



HAL
open science

Sustainable supply chain management in city logistics solutions: an experience's comeback from Cityporto Padua (Italy)

Joëlle Morana, Jesus Gonzalez-Feliu

► **To cite this version:**

Joëlle Morana, Jesus Gonzalez-Feliu. Sustainable supply chain management in city logistics solutions: an experience's comeback from Cityporto Padua (Italy). 2009. halshs-00432624

HAL Id: halshs-00432624

<https://shs.hal.science/halshs-00432624>

Preprint submitted on 16 Nov 2010

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Sustainable supply chain management in city logistics solutions: an experience's comeback from Cityporto Padua (Italy)

J. Morana¹, J. Gonzalez-Feliu¹

¹ Laboratoire d'Economie des Transports ({joelle.morana, jesus.gonzales-feliu} @let.ish-lyon.cnrs.fr

Abstract : The sustainable logistics and transportation studies constitute a primordial research axis in the enterprises' governance. In the last years, many reflections and developments in logistics research have studied the economic and the environmental questions related to supply chain management, but only few of them consider sustainability in its totality. Moreover, in practice, city logistics systems conception and planning is currently following a sustainable approach. The aim of this paper is to start a reflection about the three dimensions of sustainable supply chain management (economic, environmental and social), and illustrate these concepts by the results of an experience's comeback from a city logistics system, Cityporto (Padua, Italy).

Keywords: Sustainable SCM, Experience's comeback, urban freight distribution

1. Introduction

The sustainable logistics and transportation studies constitute a primordial research axis in the enterprises' governance. For example, in the last International Meeting of Logistics Solutions (SITL 2009) in Paris (France), the Environment and Logistics Demeter Club and the French Agency of the Energy (ADEME) have validated 10 categories of "good practices" for a better respect of the environment (Les Echos Magazine, 24-03-2009, p. 30). But to speak about sustainable transportation and logistics needs to make a connection to the sustainable development concept such as that agreed in the Rio de Janeiro submit in 1992 whose aim is to meet the current needs without compromise the capacity of the future generations to meet their needs (Mrs. Gro Harlem Bruntland, former Norwegian Prime Minister, 1987). Its practice needs to be focused in a generational horizon (more than 25 years) and to join three consubstantial elements, which are respectively related to the economical, the environmental and the social spheres of the sustainable development.

Although several works deal with the economical and environmental aspects of transportation and logistics, general sustainable SCM modelling approaches have not been already proposed. The aim of this paper arises on a reflection about the Sustainable Supply Chain Management (SuSCM) modelling and characterisation. Indeed, the SuSCM

is being considered by the enterprises in the strategic actions that contribute to their durability. After presenting the main principles of a SuSCM approach, we will illustrate them by their practice at Cityporto, a sustainable urban freight distribution system in Padua, Italy. This experience's comeback show however that, although this project incorporates practices that can be considered as part of a SuSCM approach, the global reflection is only at its beginnings.

2. Literature review

Traditionally, urban freight transportation planning has been made by the operating companies. In the last years, the public authorities have started to get involved into the development of solutions to deal with the major problems of freight transportation in city centres: congestion, air pollution, noise and other nuisances. Some of the most common measures taken by the authorities in different countries are restrictive policies, mainly regulation on parking, and street access. In several countries, surveys and data collection activities have been undertaken, and some studies give elements of freight transportation analysis and organisation for urban areas (Dablanc, 1998; Visser et al., 1999; Gerardin et al., 2000; Taniguchi et al., 2001; Crainic et al., 2004; Rosini, 2005; Patier et al., 2007; Crainic, 2008; Bestufs, 2009). These efforts are aimed at better understanding and quantifying these phenomena and represent a first step in the development a new discipline, called by several

authors City Logistics (Taniguchi et al., 2001; Crainic, 2008) or Urban Logistics (Routhier, 2002; Anderson et al., 2005). The main goals of City Logistics measures and projects are related to congestion and air pollution rates, without a penalisation of the commercial activities in the city centres.

City logistics solutions are in general studied and conceptualised to be developed by the public authorities or with a strong support from this type of stakeholders. However, the main organisational aspects of these solutions are closer to those of many logistics operators, and a city logistics solution need to be considered in a global supply chain management point of view, integrated in the global chain(s) of the delivered products. For this reason, a SuSCM point of view has to be followed, in order to make a strong link between a city logistics solution and the supply chain(s) it is related to.

Considering the current economic, environmental and social context, it is imperative that an enterprise thinks "sustainably". Logistics is often considered by the different actors as the "reason to be" of each firm belonging to a supply chain. Without logistics, no raw material can be extracted, transformed and delivered to the final destination. As a natural continuation of the last works on logistics, more concretely those related to SCM, we reckon that it is now primordial to focus on Sustainable SCM that associates, reassociates and integrates all the works and reflections on the SCM (where the main questions related to freight transportation have also to be explicitly considered), the Green SCM, the Social SCM, and, of course, all reflections about the transportation's improvements.

From the literature in logistics, and more precisely on SCM, we can retain that Supply Chain Management (SCM) must be considered by the definition done by CSCMP (Council of Supply Chain Management Professionals): *"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies."* (Gibson et al., 2005). In general, SCM can be examined on the basis of three types of prerequisites: co-operation, human resources and performance (GRLT 1995; Cooper et al., 1997; Lambert et al., 1998; Bowersox, et al., 1999; Mentzer et al., 2001; Min and Mentzer, 2004). Considering the non-negligible weight of the

human factor in the transportation and logistics field, we think that the human resources prerequisite has to be specially studied in the Social SCM. In fact, SCM approaches focus on the cooperation and the organization of intra and inter-enterprise processes and the measure of its performance.

First, and in a general way, the cooperation prerequisite highlights the importance of a clear product/service design and process along the supply chain. In this context, a reflection must be done on the entire supply chain (upstream, production and downstream). Two elements are important in this prerequisite: traceability (ability to trace and follow a product) and transportation (physical transport of each product from A to B, defined respectively an origin and a destination point). Second, the performance prerequisite consists of simplifying a complex process for each organization in the business network. It highlights the driving role of information systems such as Advanced Planning Scheduling (APS), Enterprise Resource Planning (ERP), Electronic Data Interface (EDI), etc. But also, its recognition, from an organizational, tactical and strategic perspective, requires the definition of Key Performance Indicators or metrics in order to appreciate the competitive advantage. It is also important to adapt the transportation network to the economical, geographical, organizational and quality constraints (Crainic and Laporte, 1997; Wieberneit, 2008). More precisely, the main questions in freight distribution tactical and operational planning are related to supply and inventory policies (warehousing), vehicle routing and scheduling (transportation management), vehicle assignment to a route and crew assignment to each operation. In city logistics solutions, many aspects have to be considered in strategic planning (Gonzalez-Feliu, 2008):

- *Financial aspects*: financing is important for such systems. Many of them are based on public-private-partnerships (PPP), or in strong public authorities' subventions.
- *Infrastructural aspects*: the infrastructures' usage, alongside to the need of realizing new infrastructures, is evaluated.
- *Organisational aspects*: the distribution system has also to be defined.
- *Vehicle-related technological aspects*: once the distribution system is defined, it is important to find the adequate technological solution.
- *Information and Communication Technologies*, mainly related to traceability, assistance to drivers, communication tools and intelligent transportation systems.
- *Transportation planning tools*, to optimise routes, to manage vehicles and crews (even in

real time situations), or to model the traffic in order to evaluate the different solutions.

Another element of SuSCM concerns the Green SCM that highlights the environmental aspects of the supply chain. It is in the 90's that the Green SCM found a recognition in the scientific literature (Srivastava, 2007). In this field, we find the concepts of the eco-conception (Ademe, 2006) and the reverse logistics (Rogers and Tibben-Lembke, 1999). The Green SCM is defined as the *'integration of the environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life'* (Srivastava, 2007). It can then be consolidated by three elements: (1) the *'definition of the meaning and scope of various terms and suggests approaches to explore the area further'*, (2) the green design that includes the eco-conception criteria, developing an *'understanding of how design decisions affect a product's environmental compatibility'* and (3) the green operations that symbolise all the reflections about waste management or, in a more general way, the reverse logistics management.

But, the human factor is central to the management of any organization. If genuine attention is not paid

to the role of individuals within the organization, the gains that arise from SuSCM may be diminished. It is primordial to develop a Social SCM. To make it, we can refer to Gond (2006). Indeed, for this author, the sustainable development needs to be based on the human resource management. In this way, it is important to consider both the intra-organizational stakeholders (the employees of the company) and the inter-organizational ones (recognition made from the Stakeholders Theory). New trends on Human Resources Management have to be taken into account. In literature, we find several works that analyse the expected competencies by the responsible figures (Bironneau and Le Roy, 2005), but following the reflections made by Gond (2008), the Social SCM needs to consider each actor of the supply chain. According to Morana et al. (2008), it is necessary to define a Social SCM that integrates the social thought into the SCM. In consequence, we propose to follow the model proposed by Gond (2006), including the literature's social dimensions applied to the SCM field, as for example the general behavioural context, to be reconciled with the managerial and behavioural components + common culture / definition of roles/sharing of risks and rewards, rhythms of work, reduction of conflict, training, suggestion box), and to Green SCM. In brief, we propose to represent the components of Sustainable SCM as follows:

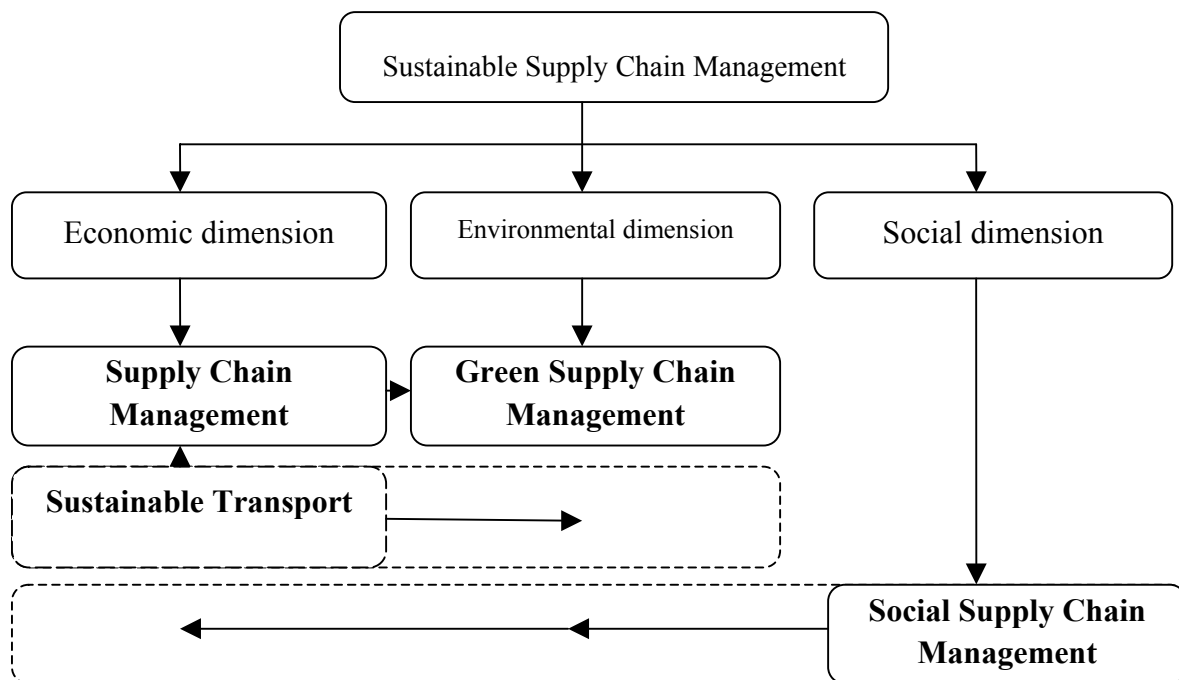


Figure 1 - Main components of the Sustainable Supply Chain Management

3. Data collection methodology

In this section, we present the data collection methodology adopted in this study. The aim of this research is to illustrate the main concepts of SuSCM in the case of city logistics solutions. A preliminary analysis of city logistics experience has been made from the available information on this type of experiences (Patier, 2002; Russo, 2004; Rosini, 2005; Gonzalez-Feliu, 2008; Spinedi, 2008; Bestufs, 2009). From these studies, we can appreciate that only few of them are nowadays operating, and in many cases they could not be maintained without public funding support. From these cases, only Cityporto, a urban freight distribution developed to deal with the nuisances in the city centre of Padua (Italy), is presented a project having a strong will of economic sustainability, and its business model has been applied to other urban areas, like Modena, Como or Aosta, all of them in the Italian Peninsula. For these reasons, we have centred our study in the analysis of this system in relation to the SuSCM concepts and the resuming schema proposed in section 2.

The data collection has been made by two complementary methods. First of all, a bibliographic research on Cityporto, based on both scientific literature (Marcucci and Danielis, 2006; Gonzalez-Feliu, 2008; Spinedi, 2008; Bestufs, 2009) and technical and operational documentation obtained before the terrain research. The second is based on four interviews to internal and external stakeholders related to Cityporto. The first was a directive interview, based on a detailed information form, to describe the general context and the different phases of the city logistics system's conception and experimentation. This interview has been made by phone. Other two face-to-face interviews have been made, one with the person that ideated and developed Cityporto, and the other with a representing member of the public authority that supports Cityporto with a favourising legislation. A detailed visit of Cityporto allowed us to understand how the daily operations are managed, making an open interview to the logistics advisor in order to obtain complementary information.

Table 1 - Modalities of the different interviews

<i>Name</i>	<i>Post</i>	<i>Entity</i>	<i>Type of interview</i>
Federica Frigato	Assistant	Interporto di Padova	Directive, phone
Walter Stefan	Vice-President	Interporto di Padova	Semi-directive, face-to-face
Ivo Rossi	Vice-Major	Padua Municipality	Semi-directive, face-to-face
Dino Compagni	Logistics Advisor	Cityporto	Open, face-to-face

Moreover, several internal documents have also been consulted during and after the visit when essential or complementary information (mainly key numbers and evaluation results) were required to complete our analysis.

This comeback is proposed to illustrate the different economical, environmental and social performances for what is defined a sustainable city logistics project that integrate both transportation and distribution logistics elements. These three dimensions are represented to test our central hypothesis of a Sustainable SCM that has to be daily verified in a company that is presented as a sustainable logistics provider (Stefan, 2009) and/or a contribution to urban sustainable mobility (Giordani, 2009).

Considering the several studies that study the links between logistics and sustainable development (Bulin-Munier, 2009), we built an interview guide for the two semi-directive interviews answering to Sustainable SCM. The definition of this guide was a long and difficult task, because this guide has to be flexible enough to allow the two actors of the

interview (the interviewed vs. the interviewer) to adapt their interventions to each another's constraints and needs, for example, to obtain the maximum quantity of responses respecting the highly restrictive constraint of time availability of the interviewed, which is in general a decisional figure in the enterprise or in the organisation of the public entity.

Taking into account this pre-requisite and having as references the different works presented in the literature review, we have defined the following interview guide (box 1):

Box 1. Interview guide

Economic variables

- Identification and analysis of each activity included in the enterprise's supply chain (infrastructures, standard procedures)
- Planning methods and technologies (information flows)
- Measuring methodologies and indicators
- Long term relations (contracts, partnerships) : gain's repartition among actors

Environmental variables

- Description of the environmental approach:
 - Actors' roles
 - Environmental performance measures
 - Internal waste management
 - Resource's conservation (CO₂, Energy)
 - Reverse logistics

Social variables

- Internal actions:
 - Formation
 - Idea's boxes
 - Management of stress situations
 - Friction reduction
 - Primes
 - Final consumer
- Actions undertaken on external stakeholders
- Syndicates and external stakeholders' support (transportation operator's consortiums and associations)
- Attractiveness
- Reputation and image

Padua city center and main motivators of Cityporto

Padua is an Italian medium city (about 250 000 inhabitants) that has a historical city centre recently classified as Human Patrimony by the UNESCO. The main urban transport problems in Padua are traffic congestion and noise, low air quality and large commercial road traffic into the city centre. Like other medium Italian cities, the municipality has defined a restricted access zone, called ZTL (local policy) to deal with this congestion. Further regulations are proposed by the Veneto region (regional policy). These regulations establish a time window within it is possible to enter the ZTL. In the rest of the day, only the residents and other authorised categories are allowed to enter. An electronic tag identification system has been adopted to increase the access control at the "gates" of the zone.

Cityporto

Cityporto is a urban logistics service proposed by Interporto di Padova S.p.A. The main purpose is to reduce the number of trips by maximizing the loading rates of vehicles and the usage of low-pollution. Further than that, Cityporto is a new service for freight transport operators destined to enhance the delivery flows of goods as well as to improve the quality of the city life. Operative since the 21st of April 2004, Cityporto of Padua is one of the few experience of this kind successfully operating in Italy.

The project, promoted by the Municipality and Interporto di Padova, in collaboration with the Province, the local Chamber of Commerce and A.P.S. Holding S.p.A. – Mobility Division, is the result of more than 18 months of an experience which involved also the transport operators. The Protocol of Agreement which established Cityporto has been signed on the 5th of April 2004 and established, among other things, a four year long contribution. The project forecasted a twelve months long first pilot stage directly managed by Interporto. The model laying on the basis of Padova urban consolidation centre is extremely simple: the transport operators or the self-transporting stakeholders deliver the goods to a logistics platform (a warehouse property of Interporto di Padova S.p.A.) located on the city surrounds where they are temporary stored; from this site depart the low-emission vehicles, i.e., those that have a low environmental impact in terms of CO₂ emissions and other air polluting gazes, which are intended for the distribution of goods in the city centre, i.e., the last mile of the supply chain. Nowadays, Cityporto's fleet has 9 vehicles: 7 methane small lorries (3,5 t), one electric small lorry and one methane light commercial vehicle (2,5 t). In the

4. Experience's comeback and first analysis

4.1. Context overview

Interporto di Padova S.p.A.

Interporto di Padova S.p.A. is a mixed capital company that operates as both logistics real estate company and platform management operator. This company was created to deal with the management and planning of the intermodal platform of Padua (Italy). This platform hosts nowadays about 80 companies and its inducted activity involves more than 3000 employees. Its surface is about 2 km² and has both a railway infrastructure and terminal facilities, like warehouses and cross-docks. Located in the North East of Italy, Interporto di Padova is connected to the main national and international railways and roads; it is thus a "strategic" logistic hub.

following analysis, the small lorries will be called city freighters and the other vehicle light freight-delivery vehicle (LFV). It is important to highlight that Cityporto is not an enterprise but a brand of Interporto di Padova S.p.A. The number of employees working partially) on this service are 3: two managers and one assistant. The logistics and commercial operations are made by a co-operative enterprise, where 12 people are affected to this service, plus one logistics advisor, who is an external consultant engaged full and long time on Cityporto's operational and commercial management.

4.2. First indices of “ Sustainable SCM ”

The main activities of Interporto di Padova S.p.A. are oriented on two main axes: intermodality and sustainability. The company manages an intermodal terminal, providing logistics and real estate services to providers and operators. The company's logistics

department holds a specific know-how to answer all technical and service logistics needs proposing a wide variety of services: consultancy, goods storage and management services, and assistance to national and international transportation, focusing on rail-road intermodal terminal services.

Cityporto is one of the sustainable logistics solutions of Interporto di Padova, more precisely the city logistics solution adopted in 5 Italian cities, where Padua was the first of them and the place of the project's conception and testing. The main activities of Cityporto are destined to transportation operators, although some self-transportation companies like furniture retailers are also customers of the service. The term customer will be used to define the transportation contractor, i.e. the operator or retailer asking Cityporto's services. The retailer will be the actor receiving the freight, although B2C transportation operations can also take place.

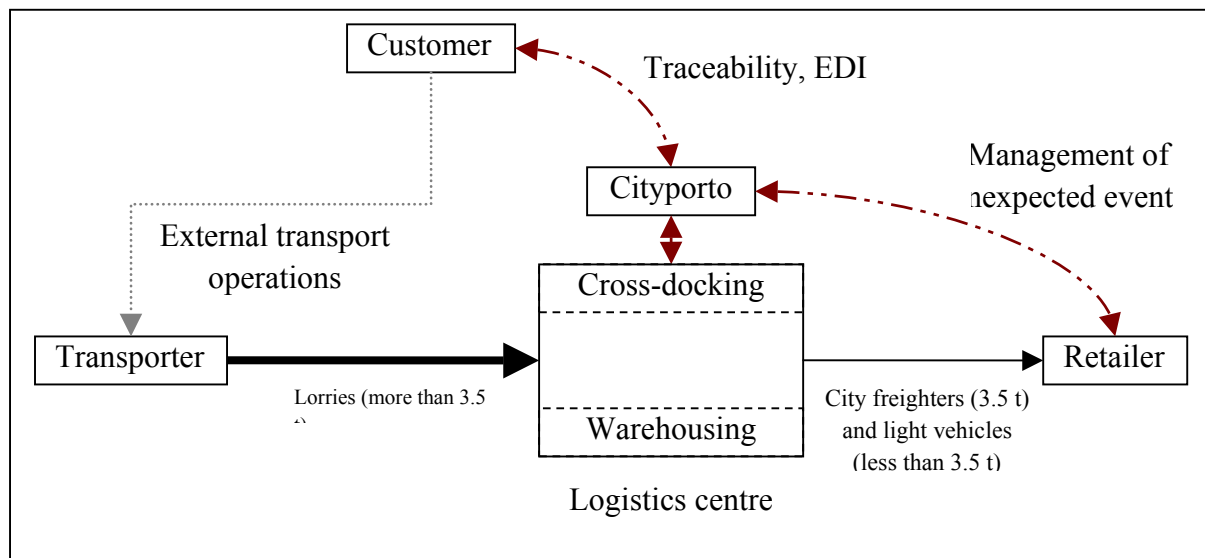


Figure 2 - Schema of the relations between Cityporto and their customers

The main activities are related to last mile urban freight transportation, and include transportation, cross-docking, warehousing, and management of rejected freight by the retailer or other non-delivering situations. In this case, Cityporto finds a solution in agreement with its customer to satisfy the main needs as soon as possible. The platform operations are assured by a co-operative enterprise, which are paid proportionally to the quantity of freight that passes through the platform. The tariffs of the service are contracted with each customer, in base of the quantity of freight to be delivered.

4.3. Economic dimension

Although the project was developed for environmental reasons, it is important to assure its continuity by a strong economic performance. For this reason, in 2003, after the signature of an agreement between the institutional stakeholders and Interporto di Padova S.p.A. related to Cityporto project initial founding and main guidelines, an industrial plan was developed. This industrial plan is based on the fact that the benefits of a city logistics system in a small or medium urban area are small, so the economic performance of the conceived system has to be to reach the balance in order to do not depend on public funding contributions to maintain it.

As a support to tactical and operational planning, a strong information system has to be developed. Cityporto has developed its own information system in synergy with Cityporto services. This information system allows to make a follow-up of the freight (traceability functions) and the preparation of the different commands to be delivered to each retailer. The freight traceability is made by the following procedures:

- Each received parcel at the platform is identified. Then, a new tag containing a Cityporto barcode is applied to the parcel. If the customer uses EDI to transfer the command documents, the tags are automatically prepared in advance by the system. Else, an operator prepares them when the parcel arrives.
- The parcel code is activated in the system. A GPS-based tool sends the code and the geographical position to the central server of the system.
- The central server is informed regularly about the position of the freight and which commands have arrived at final destination, in order to make a complete follow-up process.
- The customers (transportation operators, service providers or self-transportation commercial activities) can follow online the vehicle where their freight is on and see the state of their commands.

The basis of Cityporto is its economical sustainability. Each year, an important economical performance analysis is made. The main used indicators are the number of parcels that pass each month through the platform, the monthly average loading factor for the two categories of vehicles (city freighters and light vehicles) and the results of the year's cost-benefit analysis. Cityporto's targets were to achieve a non-negative balance at the end of the fourth year, and they were met in the second. In 2008, the costs were covered by $\frac{3}{4}$ of the total income.

More specifically, the costs of Cityporto are mainly related to the logistics operations at the platform. The infrastructures and buildings belong to Interporto di Padova S.p.A., so they do not constitute an explicit cost to Cityporto. Moreover, the first 6 vehicles were bought by the local public transport operator with provincial and municipal subventions, and lent to Cityporto, who become the legal owner in 2007. Another vehicle, the electric one, has been also bought with a subvention of the region and also a municipal financial aid. Finally, the remaining vehicles have been financed with Cityporto's benefits. In conclusion, only the operational and platform management costs have to

be met, and the system reaches the balance conditions each year, having also small benefits to reinvest in the development of the city logistics system (as for example more vehicles or material to manage other classes of freight).

The environmental goals of Cityporto involves the companies that follow an environmental approach. This approach will favourise the development of collaborative agreements and partnerships. At the beginning of the project, the number of customers was near 20. In 2008, considering that Cityporto makes only parcel-logistics services, the number of customers is more than 50, which is big for a city like Padua. Most of the transportation operators are engaged for long-term collaborations with Cityporto. Moreover, a soft drinks distribution company operating in Padua has signed a partnership with Cityporto for restaurant and bar deliveries.

4.4. Environmental dimension

City logistics solutions like Cityporto are essentially developed for environmental reasons. Moreover, the environmental performance of Cityporto's services have to met several targets, because its connection to legislation and to public entities' environmental actions. For these reasons, a study has been commanded to the Bocconi University of Milan, Italy, to evaluate Cityporto's environmental performance (Vaghi and Pastanella, 2006). This study derives from a survey of the system's economic and environmental performance during 15 months from September 2004 to December 2005. In this period, Cityporto had 6 vehicles (4 city-freighters and 2 light vehicles). The number of freight distribution vehicles is decreased by 60%. The reduction of polluting emissions is remarkable: -38.4 t. CO₂, -202 kg CO, -163 kg NO_x, - 16,3 kg SO_x, -58.1 kg VOC and -41.4 kg PM10. In consequence, considering the health, noise and other benefits that derive from this congestion and pollution reduction (Vaghi and Pastanella, 2006), the environmental gain is quantified (Stefan, 2009) in 174.600 €/year. In terms of financial weights, the most benefic elements concern a reduction on (1) the subtle powders [PM10], (2) the acoustic pollution and (3) the road incidents. This calculation highlights the viability of the project and justifies the inversions made by the public entities in the first years. After this survey, the environmental indicators are calculated yearly on the basis of the methodology proposed by Vaghi and Pastranella (2006). The following table show the main data for the period April 2004 - September 2009.

Table 2 - Reduction of polluting emissions (in kg) with Cityporto (Giordani, 2009)

Polluting emission	2004	2005	2006	2007	2008	2009
Carbonic anhydride: CO ₂	13717.2	56397.8	74423.5	80958.3	81860.0	54915.3
Carbone Monoxide: CO	69.3	296.7	391.5	425.9	430.6	288.9
Nitrogen oxides: NO _x	55.9	239.4	315.9	343.7	347.5	233.1
Sulphuric oxides: SO _x	5.6	23.9	31.6	34.4	34.8	23.3
Volatile organic components: VOC	19.9	85.3	112.6	122.5	123.9	83.1
Subtle powders : PM ₁₀	14.2	60.8	80.2	87.3	88.3	59.2
Number of vehicles	6	6	9	9	9	9

Another important aspect is the internal waste management procedures. In a system like Cityporto, the waste is basically empty boxes and packages, most of them recyclable. A specific container in the platform is filled in by Cityporto's operators. Its position in the platform has been chosen by practical rules to improve the time performance of the operations. This container is emptied in the corresponding place for recycling for all the industrial area where the platform is located. The reverse logistics procedures are not very important because the only materials that can follow them are the empty pallets. However, the management of returned freight that has not be able to reach its destination for several reasons is an important question that is daily answered. A special area of the platform is reserved to undelivered commands and the customer is informed immediately, in order to quickly find a solution to deliver it to the retailer or to return it to the customer.

4.5. Social dimension

The number of employees in charge of Cityporto is small (only three) makes the system a familiar structure. For Cityporto's operational planning and management, a co-operative enterprise is contracted. These people are administratively external but they can be considered as internal stakeholders in an organisation point of view. This situation leads to a huge autonomy of the vehicle drivers because the routes are managed manually and the vehicles are loaded by their own drivers. The platform operators are assuring the administrative and warehousing activities. The relation between the drivers and the retailers is very good. During the visit, a follow-up of a route was made, and four retailers were quickly interviewed. They agree that the service is efficient and the human relations are good. Moreover, the logistics advisor has also commercial and customers' relations functions.

The environmental performance leads to a quality image, that is reinforced by the social aspects explained above. Moreover, the good relations with the customers and the perability of the information

system has led to a transferability of Cityporto to other cities. In 2007, Modena adopted the Cityporto system, and in 2009, Como and Abano Terme, other medium Italian cities, started a city logistics system derived from Cityporto's know-how. Moreover, other two similar cities, Aosta and Rovigo, are in a study phase to integrate what Cityporto expects will become a network of city logistics solutions that follow the same model and the same information system.

As seen above, the social impact can be appreciated not only on the environmental aspects, but also on the economic performance and on standardisation questions (the Cityporto network), which lead to a strong relation between customers and city logistics services. Moreover, a city logistics system is connected to a city, avoiding competition and concurrence questions between the different systems. For these reasons, partnerships not only between city logistics systems and customers but also with other city logistics systems are primordial to develop efficient urban freight solutions.

5. Conclusion

Sustainable SCM constitutes, in our opinion, an important investigation key for each stakeholder of the supply chain. This seems to be more and more urgent since the environment as a whole follows such variations that the actors (enterprises, public entities, customers, retailers, consumers, etc.) have to change their practices in order to improve, or at least to stabilise, the industrial model established in the XIXth century. The SuSCM approaches constitute an important support to this improvement.

The experience's comeback shows that a city logistics system can be based on a SuSCM approach. The three dimensions (economical, environmental and social) are observed and strongly connected. Moreover, the social dimension has an important impact on economic and on environmental aspects. We observe however that even when a project is developed with environmental goals, the economic dimension is

primordial to assure its continuity. In this sense, the responsible figure of Cityporto's services affirms that without money, the activity cannot sustain. Following the reflection of Paché (2009), it is important to observe the impacts of the current economic crisis to the economic rentability in current logistics schemas. In consequence, the environmental and social dimensions will be conditioned by the economic one, although they must remain fundamental for Sustainable SCM as a whole.

References

ADEME (2006), *Eco-conception en actions*, 2^{ème} édition, www.ademe.org

Belin-Munier, Ch. (2009), Logistique, SCM et développement durable : une revue de la littérature, *Atelier de Recherche Transport et Logistique : histoire(s) de durabilité*, paris, Marne la Vallée, 17 sept.

BESTUFS (2009), BESTUFS II Bibliografic Overview, Final DVD-Rom, BESTUFS, The Netherlands.

Bironneau, L. et Le Roy, B. (2005), Définition d'un modèle générique des compétences du responsable logistique, *Logistique & Management*, 13(1), 7-18.

Bowersox, D., Closs, D. and Stank, T. (1999), *21st century logistics: making supply chain integration a reality*, Council of Logistics Management, Oak Brook (IL).

Cooper, M., Lambert, D. and Pagh, J. (1997), "Supply chain management: more than a new name for logistics", *The International Journal of Logistics Management*, 8(1), 1-13.

Crainic, T. G., Ricciardi, N., and Storchi, G. (2004), Advanced freight transportation systems for congested urban areas. *Transportation Research Part C*, Vol. 12 n. 2, pp. 19-137.

Crainic, T. G. (2008), City Logistics, in Chen, Z. L. and Raghavan, S. (eds.), *Tutorials in Operations Research 2008. State-of-the-Art Decision Making Tools in the Information-Intensive Age*, INFORMS, e-book, pp. 181-212.

Dablanc, L. (1998), *Transport de marchandises en ville. Une gestion publique entre police et services*, Liaisons, Paris, France.

Gerardin, B., Patier, D., Routhier, J. L., Segalou, E. (2000), *Diagnostic du Transport de marchandises*

dans une agglomération, Programme national Marchandises en ville, DRAST

Gibson, B., Mentzer, J. and Cook, R. (2005), "Supply Chain Management: the pursuit of a consensus definition", *Journal of Business Logistics*, 26(2), 17-25.

GLRT: Global Logistics Research Team (1995), *World Class Logistics: the challenge of managing continuous change*, Council of Logistics Management, Oak Brook (IL).

Gond, J.-P. (2006), Gestion des ressources humaines et Développement Durable, in Reynaud, E. (Coord.), *Le Développement Durable au cœur de l'entreprise*, Ed. Dunod, 83-116.

Gonzalez-Feliu, J. (2008), *Models and methods for the City Logistics. The Two-Echelon Vehicle Routing Problem*, PhD. thesis, Politecnico di Torino, Turin, Italy.

Marcucci, E., Danielis, R., (2006), "Centri urbani di distribuzione delle merci e politiche del traffico: una valutazione empirica tramite le preferenze dichiarate", Paper presentato alla XXVII Conferenza Scientifica Annuale dell' AISRe, Scuola Superiore Sant'Anna di Pisa

Mentzer, J., DeWitt, W., Keebler, J., Min, S., Nix, N., Smith, C. and Zacharia, Z. (2001), "Defining supply chain management", *Journal of Business Logistics*, 22(2), 1-25.

Min, S. and Mentzer J. (2004), "Developing and measuring Supply Chain Management concepts", *Journal of Business Logistics*, 25(1), 63-91.

Morana, J., Van Hoorebeke, D. et Piré-Lechalard, P. (2008), Supply chain management, Green SCM, Social SCM : La Logistique Globale au cœur au Développement Durable, *3èmes journées Neptune et 1ère université "Réalités et Perspectives du Développement Durable organisationnel"*, Toulon, 13-14 nov.

Paché, G. (2009), Quels impacts de la crise sur la logistique ?, *Revue Française de Gestion*, 35(193), 51-57.

Patier, D., Dufour, J.-G., Routhier, J.-L. (2007), Du transport de marchandises en ville à la logistique urbaine, *Techniques de l'Ingénieur* n° AG 8 210.

Rogers, D. et Tibben-Lembke, R. (1999), « Reverse logistics » : stratégies et techniques, *Logistique & Management*, 7 (2), 15-25.

Rosini, R., ed. (2005), *City Ports Project. Intermediary report*. Quaderni del servizio Pianificazione dei Trasporti e Logistica, Regione Emilia Romagna, Bologna, Italy.

Routhier, J. L. (2002), *Du transport de marchandises en ville à la logistique urbaine*. 2001 plus Synthèses et Recherches n. 59, DRAST.

Spinedi, M., ed. (2008), *Logistica urbana: dagli aspetti teorici alle applicazioni pratiche. Esperienze italiane e straniere a confronto*, Emilia Romagna Region, City Logistics Expo, Bologna, Italy.

Srivastava, S. (2007), *Green supply-chain management: A state-of-the-art literature review*, *International Journal of Management Reviews*, 9 (1), 53-80.

Taniguchi, E., Thomson, R. G., Yamada, T., Van Duin, R. (2001), *City Logistics. Network modelling and Intelligent Transport Systems*, Elsevier, Amsterdam.

Vaghi, C., Pastanella, M. (2006), *Analisi costi/benefici di Cityporto*, Report for Interporto di Padova, Bocconi University, Milan, Italy.

Visser, J., van Binsbergen, A., Nemoto, T. (1999), *Urban freight transportation and policy*. In Taniguchi, E. and Thomson, R. G., *City Logistics I*, Institute for City Logistics, Kyoto, Japan.

Wieberneit, N. (2008). *Service network design for freight transportation: a review*, *OR Spectrum*, 30, 77-112.

Internal documents

Giordani, S. (2009), *Cityporto padova : la mobilità sostenibile delle merci nelle aree urbane*, *Presentazione nuovo veicolo elettrico*, Comune di Padova, 12 ottobre

Stefan, W. (2009), *Cityporto Padova: Logistique soutenable. Une ville meilleure pour une vie meilleure*, *4èmes Assises nationales du Centre-Ville*, Nancy, 23 oct.