Green practices in the logistics service industry: A comparative case study analysis between Hungary and Italy

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Abstract

Due to the more critical role of third-party logistics service providers (3PLs) in the supply chain and the significant environmental impact of their operations, such companies are increasingly requested to respond to the challenges of green logistics by implementing more environmentally sustainable strategies. Even if the number of research works increased over the last years, there is the lack of studies comparing 3PL's green practices operating in different countries. Accordingly, the main aim of this paper is to shed light on environmental sustainability practices undertaken by a sample of ten 3PL companies in Hungary and Italy. The analysis is specifically focused on the implementation of green initiatives and the most significant drivers and barriers influencing their adoption.

Keywords: Green actions, Drivers and inhibitors, Italian and Hungarian logistics service providers

Introduction

One of the greatest challenges of the 21st century is to shift production and consumption toward more sustainable patterns in order to live within the limits of our planet. Production and manufacturing is known to have great environmental impact and services are to be considered less harmful for the environment. Transport and logistics services are exceptions. According to Yossi and Klaus (1997, p. 3) "The globalization of commerce has created the need to procure material and parts from far-flung locations and sell finished products globally. Furthermore, many global companies who truly manage operations worldwide have emerged, creating a need for intra-company international movements of material..." causing a harmful impact on the environment. Consequently, more green transport and logistics services have become a major concerns for 3PLs.

In the EU, the transport sector has the highest emissions followed by energy industries. The total CO_2 emissions caused by transport in the 28 EU countries (see Figure 1.) were 1036.2 million tons in 2016 (EC, 2017), which is the 28.5 percent of the overall CO_2 emissions in Europe. In Figure 1, it is interesting to note that the energy sector and transport sector are followed by industry, households, retail and agriculture (EC, 2017).

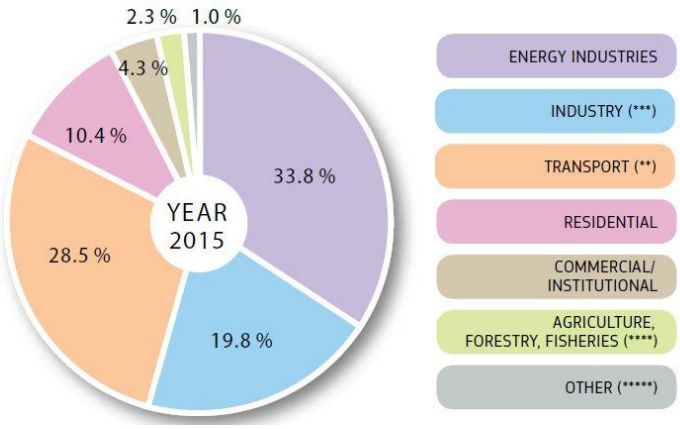

Figure 1 - CO_2 emissions by sector in the EU-28 (source: EC, 2017)

As shown in Figure 2, emissions from transport in the EU are well above the 1990 base year and they have an upward trend in contrast to other industries (EC, 2017).

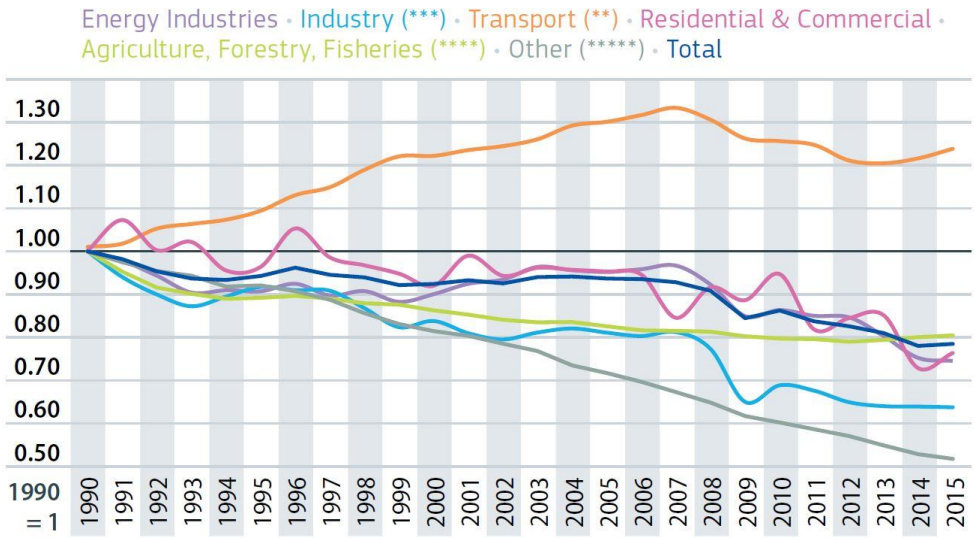

Figure 2 - CO_2 emission trends by sector in the EU (source: EC, 2017)

Several studies have shown that the implementation of green measures in logistics and transport may result in achieving or reinforcing the competitive advantage of 3PLs (see for example Fürst and Oberhofer, 2012), but it is not yet clear which green programs may give the best "value for money" for improving the company performance and reduce costs. (Lin and Ho, 2008).

Evangelista (2014) argued that relatively little research has been published on the environmental sustainability strategies and actions adopted in the logistics service industry, although the term "green logistics" are more and more frequently used by businesses. In addition, the extant literature on green practices in the 3PLs' industry provides findings predominantly from a single country perspective. This is a serious gap because of cross-country analysis could be of help in understanding differences and commonalities of green practices adopted by 3PLs located in different countries as well as drivers and barriers. Dekker et al. (2012, p. 671) defined green logistics as the "…practices that aim to reduce the environmental externalities, mainly related to

greenhouse gas emissions, noise and accidents, of logistics operations and therefore develop a sustainable balance between economic, environmental and social objectives".

Starting from this definition, this paper is aimed at analyzing green logistics practices in terms of the type of green initiatives adopted and the factors (drivers and barriers) influencing their implementation in a sample of 3PL case study companies operating in Hungary and Italy. The following section presents a short overview of the existing literature on environmental sustainability in the 3PL industry. The third section describes the methodological approach used. The main findings obtained from the case study investigation are presented in the fourth section. Finally, conclusion and implications deriving from the study are drawn in the fifth section.

Literature review

This section provides an overview of the extant literature on the green actions adopted by 3PLs and the main factors influencing their adoption.

Green initiatives implemented by 3PLs

The articles dealing with green initiatives show that the research efforts have followed two main approaches: one is based on the analysis of single measures, while the second discusses the adoption of multiple measures by 3PLs and their possible classification. The papers belonging to the first approach emphasize the role of multimodal transport to minimize the environmental impact of 3PLs' operations. Rondinelli and Berry (2000) argued that 3PL companies should adopt strategies based on proactive environmental management and provide a conceptual framework for understanding the interactions among multimodal transport activities and their impact on the environment. Lammgard (2012) indicate that the role of customers and competitors is crucial in driving the adoption of intermodal road-rail transport services for reducing carbon emissions and improve environmental performance.

In relation with the second approach, Lieb and Lieb (2010a) classified the green initiatives adopted by large 3PLs into four categories: administrative, analytical, transportation-related and "other". Isaksson and Huge-Brodin (2013) investigated how the service offering is affected by green initiatives in six 3PLs operating in the Swedish market. They identified three patterns in the development of green initiatives. The first focused on strategic standpoint of the greening of the 3PLs' activities. The second involves customer orientation and the transferring and sharing of green knowledge and competences. Colicchia at al. (2013) classified the environmental actions implemented by the surveyed companies into two macro categories: "intra-organizational" practices (including distribution strategies and transportation execution, warehousing and green building, reverse logistics, packaging management and internal management) and "inter-organizational" practices (including collaboration with customers and external collaborations). The results show that initiatives related to distribution strategies and transportation activities are the most widely implemented, while initiatives involving internal management are not broadly adopted. Kellner and Igl (2015) analyzed the impact of different logistics network on CO_2 emissions in the distribution stage. Findings shown that logistics providers that are able to adopt a decentralized shipments consolidation approach obtain the most relevant results in terms of reducing emissions. The work of Abdullah et al. (2016) investigated the involvement of 3PLs in green logistics initiatives in the Malaysia logistics service market. Those actions were classified within three areas such as customers, logistics operations and logistics amenities. The results indicated both positive and negative impacts when green initiatives are adopted.

Factors affecting the adoption of 3PLs' green initiatives

The first topic area relates to articles analyzing factors influencing the adoption of green initiatives by logistics service companies. In an early work, Wong and Fryxell (2004) examined the influence of stakeholders on the environmental management practices in fleet management in Hong Kong. The study found that environmental management practices among fleet managers appeared to be modestly influenced by stakeholders. Lin and Ho (2008) and Ho et al. (2009) analyzed the factors influencing logistics companies' attitudes toward environmental management practices in a sample of Taiwanese 3PLs. The results indicate that the diffusion of knowledge about green practices can help the transfer of technological knowledge within the organization and can raise the willingness to adopt green actions. Lieb and Lieb (2010a) conducted a survey on a sample of 20 CEOs of large logistics companies operating in the North American market. The findings indicate that the most important factors triggering their involvement have been "the corporate desire to do the right thing" and "customer pressures".

Similarly, the survey carried out by Lin and Ho (2011) on a sample of 322 Chinese 3PLs reveals that different types of factors, both internal and external to company, influence the adoption of green practices. Jumadi and Zailani (2010) highlighted the importance of customer influence on green practices of 3PLs. Beskovnik and Jakomin (2010) discussed the challenging role of green logistics in Southeast Europe. They identified long-term contracts as an important driver for implementing green measures by 3PLs. Oberhofer and Dieplinger (2014) identified a number of influencing factors such as the pressures coming from upstream actors in the supply chain, the structure of the logistics and transport sector and the importance of energy efficiency in the long run. Perotti et al. (2015) found that key motivations for adopting green practices are environmental reputation and the need to establish a company green image. High investments, lack of interest of suppliers and customers in environmental sustainability and difficulties in identifying and measuring environmental performance have been identified as main barriers to green practices implementation.

Assessment of literature

The analysis of the articles described above allows synthesizing different perspectives concerning environmental sustainability in 3PLs and identifying missing themes and related research gaps. The analysis of papers included in the topic area concerning the adoption of green initiatives and the impact on 3PLs' performance highlights a clear lack of a comprehensive taxonomy of green initiatives that put in evidence the degree of involvement of 3PLs at different supply chain levels. Another missing dimension in the extant literature on green actions adopted by 3PLs is the lack of country comparison. In fact, most, if not all, existing research contributions provides findings predominantly from a single country perspective.

The literature on factors affecting the adoption of 3PLs' green initiatives highlights an unclear picture about driving and hindering factors. All the papers included in this topic area analyzed a number of factors triggering and facilitating sustainability actions by 3PLs. It emerges that there is not a consensus in relation with the nature and origin of factors facilitating the adoption of green initiatives by 3PLs. Furthermore, none of the papers analyzed indicate any linkages with theories that may explain why certain factors are more influential than others. Almost all the papers belonging to this topic area are based on questionnaire surveys. Given the qualitative nature of the major enablers and inhibitors of green actions, there is the need to integrate the results of quantitative investigations with more qualitative research that have the potential to generate deeper and richer insights.

Methodology

The investigation conducted in this research was based on multiple case studies. The case study methodology allows to gain a deeper understanding of a phenomenon under development or whose dimensions are not yet fully understood (Yin, 2003). Additionally, the multiple case approach allows for the comparison of two or more business situations to support explorative investigations (Eisenhart, 1989; Yin, 2003). In relation with the sample, it was decided to compare an equal number of companies in the two considered countries for performing a balanced country comparison. We selected ten different companies overall. We consider this number of case studies to be sufficient to capture changes in theory and concepts, considering that this research is explanatory in nature (Aastrup and Halldórsson, 2008). Companies were selected in the domain of the so-called Third Party Logistics (3PLs) service providers (Evangelista, 2014). In order to compare and contrast practices and attitudes in two different geographical contexts, we selected companies based in the Hungarian and Italian logistics service market. The selection of the companies was based on the following specific criteria:

a) including companies differing in the range of services provided;

b) including companies with different emphases on environmental sustainability.

To ensure reliability, a formal interview protocol was developed. It contained a mixture of open and multiple choice questions. In each case, the interview protocol was submitted to the company CEOs or the managers responsible for sustainability within the company. Interview reports were produced to enable data analysis. Moreover, triangulation of data was carried out through the concurrent examination of company documents such as internal presentations, reports, and external documentation, as well as web sites. A cross case analysis was then performed, to uncover themes, patterns of commonality and key differences (Ghauri, 2004). For confidentiality reasons, the name of the case companies has not been disclosed and each company has been referred to by using the acronym of the country (IT or HU) followed by a sequential number. Table 1 provides the summary profile of each of the case companies included in the sample in terms of range of services provided, geographical reach and company size.

Table 1 - Profile of the case study companies

		IT1	**IT2**	**IT3**	**IT4**	**IT5**	**HU1**	**HU2**	**HU3**	**HU4**	**HU5**
Services provided	Transport	x	x	x	x	x	x	x	x		x
	Warehousing		x	x	x	x	x	x		x	
	Distribution				x	x	x			x	
	Value added services		x	x	x	x	x	x	x		
	SCM services					x	x		x		
Geographical reach	Regional										
	National									x	
	Europe	x	x	x	x			x	x		x
	Global					x	x				
Company size (by employee bands)	1-9 (micro)										
	10-49 (small)				x	x		x	x		
	50-99 (medium)	x									
	>100 (large)		x	x			x			x	x

Main findings

This section describes the main findings achieved from the ten case study companies analyzed.

Green actions adopted

Table 2 shows the proportion of each green initiative adopted by case study companies in the two countries and the combined averages. The classification of green initiatives reflects that used by Evangelista et al. (2017)

Table 2 - Green initiatives implemented by the Italian and Hungarian 3PLs

Area	***Initiative***	***IT***	***HU***	***Combined average of IT and HU***
A1. Vehicle use	Changing vehicle specifications	20%	60%	40%
	Reducing empty running	100%	80%	90%
	Improving vehicle loading phase	100%	60%	80%
A2. Transport modes and intermodality	Using lower energy transport modes	80%	40%	60%
	Greater use of intermodality	40%	60%	50%
A3. Energy efficiency in transport	Renewable energy (including alternative fuels)	80%	0%	40%
A4. Recycling materials and packaging	Increasing waste recycled	40%	60%	50%
	Reducing packaging	60%	40%	50%
A5. Warehousing and green building	Eco-friendly building design	0%	60%	30%
	Energy-efficient material handling equipment	0%	60%	30%
	Use of alternative energy sources in warehousing	60%	60%	60%
	Efficient land use	0%	0%	0%
A6. Environmental training and information	Employee training (including eco-driving and tyre pressure monitoring)	80%	60%	70%
	Customer/supplier training	40%	0%	20%
	Information on carbon footprint	60%	40%	50%
A7. Supply Chain re-organization	Transport planning (including route optimization)	80%	80%	80%
	Changes in logistics system	60%	40%	50%
A8. SC collaboration on shared green targets	With customer	20%	20%	20%
	With other 3PLs	20%	0%	10%
A9. Collaborative planning and environmental control	Environmental Management System (ISO 14001)	80%	20%	50%
	Emission off-set programs	20%	0%	10%
	Setting lower GHG targets	40%	0%	20%

As far as vehicle use (A1) is concerned, the reduction of empty running and minimizing loading time were the most popular solutions. The Hungarian respondents often interpreted changing vehicle specifications as a modernization of their fleet, meaning that Euro 4 and 5 rated vehicles are replaced by the most current Euro 6 vehicles. From the interviews, it is possible to say that currently around half of the companies use lower energy transport modes, but there is a growing interest toward intermodal solutions (A2). In the interview protocol, energy efficiency in transport (A3) means using alternative fuels. There are great differences between the two countries. In Hungary none

of the respondents is using alternative fuels. In waste management (A4), the reduction of packaging materials and the selective collection of waste are realized only in 50 percent of companies.

In average, 30 percent of companies gave a positive response to the environmentally friendly deployment of warehouses and buildings (A5). There is a great difference here as well, because none of the Italian companies reported on using eco efficient building design. Hungarian respondents meant the insulation, the replacement of doors and windows, the development of lighting technology, the use of motion sensors, the use of cooling and heating systems etc. The alternative energy sources are used by 60 per cent of companies, but we must note that it works as an additional energy source in all cases.

None of the respondents reported about efficient land use. Which is interesting in terms of real estate industry. On the other hand, employee training, typically eco-drivee training, is used by 70 percent of 3PLs on average. The carbon footprint calculation tool is also used by more than half of the respondents. It is interesting to note that we received very extreme responses from Hungarian companies. There were some that use carbon footprint calculations in their quotations and invoicing. On the other hand, there were those who said the carbon footprint calculation method was unknown for them. Only Italian companies have greenhouse gas reduction targets and take part in emission off-setting programs (A9). Fifty percent of the companies have environmental management systems (ISO14001) (A9) in place and, at the same time, 90 percent of them has quality management system (ISO9001). In terms of supply chain-level cooperation (A7, A8), route optimization and distribution system optimization is relatively popular among the respondents, but cooperation with customers and other 3PL providers in order to achieve environmental goals is significantly low used.

Factors effecting the implementation of green initiatives

During the interviews, it was asked what are the factors that facilitate the implementation of green programs (see table 3) and what are the factors that hindering such implementation (see table 4). Significant differences have been found between Hungarian and Italian companies.

Table 3 - Top 4 drivers of implementation of green initiatives

Top 4 drivers of implementation of green initiatives	
 Hungary	 Italy
Cost reduction for company	Improvement of corporate image on the market
Increase of the company's profitability (e.g. ROI)	Green initiatives requested by management
Green initiatives requested by management	Improvement of customer relationships
Improvement of customer relationships	Cost reduction for company

The most important driver for Hungarian logistic service providers was cost reduction, followed closely by meeting management-level expectations, enhancing competitiveness and improving company's image. In the case of Italian companies, the improvement of

corporate image, request by management and the improvement of customer relationships was followed by cost reduction for the company.

In relation with barriers, both countries have emphasized the high investment costs, and lack of financial resources. The lack of economic incentives and funding is also a problem in both countries. In addition, Hungarian respondents identified the lack of customer environmental awareness as key hindering factor and accounted for the lack of know-how/human resources for the implementation of green programs. On the other hand, it is interesting that Italian companies lack well defined regulations.

Table 4 - Top 4 barriers to the implementation of green initiatives

Top 4 barriers hindering the implementation of green initiatives	
Hungary	Italy
High investment costs and lack of financial resources	High investment costs and lack of financial resources
Lack of customers environmental awareness	Lack of funding/economic incentives
Lack of funding/economic incentives	Doubtful payback
Lack of human resources available for green programs	Lack of well defined regulations

Discussion

It is clear from Table 5. that not all companies apply all of the listed initiatives, and not with the same intensity of implementation (Pieters et al., 2012). The level of effects of these green initiatives was analyzed. There are some that exert their effects at company level and some at supply chain level. Colicchia et al., 2013 use a similar categorization: intra-organizational (e.g. distribution strategies and transportation execution, warehousing and green building, reverse logistics, packaging management, and internal management) for company level actions and intra-organizational (e.g. distribution strategies and transportation execution, warehousing and green building, reverse logistics, packaging management, and internal management) for initiatives at supply chain level.

Table 5 - Summary of green actions

Green Actions	**IT1**	**IT2**	**IT3**	**IT4**	**IT5**	**HU1**	**HU2**	**HU3**	**HU4**	**HU5**	**Total**
Results in decreasing costs	6	7	9	8	4	11	8	7	2	6	**13**
Improves environmental performance	0	5	3	4	8	3	1	0	1	3	**9**
Level of effects: Supply chain	0	4	2	3	8	2	1	0	0	3	**8**
Level of effects: company level	6	8	10	9	4	12	8	7	3	6	**14**
Total	6	12	12	12	12	14	9	7	3	9	**22**

Differences have been found between 3PLs operating in both countries in relation with the main aims of implementing green initiatives. In terms of their objectives, the green actions have been divided into two groups: some of them aim to improve the environmental performance of the company, and some other are mainly used for cost reduction. Green programs that have been implemented for economic reasons are also

beneficial in terms of environmental sustainability, but differences are expected in the attitude of companies to implement them. In both countries, win-win solutions (e.g. reduction of cost and improvement of environmental performance) were the most popular. This finding contradicts the popular assumption in business that environmental protection results in more expensive operations.

When analyzing the case studies, a fundamental difference had been noticed between Hungarian and Italian 3PLs in terms of green practices. Hungarian companies prefer solutions that can be implemented within company boundaries, do not require cooperation with other partners and result in direct cost reduction. The low-level implementation of supply chain level cooperation might be due to the outsourcing phenomenon, very common in the Hungarian 3PLs market and was analyzed by Oláh et.al (2017). For Italian companies, a number of green initiatives are characterized by supply-chain cooperation, with the goal of reducing emissions throughout the supply chain. Perhaps, it is possible to argue that, Italian 3PLs prefer to co-operate with each other and with their customers.

In relation with drivers, internal economic and financial drivers (e.g. cost reduction and increase profitability) are much more important for Hungarian companies. On the other hand, external drivers (e.g. improve corporate image and relationship with customer) are the most influential drivers for Italian companies as suggested by Lieb and Lieb (2010) and Evangelista et al. (2017). As far as barriers are concerned, economic and financial issues are the major inhibitors of green initiatives implementation for Italian companies. Hungarian companies indicated almost the same factors as inhibitors of green initiatives. This is in line with the arguments posited by Oberhofer and Dieplinger (2014).

Conclusions and implications

Due to globalization the logistics service industry is playing a key role in our economy. Eco-efficiency for logistics service providers is becoming important because of the state of our environment, the growing awareness towards sustainability and because environmental issues can be used to gain competitive advantage in terms of cost savings. According to our knowledge no research had been conducted on sustainability practices of Hungarian 3PLs. For this reason, one of the expected outputs of this paper is to raise attention about emissions in the logistics industry and the huge potential for emission reductions in Hungary. The study gives insight to current green practices by case study analysis of five Hungarian and Italian 3PLs. Our main finding from the case study analyzes is that (1) there are significant amount of green initiatives in both countries that are improving the environmental performance and reducing costs for 3PLs in the field of transport and other management operations. The other findings are in connection with the analyzes of each country. We can conclude that (2) Hungarian 3PLs currently implement more intra-organizational green initiatives, that have their effects on the company level, and result in direct cost reduction. We found quite weak willingness for cooperation on the supply chain level among the respondents. (3) The Italian companies prefer to cooperate on the supply chain level and the improvement of corporate image on the market is the most important driver of implementing green initiatives.

As a future research possibility, it would be interesting to investigate the exact benefits of the green initiatives and determine which one is the "best value for money". In order to investigate this, performance measurement systems of the companies should be analyzed, and best practices identified.

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