassen and Johnson (2004), environmental practices may regard environmental certification, pollution prevention, life cycle assessment and design for environment.

GSCM reflects an organisational philosophy that aims to reduce environmental risks (Diabat and Govindan, 2011) and eliminate or minimise the negative impact of all of the processes in the life cycle of a product or service on the environment for present and future generations (Gurtu et al., 2015, p.117). As the result of proactive GSCM

approaches, firms can benefit from superior long-term performance, which is achievable through the management of environmental risks and the development of capabilities for continuous environmental improvement (Zhu and Sarkis, 2004). Kumar et al. (2012) point out that applying a green approach may offer benefits in terms of cost saving, efficiency and innovation. GSCM practices and positive economic and financial performance are strongly correlated (Green et al., 2012; Rao and Holt, 2005; Zhu and Sarkis, 2004). The green supply chain approach goes much further than mere compliance with environmental regulations (Kumar et al., 2012), and voluntary approaches are required in order to achieve sustainable development, for example, in the form of sustainability reporting.

2.2 Why companies do engage in sustainability reporting?

Several factors influence companies' propensity to implement sustainability reporting. These are both internal and external to the context in which the company operates and thus can be termed endogenous and exogenous factors. The former regard broadly shared cultural and organisational aspects of a company's management (Pagell and Wu, 2009), internal capabilities (Bowen et al., 2001) and costs. The second emerge from broadly defined stakeholders' requirements, in particular governments, NGOs, supply chain pressures and competitors (Sarkis et al., 2011). These factors shape corporate activities in relation to the pursuit of environmental and social goals. When sustainable practices are achieved in response to legislation, we may speak of a 'receptive approach' (Walton et al., 1998). In contrast, when companies apply environmental and social improvements voluntarily, it is seen as a 'constructive approach' (Walton et al., 1998). Table 1 sets out the various areas of interest deriving from the variety of groups of stakeholders.

Table 1 Who uses sustainable reporting and in which areas of interest

<i>Stakeholder group</i>	<i>Areas of interest</i>
Communities	Health and safety, economic opportunities, environmental concerns
Customers	Product safety, customer satisfaction, ethical performance
Investors	Risk and opportunity factors, major capital input as a factor of production, ethical performance
NGOs	Environmental performance, ethical performance, What you do not report?
Employees	Health and safety, employee compensation, workforce demographics
Regulators	Ethical performance, environmental performance, environmental compliance

Source: Riley and Gadonniex (2009)

Following on from the observations set out in the previous paragraph, we may speak of environmentally sustainable supply chain management when the constructive approach is applied. Such an approach is similarly represented by sustainability reporting. Indeed, the Bruntland report, which provides the most broadly accepted definition of sustainable development, stresses that "industry's response to pollution and resource degradation has not been and should not be limited to compliance with regulations" (Gro Harlem Brundtland, 1987, p.185), since legal and regulatory compliance policies are an essential part of resources and environmental management, but are not sufficient in themselves. Sustainability reporting (SR) as a voluntary corporate initiative (Lozano, 2012) aims to

evaluate the current situation of an organisation as well as inform internal and external stakeholders of progress towards sustainability (Dalal-Clayton and Bass, 2002; White, 2009). As such, it can serve as a managerial tool (White, 2009). Through proactive reporting companies can reduce information asymmetry regarding their sustainability-related activities to ensure legitimacy (Hahn and Kühnen, 2013).

SR is a broad term which embraces the practice of measuring, disclosing, and being accountable to internal and external stakeholders for performance as it relates to the goal of sustainable development (GRI, 2002). It is characterised by a high degree of transparency as it should provide a “balanced and reasonable representation of the sustainability performance of the reporting organisation, including both positive and negative contributions” (GRI, 2010–2011, p.3). SR is considered a key element in the response of companies to sustainability requirements and a precondition for their survival in the global economy (Wells, 2013). According to the KPMG survey (2011), almost 50% of the world’s largest companies reported increased financial value from corporate responsibility programs, achieved through higher revenues or cost savings. In addition to its financial benefits, SR can produce additional advantages of an internal nature (in operational and organisational terms) and an external nature (in terms of reputation, leadership and engagement with stakeholders) (Gaddoniex and Riley, 2009; White, 2009).

A number of critical approaches to SR have emerged. Stubbs et al. (2013) surveyed organisations with the aim of determining reasons for non-reporting. Their most frequent response was that the absence of sustainability reports did not necessarily equate to lack of concern about sustainability. The following factors may account for this choice:

- a lack of external stakeholder pressure
- no perceived benefits and thus little motivation to report
- SR is considered something ‘nice-to-do’, and not a ‘must-do’
- a compliance culture with regard to sustainability
- the organisational structure and/or culture does not encourage reporting (Stubbs et al., 2013).

Moneva et al. (2006) have noted that in some cases the sustainability reports published on company’s websites are not automatically indicators of responsible behaviour. Nevertheless, taking up the challenge of sustainable logistics is a key issue for the future success of sustainable development (Burrit and Schaltegger, 2014, p.333).

2.3 Contribution of LSPs to the green supply chain

A large body of survey evidence has been gathered to show that companies around the world are taken to promote their green credentials through the management of logistics (McKinnon, 2015).

Logistics activities, and in particular transport, can cause several negative effects on the natural environment, such as air pollution, and the safety of people, such as road accidents (Rondinelli and Berry, 2000; Murphy et al., 1994; Rossi et al., 2013; Wolf and Seuring, 2010). The European Commission (2001) has stated that the goal for the logistics sector is to decouple mobility from its adverse effects. With a view to environmental sustainability, in particular, among all different service sectors, the

logistics sector can be more polluting than all others (Skjoett-Larsen, 2000; Wu and Dunn, 1995). Transport in general – in the context of logistics – is, in fact, the major contributor to global emissions (World Economic Forum, 2009): in Europe in 2009 it accounted for 30% of CO₂ emissions, and the trend continues to rise, in contrast to other sectors which have succeeded in reversing the trend (European Commission, 2012).

The rise in environmentally responsible logistics has been the result of government regulation, economic considerations and increasingly strong market signals from customers (Goldsby and Stank, 2000; Scholtens and Kleinsmann, 2011). Dey et al. (2011) identify four reasons why it is important to invest in the sustainability of logistics: brand value, misuse of resources, institutional intervention, and international standards and regulations. As Prokesch (2010) notes, “adding sustainability into the corporate strategy has become about meeting the expectations of investors while taking into account the long-term impact that operations have on the community and environment”.

Many large companies operating in the logistics sector have intensified their commitment to sustainability programs, as a source of competitive advantage despite the recession (Lieb and Lieb, 2010). The cross-functional nature of logistics makes it vital to every corporate strategy, particularly to actions and policies aimed at ensuring environmental and social sustainability of operations (Piecyk and Björklund, 2015). Sustainable performance becomes a significant element in what LSPs offer and a vital part of their strategic planning (Björklund and Forslund, 2013).

With regard to sustainability, environmental issues, in particular, appear to be the most prominent focus of more recent academic papers (Piecyk and Björklund, 2015). Recent studies on procurement and subcontracting of logistics services have found that purchasing companies place high value on the environmental performance of LSPs (Large et al., 2013; Scholtens and Kleinsmann, 2011). Moreover, as several authors point out (Wolf and Seuring, 2010; Lammgård and Andersson, 2014), provision of customer support by sustainable logistics providers is increasingly a factor in the choice of the logistics provider by the customer’s own business.

The provision of sustainable services by logistics providers has a significant impact on the broader issue of relationship/network. In this respect, therefore, through a range of stakeholders, including consumers, investors and policy makers, the sustainability of economic actors offering logistics services tends to take on increasing importance (Lieb and Lieb, 2010). The activities of logistics providers have a significant environmental as well as an economic impact, which is indicative of significant potential as yet to be exploited. Indeed, companies are increasingly finding that sustainable outputs will be more sustainable if value-adding logistics activities become sustainable themselves (Wu and Dunn, 1995), although the potential of LSPs as ‘enablers’ of sustainable management of the supply chain has not yet been much debated in research carried out to date (Piecyk and Björklund, 2015; Kudla and Klaas-Wissing, 2012): “outsourcing has a significant potential to increase sustainability in the supply chain as third-party logistics providers focus on improving resource utilisation and making processes more efficient” (Facanha and Horvath, 2005).

This also suggests that sustainability is a potential driver for LSPs to migrate from simply delivering commodities to providing more strategic services (Rossi et al., 2013).

In this way they can help their customers’ businesses to comply with environmental legislation and protection imposed by social policy at the local, national and international level, anticipate standards, increase economic benefits – especially in relation to cost reductions – and develop differentiation strategies based on offering products

characterised by high environmental and ethical values for those customers willing to pay a premium price for them.

With respect to this last point, a number of studies in the literature, including Lammgård (2012), show that the sustainability aspects of logistics operators are not necessarily recognised with a corresponding increase in price, but are considered by business customers as an element included in the price of the basic service. In particular, some empirical evidence emerging from research by Rossi et al. (2013) shows that “the quality of the services expected by the customer remains the same. Moreover, they are not willing to pay a premium price for more eco-efficient logistics services”; in short, customers remain very much cost-focused (Lieb and Lieb, 2010; Wolf and Seuring, 2010).

Logistics providers have the potential to help mitigate the three aspects that are most frequently mentioned in the literature as barriers to the implementation of sustainable supply chains, namely

- higher costs
- the complexity and the greater effort of coordination
- insufficient, or even missing, communication between actors along the supply chain (Seuring and Muller, 2008).

This task can be achieved by those logistics providers that are not only able to physically perform one or more logistics activities based on the tactical and strategic decisions taken by their customer, but are also able to take responsibility for coordinating large and small parts of the logistics process in place of their customers (in manufacturing and/or distribution) and organising and implementing them, as well as taking decisions with a certain degree of independence geared towards

- reducing costs
- aggregating and simplifying aspects of coordination
- ensuring communication throughout the supply chain.

This capacity derives from the role that some logistics providers may play in terms of operational support, management and planning of all aspects of the logistics network at three levels: nodes (or points), strings (or segments) and above all interfaces (or junctions). It is especially at these contact points that there is, generally, a shift of responsibility that can create a discontinuity – at the physical, operational or temporal level – which may lead to less attention being paid to sustainability requirements (Cozzolino, 2009; Massaroni and Cozzolino, 2012).

3 Methodology

The theoretical framework was developed using the Ebsco and Science Direct databases, while empirical data were drawn from the global reporting initiative (GRI) database which was used to analyse the European logistics sector. This specific standard “is becoming the dominate SR guideline as its use has been growing exponentially

every year” (Dumay et al., 2010, p.7), as the GRI is “the most relevant institution in the sustainability reporting context” (Moneva et al., 2006, p.126) and the most common ‘non-financial reporting framework’ (Cohen, 2013, p.20). The GRI reporting framework provides “a tool that could be used by operator to ensure industry-wide consistency of reporting” (Piecyk and Björklund, 2015, p.462). GRI is therefore ‘the de facto global standard’ (KPMG, 2011, p.20). Sustainable reporting is a tool for management in moving toward corporate sustainability (Schaltegger et al., 2006). Company websites constituted our secondary source of data.

Sixty-seven companies were initially selected. A second selection was then made according to the following criteria:

- only reports in English were chosen
- all reports were available on the GRI website in PDF format (where standalone PDF versions were unavailable, online reports were also reviewed.)
- reports not in the GRI database were excluded.

The number of companies was reduced significantly to 28. Further subjective criteria were transportation of goods and not people, the exclusion of mail delivery services and state-owned companies. Ultimately, a total of nine private-sector European companies that published a sustainability report or equivalent document in English and satisfied the aforementioned conditions were selected. The reports were then analysed by means of qualitative content analysis, i.e., the “systematic interpretation of textual, visual or audible matter, such as newspaper editorials, television news, advertisements, public speeches and other verbal or nonverbal units of analysis” (Hayes and Krippendorff, 2007, p.1). As Delai and Tahahashi (2013) have stated, this technique is often applied in the study and analysis of sustainability reports.

We analysed the latest reports of the companies selected in order to identify initiatives promoted independently by the LSPs as well as through relationships with their suppliers and customers.

For the purposes of this study it was deemed essential to move beyond the confines of an analysis at the individual LSP level and to extend the conventional definition of the supply chain in order to explore the full potential of green supply chains (Kumar et al., 2012; Vachon and Klassen 2006;). Furthermore, more companies are acknowledging that the sustainability of their partners plays an important role in their own development (Ageron et al., 2012; Bai and Sarkis, 2010; Dyllick and Hockerts, 2002).

4 Findings

4.1 General overview of the companies and reports selected for analysis

A general overview of the characteristics of companies and reports analysed in terms of environmental considerations is presented in Table 2.

4.2 Environmental initiatives of LSPs

Table 3 classifies initiatives promoted by LSPs in terms of environmental sustainability. LSPs may promote many kinds of initiative from an internal perspective. In order to

prevent negative environmental impacts, LSPs may focus on the following objectives: efficient use of natural resources, alternative energy sources, reducing carbon dioxide emissions and protecting biodiversity. These aims are achievable if the main processes managed by LSPs (e.g., transport and storage) are organised with a view to optimal efficiency.

Table 2 Main company's profile information and environmental sustainability impact in reports

<i>Company</i>			<i>Environmental aspects</i>		
<i>Name</i>	<i>Headquarter</i>	<i>Size</i>	<i>Titles of parts dedicated to environmental issues</i>	<i>Pages relating to only environmental issues</i>	<i>Content¹/Total pages (%)</i>
Adampol (A)	Poland	Large	Environmental responsibility	pp.34–42	19
DHL (B)	Germany	MNE	Shared value-environment	pp.10–14	18
DSV (C)	Denmark	MNE	Environment and climate	pp.97–121	19
Hermes (D)	Germany	Large	Climate and environment	pp.18–26	22
Hhla (E)	Germany	Large	Sustainability – Ecology	pp.51–56	3
Norden (F)	Denmark	MNE	CO ₂ efficiency, Environmental management, Responsible supply chain management	pp.7–9; pp.14–16; pp.18–19	21
Panalpina (G)	Switzerland	Large	Health, safety and environment	pp.20–25	15
Schenker (H)	Sweden	Large	Pioneering environmental protection	pp.70–88	12
TNT (I)	Netherlands	MNE	Environment (in Corporate Responsibility performance)	pp.27–30	2

¹The percentage of pages dedicated to environment-related content.

Source: Authors

4.3 *Actions undertaken by LSPs with suppliers, customers and business partners*

Table 4 illustrates the main environmental 'tools' used by LSPs in selecting their suppliers and collaborations with customers and other business partners.

Table 3 Environmental sustainability initiatives undertaken by LSPs

Company	Resources	Environmental aspects			
		Alternative energy sources	Reducing carbon emission (CO ₂)	Other environmental components	Biodiversity protection
A	Sustainable use of raw materials, fuel, energy, water Investments in low energy products		Yes		
B	‘Burn clean’: alternative fuels, energy from renewable sources	Solar and biomass; generation of green energy; such as wind and hydropower	Yes	Local air pollutants, noise	Yes, a central environmental issue
C	Minimising use of resources, maximising energy efficiency		Yes		
D	Minimising fuel consumption, use of water, energy, waste		WE DO! program	Noise	Collaboration with Biodiversity Conservation Union (NABU)
E	Land conservation, climate protection	Solar	CO ₂ calculated in accordance with standards drawn up by European Economics Environment Group (EEEG)		Minimise impact on nature and actively protect natural habitats
F	‘Climate action plan’, responsible supply chain management, one set of numbers				
G			‘Ecotransit’ tool, PanGreen program which aims to minimise impact of operations and services provided to customers		
H	Climate and natural resource protection		Yes	Noise	Yes, woodland project
I	Fuel, energy		Yes		

Table 4 Internal environmental practices promoted by LSPs

Internal practices								
Company	Keeping fleet up to date	Optimisation of efficiency	Alternative use of vehicles/alternative vehicles	Certification	Education	Transport	Facilities	Packaging
A	Purchase of Euro 5 and Euro 6 trucks	Decreasing percentage share of 'empty kilometres', Responsibly managing transportation process, TLS system		EMAS ISO 14001	Eco-driving	Eco-friendly multimodality		
B	Renewal of air and road vehicle fleet	Route optimisation, transport volumes, load optimisation	'Burn less': Reduction of energy consumption, optimised aerodynamics, engine modifications, use of hybrid drive systems; 'Carbon-free delivery project' (electric vehicles) 'StreetScooter' project, electric mopeds for urban delivery		Eco-friendly driver training courses	'Green Freight Asia' and 'Green Freight Europe', use of sustainable biofuels, green road transportation, intermodal shipping, use of telematics systems	'Burn less', intelligent lighting; efficient heating and cooling solutions; energy-efficient building design; use of natural resources: daylight and rain water harvesting. - eco-efficient logistics centre	Yes

Table 4 Internal environmental practices promoted by LSPs (continued)

Internal practices								
Company	Keeping fleet up to date	Optimisation of efficiency	Alternative use of vehicles/alternative vehicles	Certification	Education	Transport	Facilities	Packaging
C	Purchase of Euro 5 and Euro 6 trucks	Optimisation of capacity utilisation: cargo volumes and fuel	Compliance with standards relating to toxic and hazardous substances	EMAS ISO 14001		Intermodal	Energy-efficient buildings	Paper, cardboard, plastic
D		Route optimisation	Electric courier bicycles			Intermodal	Renewable raw material (biomass for heating building), electricity generation using environmentally-friendly solar energy	
E		Maritime optimisation, efficient use of rt and logistics areas	Electric vehicles					Yes
F		Speed optimisation						

Table 4 Internal environmental practices promoted by LSPs (continued)

Internal practices								
Company	Keeping fleet up to date	Optimisation of efficiency	Alternative use of vehicles/alternative vehicles	Certification	Education	Transport	Facilities	Packaging
G		Cargo consolidation, hazardous materials, eco consumption		EMAS ISO 14001		Modal shift		Paperless round trip routes for general air freight
H	Purchase of Euro 5 trucks	Energy-saving driving, preferred carrier						Packing materials are reusable
I	Substitution of short-haul aircraft with more fuel-efficient ones		Electric and low-carbon emitting vehicles, electric-assisted tricycles, particularly for city deliveries Fuel-efficient innovations such as telematics, fuel savers and aerodynamic vehicle equipment	ISO 14001	Eco-driving	Co-founder of Green Freight Europe		

Table 5 External environmental practices promoted by LSPs

Company	External practices			
	Supplier selection based on ecological and ethical criteria	Supplier's code of conduct includes environmental considerations	Collaboration for the environment	Collaboration with partners for sustainable development
A				
B	Yes	Yes	Go Green products and services Green optimisation, environmental services	
C	Yes	Yes	Involving suppliers in improving fuel efficiency Engaging customers in optimising capacity and reducing emissions	
D			Promoting environmental awareness among suppliers and customers Simulating alternative routes for carbon efficiency Providing clients with a monthly CO ₂ footprint for their orders	
E				Actively liaising with other logistics operators and creating sustainable, environmentally friendly transport chains
F	Yes	Yes	Partnership with customers via virtual arrival	
G			Providing customers with key environmental data	Cooperative partnerships

Table 5 External environmental practices promoted by LSPs (continued)

Company	<i>External practices</i>			
	<i>Supplier selection based on ecological and ethical criteria</i>	<i>Supplier's code of conduct includes environmental considerations</i>	<i>Collaboration for the environment</i>	<i>Collaboration with partners for sustainable development</i>
H	Yes	Yes		
I		Yes	Zero-emission supply chain solutions for customers; providing CO ₂ information to customers and helping them reduce their emissions; engaging with customers in services: CO ₂ Report: CO ₂ Quote CO ₂ Scenario CO ₂ Neutral	With a partner, TNT Express has developed on-board computer technology that calculates fuel efficiency and provides insights into driver behaviour and driving style

5 Discussion

Logistics service providers harbour enormous potential in terms of disseminating sustainable initiatives. The theoretical and managerial implications arising from this research affect a wide range of current sustainability practices on which strategic and competitive operations can be based.

Logistics companies can invest in sustainability through innovation, which they can incorporate into their own organisation's products and processes. In addition, as they serve a large number of customers in the manufacturing and commercial fields, the positive effects of their activities may multiply (Cozzolino, 2009; Massaroni and Cozzolino, 2012).

Logistics service providers create linkages and interdependencies in the supply chain (McGinnis et al., 1995): linkages and interdependencies among supply chain processes and relationships should be taken into account when designing and implementing logistics services. This implies that network theory (Håkansson and Snehota, 1995) provides a framework for mapping activity and resource/capability dependencies and tracing their evolution over time. Such an approach would potentially offer insights into the dynamics of outsourcing and service design decisions (Selviaridis and Spring, 2007). Being a part of larger network means that companies interact and create relationships. These may prove to be particularly significant when it comes to multiplying sustainable benefits in supply chains, where the success of sustainable practices is strictly related to learning processes. According to Håkansson and Snehota (1995), such learning processes may regard economic actors using each other's knowledge and experience and joint learning based on several actors' knowledge and experimentation.

Based on these assumptions, LSPs develop both internal and external practices which are relevant to sustainable development. The former relate to 'learning-by-doing' processes, with LSPs acting individually while implementing sustainable initiatives, while the latter relate to how they exploit the knowledge of other economic actors, which may benefit supply chain sustainability as a whole. Vachon and Klassen (2006) proposed two sets of green supply chain practices: environmental monitoring focuses on results obtained by suppliers in terms of environmental compliance, while environmental collaboration presupposes the involvement of at least two actors in joint, cooperative activities focused on environmental concerns relating to supply chains.

6 Conclusion

Companies seeking to develop supply chain solutions that are sustainable are often hampered by their lack of control over the broader supply chain and the required specialist capabilities (Svensson, 2007). These practices can be internally and externally integrated within supply chains (Andersen and Skjoett-Larsen, 2009; Gimenez et al., 2012). In the former case, such practices concern internal knowledge enhancement which is mainly achieved through employee training, while in the latter they involve the development of common standards, such as codes of conduct, between organisations and their suppliers and customers. In such circumstances, the level of interaction and coordination between these actors needs to increase considerably with a fragmented supply chain (Bitran et al., 2007; Gimenez and Tachizawa, 2012). LSPs may facilitate the introduction of environmentally sustainable practices by themselves and other companies, and consequently green management of the supply chains in which they operate. This paper sets out a taxonomy of initiatives promoted by LSPs and may serve as a viable starting point for companies interested in developing sustainable practices. From this perspective, successful LSPs may serve as a benchmark for the uninitiated to learn about the implementation of new practices and help companies seeking to establish best practices in their field of enterprise (Kumar et al., 2012).

However, this study presents a number of limitations. The main one relates to the lack of generalisability across the various sectors in which LSPs operate. Further case studies are necessary, for example through geographical extension. Future research may also be extended by considering the social dimension. In doing so, it would be useful to analyse how LSPs can contribute to sustainable supply chain management, which requires a broader vision and must highlight simultaneously the economic, environmental and social aspects of business practice.

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