PAPER TITLE

Sustainable supply chain management needs sustainable logistics services. The strategic role played by logistics service providers.

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ABSTRACT

Purpose – The purpose of this research is to examine the concept of sustainable service co-creation in triadic business relationships in logistics and supply chain management. More companies seek to develop sustainable solutions that would not be sustainable exclusively for themselves but for the supply chain they belong to. In doing that – especially when dealing with services – they may need the external support from logistics service providers (LSPs). This paper aims to explore the innovative initiatives undertaken by LSPs in triadic relationship management with their customers and suppliers while co-creating sustainable services along the supply chain.

Design/methodology/approach – To investigate the research question, a systematic literature review and empirical exploratory investigation through case study will be conducted adopting the qualitative methodology, to explore trends and evolving paradigms.

Findings – A literature review conducted in this paper enriches existing literature through an integration of sustainability in a viable system approach and logistics service provision, in particular, it investigates the ways in which sustainability is achieved. It is assumed that the triadic relationship among an LSP and its customers and suppliers requires significant modifications in collaboration and an innovative approach in operating procedures.

Research limitations/implications – This paper is an exploratory study and limited in its scope to an example of a relationship that focuses mainly on three actors: the supplier, the LSP and the customer. However, it could be extended in terms of numbers of case studies investigated.

Practical implications – The implications arising from the literature and the empirical research offer a range of current sustainable practices in the services sector. This could be a starting point for other research and company activities.

Originality/value – There is little research that addresses the issue of sustainability and logistics service providers simultaneously, hence the present paper is meant to fill the gap by providing a foundation which actors of different supply chains could use as a benchmark. This study gives evidence of how logistics services may contribute to sustainable development.

Key words – sustainable supply chain management, logistics service providers, viable system approach, co-creation, business relationship management

Paper type – Research paper

Assignments: Paragraphs 6 and 9 to Cozzolino Alessandra; par. 4, 5, 7 and 8 to Wankowicz Ewa; par. 1, 2 and 10 to Massaroni Enrico; and par. 3 to Kleinaltenkamp Michael.

1. Introduction

Nowadays, the rules of competition are being modified by several factors. Those resulting from globalization, dispersion of processes of value creation, and shortened product life cycle give an opportunity for companies to do business worldwide while taking advantage of lower costs. At the same time, this extension of processes participating in value creation recalls a major importance of supply chains. In fact, what is being faced nowadays by companies is the necessity of acting "together". Said actions, based on the fact that each company is a member of a wider network and thus does not act alone (Ford et al., 2003), imply going beyond a company's boundaries (Rullani 2010; Antai, 2011), which is particularly relevant within the value chains (Greenhalgh, 2001). Other factors, deriving from broadly understood stakeholders' requirements, are frequently bound for sustainability of business. Taking into account the supply chain as a unit of measure to compete in a turbulent environment, and given the importance of sustainability, leads both managers and researchers to focus on sustainable supply chain management. In this perspective, if the supply chain is to be managed with sustainability considerations, the development of sustainable practices becomes crucial (Linton et al., 2007). This concept becomes more evident when it comes to supply chain competition which companies currently face and no more business versus business competition (Sahay, 2003; Christopher 2005; Cozzolino, 2009; Massaroni and Cozzolino, 2012; Asby et al., 2012; Chun Hsien Liu, et al., 2014).

For many years, the service sector was believed to have a minor impact on sustainability (Rossi et al., 2013). Now, the number of outsourcing practices in the logistics sector is increasing and making supply chain management even more complex. Increasingly now, due to the considerable impact of logistics service providers on environmental and social conditions, their selection as a supplier of services can be seen as a matter in procurement (Large et al. 2013). The negative externalities attributable to logistics services can be divided into economic, environmental and "human" (Massaroni, 2002). With the expansion of the service sector and increasingly ongoing practices of outsourcing of logistics services, logistics service providers should become responsible for the introduction of sustainable practices too. Their role becomes essential for effectiveness and consequent performance of a sustainable supply chain (Panayides and So, 2005).

The research question is: What are the innovative initiatives undertaken by logistics service providers in relationship management with their suppliers and customers while co-creating sustainable services along the supply chain?

2. Sustainability definitions and the viable system approach

Sustainability could be seen as the result of sustainable development (Diesendorf, 2000), where the latter concept deals with *"development which meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED, 1987). That implies the equal use of natural resources to avoid waste and not damage the environment. Nevertheless, although this definition has been commonly accepted by academia and practitioners, the element of business was missing. In order to include the lacking item, Elkington (1997) translated principles of sustainable development into something significant for business introducing the concept of triple bottom line, which extends accountability of business beyond the profit. There is a need to change companies' behaviors basing them on new aspects that deal with social equity and environmental protection.

In this paper, sustainability definition is based on a theoretical approach named viable system approach that is considered to be a *"methodology for interpreting contemporary business arena and to manage it"* (Barile and Polese, 2010, p. 27) and which was developed, among others, by Golinelli and Barile in the 2000s. Moreover, this approach is *"one of the best ways of understanding the processes involved in the government of a firm"* (Golinelli et al., 2011). In this approach, the firm is seen as a viable system acting in certain contexts where other viable systems and single components are present. The main finality of the firm is to survive. The simultaneous integration of the above-mentioned elements is relevant as it can assure viability of the system, but at the same time, requires significant changes in government decision-making processes. The

viability of the firm can be achieved if it is sustainable (Barile et al., 2014). That means that firms have to develop business behaviors based on consonant relationships and resonant interactions with other entities (Barile et al., 2014).
Sustainability is seen as a powerful means for long-term relationship maintenance, where major attention put to sustainability can facilitate durable relationships and vice versa these relationships can draw the attention of parties to it (Barile et al., 2013). In fact, the survival capacity of a firm depends on relations and interactions that it can manage (Barile and Polese, 2010).

3. Supply chain and supply chain systems

A supply chain encompasses all individuals, organizations, resources, activities and technologies that are involved in the creation and sale of a product or service. Although using the term "chain" a supply chain nowadays typically is seen as network of actors being active on the different stages of production and delivery of goods and services (Carter, Dale and Choi, 2015). Furthermore, a number of additional members "play a vital but indirect, supportive role in the movement, storage, and transformation of products across organizations" (Carter, Dale and Choi, 2015, p.89). This means that besides the physical supply chain there also exits a support supply chain that enables the basic chain to work effectively and efficiently. Following this, supply chain management is, from the perspective of a focal firm, the oversight of the relevant materials, information, and finances moving from primary suppliers to manufacturers, wholesalers, retailers and finally to the consumers.

3.1 Changes in supply chain systems: the impact of diversified consumer markets

Supply chain systems have gone through a lot and partially dramatic changes over the last decades. They are mostly driven by developments on the respective consumer markets in which the end-users of the specific products or service are located. The first important development is the increasing demand for tailored consumer goods which results in a further differentiation of products. To what degree this trend has been caused by highly individualized consumer demands or has been encouraged by the marketing and sales strategies of the suppliers remains a matter of debate. In either case, the respective markets were divided into smaller segments resulting in a corresponding diversification of goods as the suppliers offered a larger numbers of models and variations.
In the very most cases, such an offering of customized consumer goods was and is primarily aiming at an increase of revenues. In tailoring products to customer requirements, sellers intend to exploit their customers' willingness-to-pay, to increase customer satisfaction and thus improve customer lock-in, and finally to improve their position in the overall price competition. Still, this development results in non-negligible costs, although often overseen in practice, primarily those of complexity. To customize products and/or services it is necessary that customers' needs or wishes are specified and transferred into the seller's value chain as new elements. This has a significant effect on the division of labor and thereby on the value chains in question.
Already Adam Smith (1876) pointed out that a higher degree of division of labor lowers production costs while increasing output. At the same time, this in-crease also requires a higher amount of coordination and cooperation activities among the different performers be they individual workers, corporate divisions or entire organizations, which typically results in an increase of overall costs (Tseng & Jiao 2001). The more specialized the actual processes and process operators, the higher the resulting costs of coordination. Due to price competition, the increased costs resulting from customization are rarely acceptable for the average manufacturer, since they will hardly be compensated for by increased revenues – even if we assume higher prices can be achieved due to the customized offer. Two ways of solving the problem typically are chosen (Kleinaltenkamp 2007). The first solution involves a lowering of the costs of coordination, a process normally undertaken with the help of modern information and communication technologies. A second solution is to redesign division of labor in a way that lowers coordination and production costs. This is only possible if significant areas of value creation can be shifted to less expensive suppliers

without increasing – and perhaps even by decreasing – the costs of coordination. This has led to the effect that enterprises in the consumer goods industry are increasingly focusing on their core competencies, primarily in the areas of product development and marketing, whereas nearly all other operational areas are being outsourced to other organizations.
Due to these trends in the consumer goods industry, we note two main spill-over effects affecting business-to-business markets. The first is that production moves from the consumer goods to business-to-business markets and the second is that the question of the optimal division of labor in relation to the changed market conditions gains significantly in importance.
Since suppliers take over bigger shares of value-creation, they are forced to discover new and more optimal forms of division of labor (upstream). As a result, sellers in business-to-business markets have started to take over more and more value-creating processes of their buyers, thus becoming providers of service, which may be sold individually or together with the product.
Thus, the more customer-specific a seller's value-creation processes is the higher is the need to adjust the supplier's own value chain. This degree of customer integration and adjustment is the major factor affecting the division of labor in business-to-business markets and the physical distribution of value-creating activities.
This has far-reaching consequences for the choices offered by suppliers active in business-to-business markets. Here, the customers' decisions regarding their own proportion of value added shape the possibilities that emerge for the suppliers to take over value creating processes that the customers themselves do not wish to handle themselves. In this way the possible needs of a customer depends on its make-or-buy decisions.

3.2. The demand for environmental sustainability

A second and further challenge for supply chain systems is the need or the demand for greater environmental sustainability. This can be observed by the fact that sustainable initiatives related to value chain systems have become increasingly important in recent years. In times of rising energy costs and growing public pressure by end consumers, NGOs and policy and due to the fact that supply chains become more and more transparent, achieving sustainability has become an important objective of corporate strategies. Thus, at the same time, companies get greater insight into the costs but also the potential benefits which are associated with social and environmental projects (Sarkis 2003). Hence, marketing as well as management theorists claim that the management decisions should capture environmental issues (e.g. Carter & Rogers, 2008, Sharma et al. 2010). These 'green' supply chain initiatives relate to the product life cycle, corporate processes and logistics as well as other organizational practices influencing the environment (Sarkis 2003). More and more such strategies focus on the entire supply chain, as the focal enterprises understood that sustainable objectives cannot be achieved solely by their own ecological relevant capabilities (Lee 2008). Consequently, these strategies can be defined as programs that aim to transfer primarily innovative environmental management practices on the entire value chain by taking advantage of relationships between customer and supplier firms (Lee 2008).
According to Walton, Handfield & Melnyk (1998), there are two reasons for the implementation of such measures. First, environmentally sustainable initiatives are designed in order to shape corporate activities in a way that they are consistent with legal requirements or in response to new legal guidelines. This is referred to a as a "receptive approach" (Walton, Handfield & Melnyk, 1998, p.3). Second, there is the possibility that the organizations themselves apply environmental thinking onto the entire value chain and therefore look for new environmental improvements, which is seen as a "constructive approach" (Walton, Handfield & Melnyk, 1998, p. 3).
Such environmental initiatives can start as pure operational actions which may develop to a point from which they become an environmental strategy and change the corporate culture in within the organization (Walton, Handfield & Melnyk, 1998). An example for such a development is waste prevention. For the production of a particular product or service resources are used, which partially end up as a part of the product on the one hand and in become waste on the other. Thus, for economic reasons, i.e. to save costs and optimize production, a firm should always think about on

how to increase the productivity of the respective inputs in order to minimize the associated residues (Kumar, Teichman, & Timpernagel 2012). At the same time, such activities are environmentally sustainable, since the resources are used more conscientiously.
Accordingly, the implementation of green initiatives in business-to-business sector refers to supply and demand throughout the whole supply chain system. Such initiatives relate to waste management, inventory control, logistics, lean management, including build-to-order, and the interplay of reuse of waste products, recovery of used goods and recycling of produced semi-finished and finished products.
Mostly, it is the focal company that gives the impetus for a green initiative within the supply chain. According to Vachon & Klassen (2006) there are two options to change the suppliers' behavior: environmental collaboration and environmental monitoring.
In the case of environmental collaboration, the initiating organization will intervene directly and actively in creating a green supply chain or through implementing an individual initiative and use their own resources to support the suppliers in implementing the necessary actions. Examples are seminars or the transfer of know-how and technical resources. Thus, an additional value is achieved through the cooperation between the members of the supply chain, where the common solution of an environmental problem plays the key role.
Environmental monitoring, in contrary, involves practices which are focusing on risk reduction for the focal company. These include the evaluation of environmental records, company-specific questionnaires and special audits which are performed by either the customer or independent third parties (Vachon & Klassen 2006). Hence, ISO 14001 became more and more standard for the selection of suppliers, for example in the automotive industry (Vachon & Klassen 2006), although it can be implemented voluntarily (Sarkis, 2003). Another example are questionnaires which are sent to their own suppliers. They request information on the general attitude toward the environment, the willingness to cooperate with the focal organization and the planned visit of supplier seminars, but also on their willingness and capabilities in adopting and to implementing green initiatives (Lamming & Hampson, 1996).
If environmentally sustainable initiatives are big enough and include large portions of firm activities, they may have an impact on the entire supply chain (Walton, Handfield & Melnyk, 1998). Through the right selection of measures and their effective implementation the value chain may develop into a green supply chain, the scope of which goes far beyond normal supply chain activities. Therefore, according to Kumar, Teichman, & Timpernagel (2012), green supply chain management should represent a win-win strategy for all companies involved. It combines a gain of customer loyalty (Homburg, Stierl & Bornemann 2013), sales and market shares and the reduction of environmental risks (Kumar, Teichman, & Timpernagel 2012) with an increase in ecological efficiency that can have a positive impact on all the specific actors (Carter & Rogers, 2008, Zhu, Sarkis, & Lai, 2007).
In spite of these advantages, many organizations are still slow in perusing green supply chain management approaches, although they have received significant attention. The reasons for it are multifaceted. One is that the different parties involved in such an initiative may not have the same view of its ecological sustainability or their behavior is not aligned properly as there is no consensus on measures which should be used for assessing its success. Furthermore, such methods needed to monitor and evaluate the progress and the performance of the initiatives are lacking or are only in a developmental stage. And last but not least, the strategies are not pursuit because of their unsatisfying short-term results, even if significant benefits are seen in the long run (Bose & Pal, 2012).

4. Sustainable supply chain management

In the past few years, a great interest toward sustainability along supply chains has been shown by both academics and practitioners. This is somehow related to the structure of the competition that companies are called upon to act in. In fact, nowadays businesses deal with supply chain competition rather than single business to business competition. Factors that have changed the way

to compete are related to the globalization of markets. The possible reason and consequences is fragmentation of the process of value creation which is reflected in the rising difficulties of supply processes management. In the light of the above pattern, supply chain management becomes as relevant for profitable value creation as it is essential for sustainability. Since the supply chain is present during all stages of product and service creation, it can contribute considerably to adaption to the requirements imposed by sustainable development.
The following table presents definitions of sustainable supply chain management that are commonly cited by the research community.

Authors / year	Journal	Ebsco	Definition of sustainable supply chain management	Service presence
(Carter and Rogers, 2008) pp. 368	*International Journal of Physical Distribution & Logistics*	*112*	*"The strategic, transparent integration and achievement of an organization's social, environmental and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual and its supply chain"*	*No*
(Seuring and Muller, 2008) pp.1700	*Jounal of Cleaner Production*	*159*	*"Sustainable supply chain management as the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements"*	*No*
(Ciliberti et al., 2008), p. 1580	*Jounal of Cleaner Production*	*20*	*"Sustainable SCM is defined as the management of SCs where all the three dimensions of sustainability, namely the economic, environmental, and social ones, are taken into account"*	*No*
(Pagell and Wu, 2009) pp.38	*Journal of Supply Chain Management*	*67*	*"A sustainable supply chain is then one that performs well on both traditional measures of profit and loss as well as on an expanded conceptualization of performance that includes social and natural dimensions"; "If a sustainable chain is one that performs well on all elements of the triple bottom line, sustainable supply chain management is then the specific managerial actions that are taken to make the supply chain more sustainable with an end goal of creating a truly sustainable chain".*	*No*
(Hassini et al., 2012) pp.70	*International Journal of Production Economics*	*10*	*"The management of supply chain operations, resources, information, and funds in order to maximize the supply chain profitability while at the same time minimizing the environmental impacts and maximizing the social well-being"*	*No*
(Ahi and Searcy, 2013) pp. 39	*Journal of Cleaner Production*	*5*	*"The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term."*	✓

Table 1 Service consideration in sustainable supply chain definitions selected; Source: authors

The above table is not exhaustive, even though it enables the drawing of some interesting observations. The first is that sustainable supply chain management is a relatively new field. The second is that only one defines explicit service as an important element of supply chain management according to sustainable consideration. This situation could be the result of prevalence definitions of the supply chain focusing on processes related to the good creation, transportation, delivery as the main aim of its management. In fact, the most traditional and commonly recognized definitions of supply chains refer to the different organizations working independently for product creation and its delivery to final customers, thus regarding materials, services, finances and information as flows from upstream to the downstream of the supply chain (Mentzner et al., 2001). That reflects a goods-dominant logic perspective, where operand resources are moved downstream by independent entities. Within supply chains we deal with processes that may seem to be characterized by immateriality and intangibility too, e.g. logistics services, but they do realize highly value-added activities (Mentzner, 2001; Tokman and Beitelspacher, 2011). In fact, many processes of supply chains are themselves services (Lusch, 2011). Adding that in business-to-business relationships, the order winning criteria have become service-based rather than product-based (Christopher, 2005), the impact that can have flexibility or reliability on customer satisfaction is enormous. Companies are economically successful if they offer sustainable services (Cocca and Ganz, 2015).
Nowadays, as a result of a new theory called service-dominant logic, these entities have become the value co-creation networks (Mass et al., 2014), where exchange is based on service (Vargo and Lusch, 2004).

5. Sustainable supply chain management and the service-dominant-logic

Lusch et al. (2010, p. 20) theorizes that the logic of supply chain management and service-dominant logic *"fit naturally together",* since *"supply chain management is concerned with developing and integrating resources to create competitively compelling value propositions".*
Even if, traditionally, service has been seen as an opposite of good in terms of its characteristics (immaterial/material; intangible/tangible, etc.), in service-dominant logic the nature of service has changed. Now, according to Vargo and Lusch (2004, p. 2) it has become *"the application, of specialized competencies (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself*". The service is meant as a *"process of doing something beneficial for and in conjunction with some entity*" (Vargo and Lusch, 2008a., p. 26). Nevertheless, services and goods are not mutually exclusive, neither are alternative forms of the product (Vargo and Lusch, 2008a). Service by its nature focuses on intangible items, called operant resources, like knowledge and skills. These resources are the sources of competitive advantage (Vargo and Lusch, 2008b). However, if *"no service is purely intangible"* (Sampson, 2010, p. 350), that suits logistics services perfectly. That kind of service, which is growing and which is intended to follow this trend, is particular due to the co-presence of operand and operant resources. The shift of focus from tangible to operant resources can foster sustainability (Vargo and Lusch, 2008a). That occurs when the firm provides service flows and efficiently maintains recycling tangible operand resources. It means that there is a need to give great attention to total cost of ownership and the lifecycle of products, rather than concentrating on selling enormous amounts of goods (Vargo and Lusch, 2008a). Nevertheless, neither service nor good can constitute *per se* sustainable competitive advantage, since more specific competences are needed. These are deriving from the changes in the environment and the context in which the firm operates that is marked by uncertainty and rising complexity, thus forcing the firms to develop new ways of doing business. First of all, collaborative competences are essential for sustainable competitive advantage (Lusch et al., 2007). In turn, these collaborative competences can be extended to absorptive and adaptive competences (Lusch et al., 2007). The first refers to the ability of an organization to understand trends and know-how in the external environment. These, combined with organizational learning capabilities, can allow the firm to become more co-creative (Mele, 2009). The second focuses on the ability to introduce

adjustments in ways of doing business, required by the mutable context by using the firm's partner as a mechanism (Lusch et al., 2007). Secondly, in the networks of interactions, each actor (node) "serves" the others by trying to enrich the offer through customization, flexibility and relational intelligence (Rullani, 1997). Co-creation of value, based on collaboration, has become a key success factor in the logistics service (Juga et al., 2010; Lusch et al., 2010; Yazdanparast et al., 2010; Yong Li, 2015), where mutual interdependence characterizes the relationship between producer and user based on mutual interdependence (Rullani, 1997).

Wolfson et al. (2015), posit that sustainability is a complex and intangible value that can be delivered from provider to customer via a co-creation process e.g. service. So the service can be seen as a vehicle of sustainability. It appears that this aspect is highly relevant if we observe today's sectors distribution in the economic scenario and its contribution to the employment rate.

According to the report published by Accenture (2012), logistics service providers with other interconnected businesses can contribute to a truly sustainable supply chain. The aforementioned factors causing supply chain competition, at the same time, give rise to the importance of logistics services for profitability of business, where service providers participating in economic systems, generally speaking, are responsible for "minimizing environmental impact of industrial activities" (Cocca and Granz, 2015, p. 181). Green services are when a set of pre-determined ecological sustainability criteria are implemented (Cocca and Granz, 2015, p. 181).

Initially, the service dominant logic was created in 2004 by Vargo and Lusch with eight propositions, and then expanded by Vargo in 2009 into ten propositions. The following table aims to give comprehensive adoption of the service dominant logic to logistics services (Yazdanparast et al., 2010).

Premise	Explanation-justification	Adaptation to logistics service
FP1 Service is the fundamental basis of exchange	The application of operant resources (knowledge and skills), "service" is the basis for all exchange. Service is exchanged for service	Logistics service creates solutions for quick product delivery. It is possible through exchange of operant resources.
FP2 Indirect exchange masks the fundamental basis of exchange	Goods, money, and institutions mask the service-for-service nature of exchange	Goods, money and institutions etc. are elements of logistics service and thus make it a complex process.
FP3 Goods are distribution mechanisms for service provision	Goods (both durable and non-durable) derive their value through use – the service they provide	An efficiently managed logistics service can be considered to be responsible for the failure or success of the product.
FP4 Operant resources are the fundamental source of competitive advantage	The comparative ability to cause desired change drives competition	A customized logistics service requires the ability to create new approaches to the business and the customer through highly-personalized solutions.
FP5 All economies are service economies	Service (singular) is only now becoming more apparent with increased specialization and outsourcing	Logistics service plays an important role in the service-based economy, especially when we deal with globally dispersed supply chains that constrain firms to outsource non-core activities.
FP6 The customer is always a co-creator of value	Implies that value creation is interactional	In a dynamic context of logistics service, it is crucial for the provider

		to comprehend both the customer and the environment in which it operates.
FP7 The enterprise cannot deliver value, but only offer value propositions.	The firm can offer its applied resources and collaboratively (interactively) create value following acceptance, but cannot create/deliver value alone.	Involvement of the customer in value creation implies, simultaneously, its presence in determining it. The provider can deliver a value proposition but the customer is needed for its creation, shaping and definition.
FP8 A service-centered view is inherently customer oriented and relational.	Service is customer-determined and co-created; thus, it is inherently customer-oriented and relational	Logistics service is created for a specific customer in order to satisfy well-defined and identified needs, thus it is customer-oriented. The relational nature of service derives from its interactivity between the customer and the logistics service provider.
FP9 All economic and social actors are resource integrators.	Implies that the context of value creation is networks of networks (resource-integrators)	The value creation requires integration of own logistics provider's resources with others that can be provided through the market or public and/or private sources.
FP10 Value is always uniquely and phenomenologically determined by the beneficiary.	Value is idiosyncratic, experiential, contextual, and meaning-laden	The logistics service is tailored for the unique customer, thus it is experiential and delivered in a specific context.

Table 2 Adaption of service–dominant logic to logistics service, Vargo and Lusch (2008b); Vargo (2009); Source: Adapted from Yazdanparast et al., 2010.

In order to achieve sustainability of supply chains, companies are called upon to find innovative ways of competitive advantage creation. Different processes involved in supply chain management produce output that can be synthesized in the form of products or services, and that can be designed with sustainability consideration. In this scenario, the role of logistics service providers is important as they collaborate with traders, manufacturers, and retailers, and so they are present along all supply chains. In some way, they contribute to the sustainability of supply chains.

6. Logistics service providers and sustainability

Studies of the literature on logistics service providers and sustainability relate almost exclusively to environmental sustainability and eco-efficiency, and lack a systemic approach: that includes three dimensions - environmental, social and economic - and a network perspective of analysis instead of the single business or at the customer-supplier dyad. Furthermore, the potential of logistics service providers as "enablers" of sustainable management of the supply chain is not much debated in the foregoing research (Kudla and Klaas-Wissing, 2012).

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 (Murphy et al., 1994; Berry and Rondinelli, 2000; Seuring and Wolf, 2010; Rossi et al., 2013). With a view to environmental sustainability, in particular, among all different services, logistics 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 resulted in 30% of CO^2 emissions and the rate tends to increase in comparison to other sectors that have managed to instead reverse the trend (European Commission, 2012). From a social sustainability point of view, in particular, the logistics sector is employment intensive (Kudla and Klaas-Wissing, 2012).

Dey et al. (2011) identify four reasons why it is important to invest in the sustainability of logistics: the value of the brand, the misuse of resources, institutional intervention, and international standards and regulations. Here, then, through a range of stakeholders, including consumers, investors and policy makers, the sustainability of economic actors that offer logistics services tends to take more and more attention (Lieb and Lieb, 2010). The activities of logistics providers have significant environmental and social, as well as economic, impact.
The European Commission (2001) states that, the goal for the logistics sector is to "disconnect mobility from its adverse effects". Many large companies operating in the logistics sector have increased their engagement in sustainability programs as a source of competitive advantage despite the recession (Lieb and Lieb, 2010). As stated by Prokesch (2010) *"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"*. Moreover, as several authors point out (Wolf and Seuring, 2010; Lammgard and Andersson, 2014), the support of sustainable logistics providers to their customers is increasingly a requirement for the selection of the logistics provider by the customer's own business. Sustainable services offered by logistics providers for sustainability have an important impact on the broader issue of relationship/network.
Although the importance of the sustainability of services offered by logistics service providers emerges in many contributions, nevertheless there is still much to understand empirically in terms of specific actions taken by these actors within the three dimensions of sustainability and in a network perspective. To go deeper in this direction, it is interesting to analyse the growing trend of companies which voluntarily express their commitment to sustainability through the activities of "sustainability reporting".

7. Methodology

The theoretical background of this paper was created on resources from Ebsco, Science Direct and Emerald data bases. To gain a deeper understanding of the phenomenon of interest, the empirical part was developed through on-desk investigation, consulting data bases of Global Reporting Initiatives. This international standard was recognized by many researchers as most common worldwide (Supino and Sica, 2011; Marimon et al., 2012; Roca e Searcy, 2012). In coherence with the aim of the present study, major attention was given to small, medium and large private companies operating in the logistics sector in Europe. The selection of companies followed the objective (report availability on Gri or company websites) and subjective criteria (related to the language of documentation-only reports written in English were considered; core businesses of specific provider-only transport of goods were analyzed; update level of each report - the latest reports available were analyzed). Initially, 21 reports were identified. After accurate application of the above-mentioned criteria, the number of companies included in the analysis decreased to six logistics service providers. The websites of selected companies constituted the secondary source of data. Afterwards, the qualitative content analysis was conducted. The content analysis, *"has been widely used as it is a way to infer from data what would be too costly or too obtrusive to obtain by the use of other techniques"* (Krippendorff, 1980, p. 51). Furthermore, this technique is often applied in the study and analysis of sustainability reports. Content analysis is aimed at finding the specific characteristics of relationships between logistics service providers and their customers, as well as, between logistics service providers and their suppliers. These relationships were studied in the supply chain vision to explore how different actors contribute to sustainability of the supply chain in which they operate. This research is focused, although based on desk investigation, on the triadic interface between the logistics service provider, its customers and suppliers which has resulted as being appropriate to study the inter-firm relationships (Choi and Wu, 2009). The triads are considered the essential items of networks (Choi and Wu, 2009). Future research could consider the whole network including actors like other stakeholders.

8. Findings

8.1 Overall findings

The following table presents the overall information about companies, their reports and operations.

2014	REPORT						OPERATIONS
	Application level	Status	Pages	Report type	Content (word frequency)		
					Sustainability	Supply chain	
DHL	B+	Third-party-checked audited by PwC	93	GRI - G3.1	17	27	12,000 sites worldwide; Present in more than 220 countries; In the reporting year, the total value of goods and services purchased by the Group amounted to €9.5 billion; 475,000 employees
	"Our SUPPLY CHAIN division provides its global customers with effective and cost-efficient waste management, waste reduction and recycling services and solutions"(p. 70); *Green Optimization along the entire supply chain*						
CLH	In accordance - Comprehensive	Externally verified by KPMG	174	Gri G4	41	8	39 storage facilities; 28 airport facilities; 1,396 suppliers, supplied 3,000 euro; 109 strategic partners, 76 with an environmental management system ; 86 companies are audited for compliance with labor and safety requirements; 3 suppliers have a Corporate Social Responsibility System; In reporting year 95.77% were purchased in Spain; 1,405 employees
	The CLH Group works to extend the commitment acquired in corporate responsibility to its supply chain.						
HHLA	B+	Financial statements have been audited by Ernst&Young	174	GRI - G3.1	67	1	Its operations are conducted in 31 domestic and 8 foreign subsidiaries;

							4,680 employees
	Purchasing can improve supply chains and optimize the supply process						
Norden	C+	Third-party-checked-audited by PwC	24	GRI - G3.1	2	10	285 owned and chartered vessels; 280 employees on shore and 805 on board owned vessels; 52 employees at its offices in Denmark, Cyprus, Singapore, the USA and Brazil.
Panalpina	In accordance - Core	Not externally verified	32	GRI - G4	32	18	500 offices, operations in 70 countries; partner companies in 90 countries; manages 500 branches; 16,000 employees
	"The objective is to improve the supply chain end-to-end by cutting out process waste and reducing direct and indirect costs" (p.6)						
TNT	In accordance - Core	Financial statements have been audited by PwC	187	GRI - G4	21	21	Own operations in 61 countries; active in 200 countries; TNT Express' European road network Connects more than 40 countries through 19 road hubs and over 550 depots, Aircraft in global air fleet. Approximately 53,100 employees worldwide.
	"[…]eliminating sources of inefficiency from the supply chain (including that of the suppliers and customers) *in several ways, such as integrating networks and infrastructure, bundling multiple parcel deliveries or shifting to off peak period. They also reduce CO2 and pollution by replacing conventional vehicles with 'zero-emission' transport, with the aim of securing crucial access to city centres"* (p. 186)						

Table 3 Characteristics of operations of logistics service providers; Source: authors

8.2 Who are the suppliers and customers of logistics service providers?

The following table represents the part of the supply chain where selected logistics service providers operate during provision of logistics services. Logistics service providers assume different roles depending on processes in which they are involved; they act as buyers and suppliers as well.

What they buy	LSP	Who they serve
Supplier		Customer
Materials 33% Contracting services 67% Altogether 69 million Euros; electricity and communications suppliers; the companies that provide CLH with essential materials for its activity, such as instrumentation, tanks, pipes, valves, and also additives for oil products.	CLH	"Essential stakeholder"; Petrol station, industrial facilities, airline companies, Other aviation fuel users in the vicinity of airports, Large-scale consumers, Strategic reserve agencies, Biofuel producers, International traders, Raw materials manufacturers, *The services offered to the customers are "fuel storage and transportation, as well as the supply of fuel for aviation."(p. 81)*
Procurement expenses: 24% services, 15% IT and communications, 13% Ground fleet, 12% Air fleet, 11% transport services, 10% real estate, 8% network supplies, 7% production systems	DHL	Consumer and retail in the following sectors: Life sciences & healthcare, technology, energy, automotive and engineering & manufacturing, aerospace, chemical, fashion;
38% MRO; 30% equipment/energy; 17 % construction; 15% IT; 15% of transactions are handled via e-procurement systems	HHLA	Shipping companies, freight forwarders, steel companies, power stations in the field of bulk cargo handling, international operators of ports and other logistics centers. Sector: logistics, trading companies, media, consulting, advertising agencies, fashion firms.
n/a	NORDEN	BP Shipping Ltd., Gearbulk, Rio Tinto Marine, Shell International Trading and Shipping Company Ltd., BHP Billiton or Morgan Stanley; other shipping companies
Leases aircraft or warehouses, charter vessels, partner with transport and logistics subcontractors; purchases limited amounts of materials (paper, water); the infrastructure of ships, trucks, and airplanes	PANALPINA	Automotive, chemicals, fashion, healthcare, hi-tech, manufacturing; retail and consumer
n/a	TNT	B2C, B2B - small and medium-sized enterprises

Table 4 Logistics service providers in triadic relationship

8.3 The logistics service providers, their suppliers and customers for sustainability

This paragraph represents main initiatives realized by the suppliers and customers in collaboration with logistics service providers found in the corporate responsibility reports.

a) Supplier management

CLH promotes an Ethical Code among suppliers and business partners. The Code of Conduct is aimed at setting ethical and responsible behavior inside of CLH and among business partners. These, together with other shareholders and the community, are involved in defining the Corporate Responsibility policy; in particular, these groups are involved in considerations regarding "the assignment of high priority to environmental management and protection, control and safety of the facilities, occupational health and safety, relations with the community and the stakeholders themselves, ethics and integrity, and attracting and retaining talent" (p.51). The supplier as the main stakeholder benefits from direct economic value created by CLH through "money spent on supplies" (p. 64). DLH has developed the Responsible Procurement Model that is aimed at "extending the commitments of the Code of Ethics and sustainability criteria to all its value chain" (p. 70). CLH supplies are managed and approved using the RePro system. All strategic partners (109) are included in the RePro system. In terms of social sustainability, the initiatives are: "working with local suppliers, and developing safety practices that concern its employees, contractors, suppliers, customers, community" (p. 72). The safety and prevention policy is based on the "zero accidents" philosophy in facilities and during all processes. Suppliers are invited to send orders, invoices, technical information, reports, etc. via internet to avoid sending them in physical format. The CLH Group "is preparing the carbon footprint and gathering information on its

suppliers' energy consumption and activities carried out outside the organization's reach" (p. 162). The company works constantly with suppliers to assess their compliance and to guarantee that their conduct conforms to the principles of the Code of Conduct (p.73).

Norden has developed its own Supplier Code of Conduct (SCoC) as a tool for supplier selection and verification of compliance of existing suppliers. The SCoC *"goes beyond the requirements set by the United Nations' guiding principles and includes provisions regarding labour rights, the environment and anti-corruption."* (p. 4). Suppliers are being constantly involved in collaboration in order to *ensure that they live up to the SCoC's standards* (p. 18). In future, the SCoS standard will be included in all supplier contracts. In this way, the sustainability compliance changes from being an order winner criteria to an order classifier. Norden has moved forward with its Responsible Supply Chain Management (RSCM) project created in collaboration with International Marine Purchasing Association (IMPA) and Danish ship owner J. Lauritzen. This permitted the creation of IMPA ACT, the RSCM system, that *"will allow members to access a common database with information regarding suppliers that have already been through the process and are therefore considered to be "in compliance" with the Supplier Code of Conduct"* (p. 18)". Norden support that *"focusing on reducing our CO^2 emissions is not only good for the environment; it also has a direct impact on our bottom line as fuel consumption is the largest expense in operating our vessels"* (p. 7), therefore, pursuing the economic and environmental dimensions simultaneously is not mutually exclusive rather, it is mutually profitable.

Panalpina does not select suppliers with sustainability considerations, but aims at implementing these criteria in supplier evaluation in the future (p. 20). Suppliers' role is crucial for Panalpina, as they provide materials and infrastructures that serve customers' products and materials which are distributed globally. Suppliers of Panalpina, since they are important stakeholders and business partners, are involved through *"cooperative partnerships"* in regular audits *"to ensure compliance with Panalpina's policies and applicable laws"* (p. 30).

Panalpina prevalently focus on services provided to their clients. Sustainability of performance is strictly deriving from the clients' requirements and it is guided by the evaluation made by customers on suppliers in terms of sustainability.

TNT directly controls subcontractors and suppliers, policies, and guidelines "*to ensure they meet TNT Express' environmental management requirements"* (p. 34). The business principles are included in the strategic, operational decision-making process and in supplier contracts. These principles deal with business ethics. In relation to sustainability, a few of them are worth mentioning: "TNT *provides its employees with safe and healthy working conditions that are free from* harassment*;* Pursues best practices and complies with and where reasonably possible, *exceeds laws and regulations in the areas of health, safety and environment; Deploys policies that prevent, identify and eliminate hazards in its business operations and continually measures and assesses its safety and environmental performance with a view to further improvement"* (TNT -website).

TNT Express' learning center provides, among others, learning interventions by combined delivery activities with own employees or external suppliers. This aspect is very important for supplier's education especially when it comes to new practices introduction.

TNT Express promotes smart, "zero-emission" supply chain solutions that *"work by eliminating sources of inefficiency from the supply chain (including that of the suppliers and customers) in several ways, such as integrating networks and infrastructure, bundling multiple parcel deliveries or shifting to off peak period" (*p. 186).

In HHLA, suppliers, together with other stakeholder groups, are involved in a Sustainability Council to discuss relevant key sustainability issues. HHLA creates partnerships with suppliers in order to integrate them into the development and optimization of products, facilities and processes. Every aspect of the relationship with suppliers is carefully analyzed and evaluated in terms of *"reliability, quality, innovative strength, cost structures and economic stability"* (p. 66). HHLA focuses on "using renewable energy, as well as highly efficient machinery and equipment" (p. 61). In 2011, the photovoltaic system was installed by an energy supplier. This development provided free electricity in considerable amounts of kWh in the reporting year. Additionally, the

environmental engagement is reflected in the reduction of energy consumption and noise pollution through computer-aided systems (p. 57). *"Environmental and social compliance is also becoming increasingly important for the company's suppliers in respect of their products, services and business policy",* (p. 62). HHLA adopts "*preventive measures to ensure both internal and external companies, customers, suppliers, visitors do not come to bodily harm"* (p. 64).

In DHL business partners, such as suppliers, have been obliged to respect the principles of the Code of Conduct since 2008. Suppliers' compliance with ethical and ecological aspects relates to *"child and forced labor are prohibited, and salaries and working times must comply with national laws and regulations"* (p. 28). As a member of the Partnering Against Corruption Initiative (PACI), DHL strategically fights corruption. DHL selects suppliers on the following criteria: cost-effectiveness and quality, but ethical aspects are also considered. The suppliers' Code of Conduct is an integral part of every contract and includes *"ethical and environmental standards and serves as the basis for sustainable procurement"* (p. 32). The use of electric delivery is preferred for urban deliveries, as they are a *"particularly climate-friendly and sustainable choice"* (p. 66). The alternative hybrid or natural gas drive systems are currently under investigation in collaboration with manufacturers and suppliers.

b) Customer management

NORDEN has customers who are dispersed globally, but continue to maintain close contact with them (p. 2). Norden, basing itself on the values of ambition, reliability, flexibility and empathy, defines itself as an *"independent long-term partner"* (p. 24). NORDEN aims to reduce CO^2 emissions and in doing so, create partnerships with customers and a weather routing company under the name of Virtual Arrival, but still "*customers are reluctant to participate as they do not see sufficient financial rewards"* (p. 7).

The vision of PANALPINA is to be the most customer-focused global provider of freight forwarding and logistics solutions (p. 2). To realize it, PANALPINA "*manages the needs of its customers' supply chain*s" with "*first-class, customized supply chain solutions"* (p. 2). Despite its global presence, it maintains *"very personal relationships with customers and high-quality service"* (p. 6).

The relationship with customers, which is recognized to be the most important, is based on trust, reliability, transparency, and through the efficient delivery of high-quality services (p. 18).

PANALPINA believes in strengthening relationships with customers by providing *"key environmental data to our customers as they request it"* (p. 4). Sustainability performance is now required by customers (p. 4.) as they have become *"increasingly aware of and asking for data related to the impacts attributable to the transport of their goods"* (p. 23).

Moreover, PANALPINA runs reports on behalf of its customers so they can develop strategies to reduce the environmental impact of the transport chain (p. 18). Future initiatives will focus on using sustainability activities to reduce costs and to strengthen relationships with customers. The social and environmental aspects relate to quality, health, safety, and environmental protection that are assured by integrated management of international standards ISO 9001, ISO 14001, and OHSAS 18001 (p. 21). The "*Ecotransit"* tool is an instrument which calculates emissions for each shipment based on distance, weight, transport mode, type of vessel or aircraft (p. 20). As an integral part of its strategy for sustainable growth, PANALPINA developed a global PanGreen program which aims at minimizing the impact of its operations and services provided to customers (p. 23). Customer opinions were included in the creation of the CSR report. In order to monitor customer satisfaction, PANALPINA conduct regular feedback surveys.

TNT operates in the B2B sector where it serves small and medium-sized enterprises and in B2C markets. Its business customers are concentrated in the industrial, automotive, high-tech and health care industries and are broadly distributed geographically (domestic, intra-Europe, intercontinental). TNT aims to achieve "perfect transactions" to deliver competitive products and services at competitive prices (p. 17). TNT involves customers with suppliers in eliminating any sources of inefficiency along the supply chain.

For CLH, the customer is *"at the centre of the very definition of its corporate vision" p. 74,* thus *"excellence in the service it provides to its customers is paramount"* (p. 73). In 2006, the CLH Group introduced the "EFQM model" as a tool for managing excellence, which permitted the development of projects and initiatives for gaining in effectiveness, in efficiency and in giving satisfaction to external and internal customers" (p. 79). The customer is the *"essential stakeholder"* of CLH's business (p. 81) and its satisfaction is *"maintained at maximum"* (p. 92). The service offered to customers is well-defined but can be modified and adapted to customers' requirements (p. 81). Customers, among other stakeholders, are involved in Corporate Responsibility policy. CLH wants to improve efficiency, to offer *"customers and society maximum values with the minimum consumption of resources*" (p. 83). CLH has modified its customer service invoicing system which reduces the consumption of paper (p. 85). This initiative has been approved by the majority of customers. "*The Values of the Company and its Vision is to contribute to economic, environmental and social progress, to provide customers with an excellent service, to guarantee profitability to shareholders, and to foster employees' promotion and work-life balance"* (p. 89) are elements on which the Corporate Responsibility Master Plan is based. Customer focus is explained under the slogan "Our aim, your satisfaction"; competence in cooperation, under the slogan "We grow as a team"; and competence that focuses on increasing openness and adaptation to change, under the slogan "One change, one opportunity".

For HHLA customers, employees and investors are the Group's key stakeholders. For HHLA, the ability to offer a tailored-made service to customers is crucial (pp. 12, 59). As stakeholders, customers participate in the Sustainability Council. HHLA adopts preventive and safety measures (p. 64). HHLA promotes regular dialog with its stakeholders who include customers, customers' customers and others (p. 166).

DHL offers a wide range of integrated logistics solutions (p. 12) divided in "easy-to-use standardized products" as well as *"innovative tailored solutions"* (p. 4) to meet customer needs. In DHL *"flexibility and rapidity is combined with efficient use of resources"* (p. 12). The initiative "Green Freight Europe" was created to help customers improve carbon efficiency (p. 7). Customers with employees, investors, national governments, institutions or other segments of society require that *"companies make a positive contribution to society and act responsibly in their ongoing pursuit of value creation and business growth."* (p. 17).

The principles are respect, tolerance, honesty, openness, integrity towards customers and employees, and the willingness to assume social responsibility (p. 27). The Code of Conduct is revised with internal and external stakeholders - customers). As declared by DHL "health of employees goes well beyond legal standards and requirement" (p. 53). DHL customers benefit from *"innovation expertise, which is directly translated into our range of green products"* (p. 65). These products give to the customers an *"access to our expertise through efficiency-improving consulting services*" (p. 59). An important element for sustainable procurement is collaboration with logistics companies, carriers and shippers (p. 60).

9. Discussion: logistics service providers and their role in sustainable supply chain management

These results suggest that logistics service providers' strategies for sustainability are still at an early stage of development, although there is great potential to gain efficiency and market advantages (Rossi et al., 2013), because companies are discovering that sustainable outputs will be more sustainable if value-adding logistics activities become sustainable themselves (Wu and Dunn, 1995). In fact, "outsourcing has a significant potential to increase sustainability in the supply chain as third-party logistics providers focus on improving resource utilization and making processes more efficient" (Facanha and Horvath, 2005). The results also suggest sustainability could be a driver for logistics service providers to migrate from simply delivering commodities to providing more strategic services (Rossi et al., 2013).

The theoretical and managerial implications arising from this research affect a wide range of current practices in sustainability from which strategic and operative directions to compete can be derived.

Logistics companies can invest in sustainability through innovation to be incorporated in products or processes for their own organization. Moreover, by virtue of their vocation for "service" to industrial and commercial enterprises, logistics providers can also "multiply" the positive effects of their intervention in a sustainable way for all customers served (Cozzolino, 2009; Massaroni and Cozzolino, 2012). In fact, companies seeking to develop supply chain solutions that are sustainable are often hampered by their ability to control the wider supply chain and also lack the required specialist capabilities (Svensson, 2007). Consequently, they need to draw on external support, from suppliers, distributors, and most of all, from logistics service providers. However, very little attention has been given to sustainability in the context of the logistics industry (Lieb and Lieb, 2010). As mentioned by Svensson (2007) the crucial point is that at that moment there is insufficient connection and synchronisation between first-, second- and n-order supply chains in building a sustainable supply chain. Moreover, the level of interaction and coordination among actors needs to increase considerably with a fragmented supply chain (Bitran et al., 2007; Gimenez and Tachizawa, 2012). In this context, logistics service providers have a great potential (Cozzolino, 2009; Massaroni and Cozzolino, 2012). In fact, some of the most innovative logistics providers have the capability to manage the supply chain for their clients in terms of operational support, management and planning of all elements of the logistics network: at the level of nodes (or points), strings (or segments) and, above all, of interfaces (or junctions), especially in these contact points there is, generally, a shift of responsibility that can create a discontinuity - physical, operational, temporal - which may lead to less attention to the needs of sustainability.
Logistics service providers can, therefore, contribute to sustainability in two ways:
- As a company; and,
- As a provider of services to other companies, industrial and commercial.
In this second case, they can sustain their customers' business to:
- Align with environmental limitations and protections imposed by social policy at the local, national and international level, or to anticipate the standard;
- Increase the economic benefits, especially in relation to cost reduction;
- Develop the differentiation strategy based on offering products with ecological benefits and care ethics for those customers willing to pay a premium price.
With respect to this last point, some studies in the literature, including that of Lammgård (2012), show that the sustainability aspects of logistics operators are not necessarily recognized 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, in these cases, "customers are still much more cost-focused" (Lieb and Lieb, 2010).
In any case, logistics operators 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: (1) the higher costs, (2) the complexity and the greater effort of coordination, and (3) 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 client, but are able to acquire the responsibility for the coordination of more or less large parts of the logistics process, replacing its customers (industrial and/or distribution), organizing and implementing them, and taking decisions with a certain degree of autonomy oriented to (1) reduce costs, (2) aggregate and then simplify the coordination and (3) ensure the necessary communication along the supply chain.

10. Conclusive remarks

This study constitutes the initial step in the analysis of business relationship management among actors involved in logistics services co-creation. At the same time, it addresses how these

relationships can be applied in the development of sustainability. There is little research on how a triadic vision of logistics services can contribute to sustainable development. This study could serve as a benchmark for logistics service providers in terms of relevant issues that should be considered when a sustainable service in a co-creative network is being delivered. However, it presents some limitations. An interesting area of future research could be the extension of geographical and time limits. Additionally, the next research could be focused on a broader vision of stakeholders involved in the analysis of logistics services co-creation. That would require going beyond the triadic point of view.

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