Sharing services for freight distribution: concepts, stakes and experience comebacks

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INTRODUCTION

The freight transportation industry is a major source of employment and supports the economic development of the country. However, freight transportation is also a disturbing activity, due to congestion and environmental nuisances, which negatively affects the quality of life, in particular in urban areas. Both the new trends in retail and commerce organization and the technological innovation in supply chain management and distribution planning have led decision makers to consider collaborative strategies to reduce overall cost of the supply process. In freight distribution, the most popular collaborative strategy is that of logistics sharing, that can take place at the transport level, but also in warehousing, inventory and other operations. These strategies are based on collaborative decision making and on information sharing, and usually take the form of agreements and partnerships.

Although the main aspects of collaborative logistics in production and supply management have recently reviewed, logistics sharing in freight distribution remains a less explored subject in literature, but commonly observed in several real-life cases. The aim of this chapter is to define the main concepts related to logistics sharing agreements and to present a conceptual schema setting the most important organizational aspects. We will focus on socio-economical and normative aspects by making an analysis of several experience comebacks from the freight distribution field. First of all we will present the main concepts of logistics sharing, based on the main definitions of collaborative logistics. After that, the main organizational aspects of this type of approaches will be presented. Then, both socio-economical and legislation aspects of logistics sharing will be described. To illustrate the presented concepts and schemas, we propose an analysis of several experimental cases from the literature, as well as a more deeply presented example from the French press distribution sector, more precisely a transportation and logistics platform sharing project that started at the end of 2008.

DEFINITIONS AND CONCEPTS

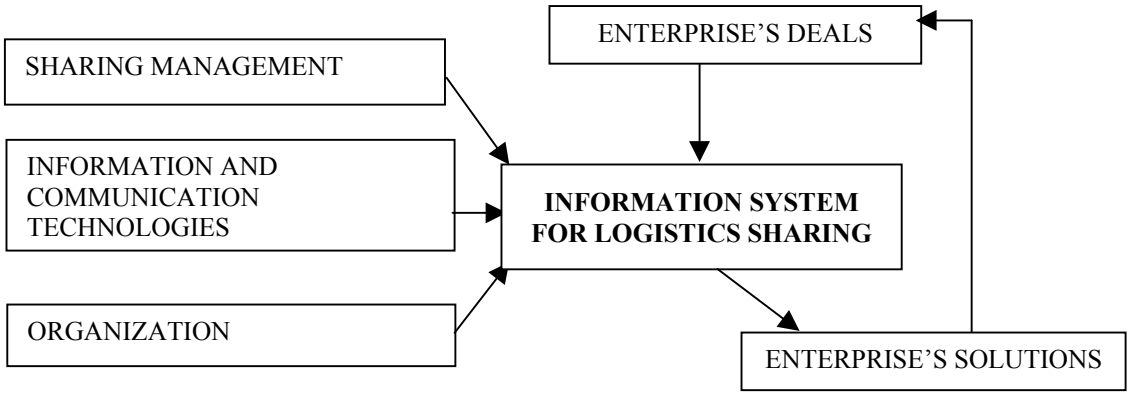
In the last years, several strategies and logistics models have been developed in order to increase the supply chain effectiveness. Collaboration is one of the most promising areas of study in supply chain management (Barrat, 2004; Min et al., 2005; Simatupang and Sridharan, 2005; Roy et al., 2006; Simonot and Roure, 2007; Lambert, 2008). In supply chain management, collaboration can take place at several stages of the chain and with different levels of intensity (Rakotonarivo et al., 2009). The collaboration levels can be classified into three categories:

- *Transactional collaboration*: Logistics and transportation needs constant administrative practices and document exchanges. In order to facilitate these operations, a first stage of collaboration consists in the common coordination and the standardization of administrative practices and exchange techniques, using information and communication systems. This stage can become the base of deeper collaboration stages.
- *Informational collaboration*: This level of collaboration concerns mutual exchanges of information such as selling previsions, stock rates and delivery dates, among others. The crucial point is related to confidentiality and concurrence rules, which can become a brake to collaboration.
- *Decisional collaboration*: This category concerns the different collaboration possibilities in planning and management decisions in logistics and transportation. These decisions can belong to different planning horizons:
  - *Operational planning*: This planning level is related to daily operations that can be coordinated or shared, like freight transportation or cross-docking. However, most of the daily operations derive from tactical and strategic choices. For this reason, this stage is in general very limited to some transportation operations.
  - *Tactical planning*: The middle-term planning decisions involve several tactical choices, like selling previsions, shipping operational decisions, stock and production management and quality settings. At this level, decision choices can establish a relation of trust between the collaborators.
  - *Strategic planning*: The highest level of collaboration involves long term planning decisions such as network design, facility location, financial investment and production planning.

After describing the main stages of collaboration, we need to define the concept of logistics sharing. The word sharing can have several meanings. In this chapter, sharing is used to define the joint use of a resource. Although in a narrow sense it refers to joint or alternating use of an inherently finite resource, such as a common pasture or a shared residence, it can also refer to the process of dividing and distributing. In logistics, the main shared resources are information, infrastructures, management and planning tools, vehicles and human resources. We assume that logistics sharing needs collaboration to assure a joint use of shared resources. Moreover, collaboration management is important to assure the stability and the continuity of collaborative sharing. For these reasons, we are focusing on collaborative sharing approaches, that are placed at least at the second stage of collaboration. When two or more actors decide to collaborate into a sharing approach, we can call them sharing partners, although sharing can be formalized by agreements that are not formal written partnership contracts.

ORGANIZATIONAL ASPECTS

We have seen that information sharing is a basic requirement to assure the continuity of a logistics sharing service. For this reason, we can affirm that such services need an efficient shared information system to assure their good performance. Morana and Gonzalez-Feliu (2009) define the organizational bases of logistics sharing, based on the general model of Laudon and Laudon (2007) for information system conception. These bases can be resumed in the following chart :



Bases for the conception, design and management of an information system for logistics sharing (Morana and Gonzalez-Feliu, 2009, adapted from Laudon and Laudon, 2007)

This conceptual model is composed by five modules. The sharing management module contains all the elements of the management of sharing services and collaboration. The information technologies module contains the Information and Communication Technologies (ICT) that are used in the proposed sharing solution. The organization module lists all the actors involved in the sharing solution, in both internal and external contexts. These three modules are related to tactical and operational decisions. The enterprise's deals and solutions are related to strategic planning. All the modules are described above, starting by those belonging to strategic planning then focusing on the tactical ones.

Enterprise's deals module

The enterprise's deals module presents both the project's expectations and the risks that are studied in that project's preliminary developments. Considering the technologies and tools and their usage levels, several choices must be made in order to set up the best solution of logistic sharing services. In order to make these choices, it is important to formulate questions related to the goals and the risks of the project, and to find answers to these questions. In consequence, it is important to make a deep analysis of the possible risks that the project may encounter. The main types of risks to be considered in a logistics and transportation project (Seiersen, 2006) are:

- The risks related to the project accounting itself, more precisely to the different type of resources that can be affected to the project, in financial, economical, technical, technological or human terms.

- The risks related to the organization of the project and its continuity. It is important to note that the reorganization of a project can be considered only when it is operative and stable.
- The technological risks. In general, the technologies present problems related to functionality, robustness and compatibility, among others. Before choosing a technology, it is important to think about these questions.
- The risks related to policies, processes and current practices. The development and usage of new logistics solutions can need an important change in the way people think and act to make them operative. Continuous social analysis during all conception and development phases seem crucial to the stability and success of very innovative solutions.
- The risks related to the impact of the systems in the current and future operations, at both human and technical levels.
- The dependence risks. If an information system based on several technologies, the risks related to the dysfunction of these technologies have to be considered. When a technological tool presents a dysfunction, the system can be less efficient, or can stop because of it. These risks have to be studied in a preliminary phase of a project.

Enterprise's solutions module

The enterprise's solutions are the main objectives of the project and the evaluation of its performance (Laudon and Laudon, 2007). Although at the end of the XXth century the notion of performance has been basically related to economic indicators, the notion of sustainability is nowadays a central element in transportation and logistics planning and management (Morana and Gonzalez-Feliu, 2009). The sustainable development is the junction of three spheres: the first one deals with the economical aspects, the second one contains the social and the societal elements, and the third is related to the environment. Depoers et al. (2003) propose a set of sustainability performance indicators. Three types of indicators (economical, environmental and social) are described. A recent research (Marais and Renaud, 2007) proposes a ranking table for the different components of Sustainable Development actions, based on an exhaustive literature review analysis. The authors propose 5 central subjects: Strategy, Enterprise's policy, organization, systems and key competences. We can also refer to the main environmental and social norms and recommendations. The most known are the AFNOR ISO 14000 environmental, the SA 8000, OHSAS 18001 and AA 1000 social norms, the SD21000 norm for the sustainable development, and the Global Report Initiative. Finally, Sustainabilily Balanced Scorecards (Hockerts et al., 2002) can be considered as sustainability performance indicators.

Organization module – Types of actors in supply chains related to sharing

All the long of a supply chain, several actors interact in order to complete all the tasks necessary to produce and distribute a product to a retailer. In this section we will present the main categories of actors in logistics and their potential domains of sharing, focusing in the logistics of distribution. We will present the main categories of actors in the freight transportation field that can be directly concerned by logistics sharing.

First of all, we can describe the "loaders" (Ambrosini and Routhier, 2004), which are the actors that send or receive the freight. We can find in this category the producers of the different raw

products and components as well as the final product manufacturers, the logistics providers, the distribution and gross commerce enterprises, then the retailers. This actors can be considered as "senders", if they act at the origin of the transport, and "receivers" if they are at its destination. Another important category are the "transporters". These transporters can be the "loaders" that make self-transport operations, or the third-party transportation companies (Ambrosini and Routhier, 2004). These companies can be artisans that have only one vehicle, small and medium enterprises or big companies and multinational groups, as well as postal and courier operators, and integrated logistics solutions providers like TNT, DHL, FedEx or UPS, among others (Patier et al., 2007). A third category are the logistics real estate actors, that are the "owners and management companies" of warehouses, cross-docks, intermodal platforms and other logistics infrastructures (Patier et al., 2007). Other actors, like public administrations, highway companies, customs operators, are not considered in this classification since their possible implication as logistics sharing partners are much less important respect to the three main categories.

Sharing management module – Sharing approaches in freight distribution

In supply chain management, we observe sharing approaches in different processes, involving both production and distribution sub-chains. More precisely, focusing on distribution, we can distinguish two main domains of application: the complementary activities to transportation, as or example warehousing or supplying, and the transportation itself. We will describe briefly the main organizational models of sharing in both fields.

The Efficient Consumer's Response (ECR) is a concept developed in the grocery distribution context. It is defined as a cooperative approach which goal is the total satisfaction of the consumer by an improvement on the economical performance of the different actors of the supply chain (Roy et al., 2006). The ECR optimizes the retailer's supply and improves the promotional actions and the freight availability by the use of ICT and logistics information systems, as well as the usage of activity based management tools. Other industries have followed similar processes, like the Quick Response (textile industry), and the Efficient Healthcare Customer's Response (Roy et al., 2006). All these processes incite the inter-enterprise collaboration and examples of logistics information sharing about actors of the same supply chain.

The Vendor Management Inventory (VMI) can be considered a next step respect the ECR. In this collaborative approach, the supplier is co-responsible of the warehouses' re-supplying using the sells database, using collaborative actions. This approach implies an involvement of the distribution company to give real time information to the producer, which will be able to make a re-supplying proposal and then make his previsions in order to adapt his production phases and his resources to these previsions (Roy et al., 2006). A new form of VMI, which can be called "shared VMI", is developed in UK and France, and involves several producers, which agree to work with the same distribution company and share with him their information (Simonot and Roure, 2007). This is a form of collaboration with a high level of information sharing, that takes place at both tactical and operational phases.

In freight distribution, shared platforms and infrastructures are very common. However, most of them are only physically shared, and the actors that operate in these platforms do not collaborate.

The manager of the platform assures the functionalities of the platforms. This is the case of warehouses that rent their space (and sometimes have also several services to propose) to several distribution companies. Multimodal transportation is also a field where infrastructures and platforms are shared (Dalla Chiara, 2009). Another model of shared platform is the "collaborative warehouse", where several producers and distribution companies share a physical space and logistics information to improve the global performance of the overall distribution processes (GCI and Capgemini, 2008). This idea can also be found in consolidation platforms, like classical cross-docks, regional platforms, urban consolidation centres or urban logistics spaces.

In freight transportation, collaboration between two operators is a usual action that is usually informal and not documented. These actions are taken to increase the loading rate of a vehicle, or to make a "friend" company deliver a customer that the contracted operator is not able to do (Patier, 2004 ; Morana and Gonzalez-Feliu, 2009). In frequent collaboration cases, the approaches can be formalized by agreements. Another form of collaboration are the networks of transportation companies. Most of these networks involve small and medium companies. A network is presented as an association, although some of them assume the form of a cooperative company (Simonot and Roure, 2007).

A more collaborative sharing approach is the open e-marketplace. This approach is based on the an electronic information exchange system, where the transportation offer actors meet the transportation demand ones. The offer comes from transport companies, and the demand can come from "loaders" or from transporters that do not have enough quantity of goods to transport in a considered area.

Information technologies' module

Information is the central key of sharing. Without information sharing, the other levels of sharing cannot take place. In transport management, the role of Information and Communication Technologies has been recently overviewed (Fabbe-Costes, 2007). Two types of information technologies are identified by the author: the transportation management modules, related to transportation planning, and the information exchange tools, that allow transportation to be integrated into the supply chain.

In logistics planning, decisions on the transportation network settings have a direct impact on the service quality but also on their costs (Morana and Gonzalez-Feliu, 2009). It is then 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. The two last points derive from the two first, and take place after them. In research, both inventory and vehicle routing and scheduling problems are very popular, and several algorithms are proposed in recent surveys (Goetschalckx et al., 2002; Toth and Vigo, 2002; Leung, 2004; Dullaert et al., 2007; Golden et al., 2008). Moreover, a periodic survey on operative software for vehicle routing management can be found (for the last version of the survey, see Hall and Partyka, 2008).

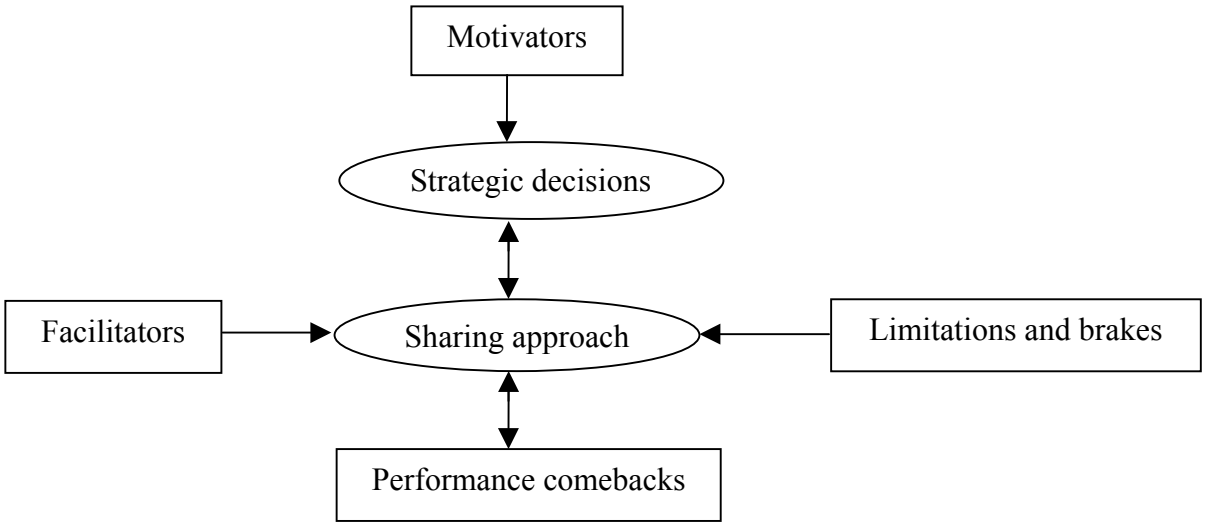
In transportation planning and management, ICT play an important role, and are usually combined with the optimization modules in order to improve the performance of the different operations. A special attention has to be given to the main technologies which allow the freight transport operations to be included in the global supply chain of a product. Fabbe-Costes (2007) individuates three categories of IS, i.e. document's exchange systems, communication systems and traceability systems. The document exchange systems assure the communication among actors and memorize several transactions. Then, the communication systems assure the enterprise flow's guidance. Finally, the traceability systems are developed to find and follow freight movement.

Information Systems	**Technologies and Tools**
Document exchange systems	Fax; Electronic data exchange tools (web-based or intranet-based); Internet
Communication systems	Onboard radio; onboard/portable terminals; Fixed phone; Mobile phone; Internet; Multifunction portable terminals
Traceability Systems	Identification/codification; Electronic lecture; Waymarks; Vocal systems; Recorders; Memory systems

Information systems and technologies in supply chain management (Fabbe-Costes, 2007)

SOCIO-ECONOMICAL AND LEGISLATION ASPECTS

Sharing approaches need the collaboration of different actors, each of them having his strategies, targets and processes. To describe the different socio-economic and legislation factors that are related to sharing, we propose a conceptual model for sharing analysis based on those of Roy et al. (2000) and Lambert (2008), but also in our apprehensions. The model is resumed in the following chart:



Conceptual model for sharing analysis in freight distribution planning and system design

In order to illustrate the model, we have done a comparative analysis of 18 logistics sharing approaches, at different levels. The data used for this analysis has been obtained from different sources. Most of the experiences' comebacks have been identified in research reports and other scientific documents (Patier, 2004; Simonot and Roure, 2007; TL&Associés and LET, 2009; Rakotonarivo et al., 2009; Gonzalez-Feliu et al., 2009; Aoufi and Stumm, 2009). We have extracted the information about sharing approaches completing the missing elements with information found on technical documents and professional logistics articles. Only four cases are obtained from only technical and professional information, with no direct relation to a scientific study. Moreover, several cases have been completed by semi-directive interviews to logistics and sustainable development managers of the main company in the sharing approach. The interviews, which number is half of the total experiences presented in this analysis, have been made to obtain qualitative information about the capacities and the adaptability competences of each enterprise to participate to a logistics sharing system, the main sharing projects and the motivations and decision processes involved in the analysis and development of logistics sharing solutions.

We have considered four VMI cases (CB4, CB5, CB6, CB18), three different transportation sharing agreements (CB1, CB8, CB9), five transportation networks and consortiums (CB10, CB11, CB12, CB13, CB16), four cases of shared logistics platforms with mutual usage of distribution systems to retailers (CB2, CB3, CB7, CB15), one open e-marketplace (CB17) and two non-transportation based collaboration agreements (CB14, CB15). We present in a first time the main categories of motivators, then, we study both the facilitators and limitations. Finally, the economic and environmental performance comebacks are presented.

Motivators

The motivators are the factors that incite the development of a sharing approach. These factors are defined from the socio-economic and legislative context of the practices. More precisely, we can distinguish the following groups of motivators:

1. *Economic, environmental and quality motivators.* Although the economic efficiency is the strongest motivators found in the experiences' comebacks, other elements are also considered, usually related to the prestige of the partners. More precisely, collaboration among transportation operators are chosen as a cost optimization approach when the favorable conditions are verified. The two main reasons of vehicle sharing are related to the increase of the loading rates, either to complete non-full loaded routes (CB2 to CB11, CB14 to CB18) or to compensate the cost of an empty vehicle returning to its departure location (CB1, CB10, CB11, CB16, CB17). Urban logistics measures are related to environmental aspects, form which CO_2 reduction is more important than the other environmental aims (CB6, CB7, CB8, CB12, CB13, CB15). Also quality is considered important, but is in general seen as a comeback indicator that motivates new developments for logistics sharing services. For example, the main results of exploratory collaborations (CB5 and CB9) led to the research of new partners to start bigger partnership-based sharing services. In the same way, the transportation networks and consortiums (CB10 to CB13) have followed evolutions inciting collaboration among their partners.

2. *Legislative motivators*. Normative and jurisprudence aspects of sharing are related to public administrations. Nowadays, the most important facilitators in this category are the different local laws that help the development of sharing approaches in urban and regional freight transportation. Their main target is the reduction of the congestion and air pollution and they can promote, among others, the mutual usage of vehicles (Dablanc, 2008). We observe two types of policies: restrictions to non-sharing approaches and incentives to sharing approaches. We can find in these categories the permits to access a limited traffic zone of Genova (Italy) and Amsterdam (The Netherlands), restrictions based on minimum loading factors of the vehicles or their CO_2 emissions of Padova and Bologna (Italy) or the reduction of restrictions to sharing-promoting transportation systems in Ferrara (Italy). More restrictive policies are those of the Principate of Monaco or Vicenza (Italy), where only one operator is allowed to access the limited traffic zone, imposing transportation sharing to the other actors of urban logistics. These questions are observed on four cases (CB8, CB12, CB13 and CB15).
3. *Relation motivators*. They are related to actors potentially related to transportation sharing. When actors already collaborated, because of common interests (this is the case of the small transportation operators that led to CB10 and CB11, as well as some of the participating operators of CB12 and CB15) or because they belong to the same supply chain (and are then complementary, as happens in CB4, CB5, CB6, CB8, CB15 and CB18), transportation sharing is more naturally taken into account than in cases where those conditions are not verified. Moreover, non-concurrent or complementary enterprises are more concerned to these types of approaches in absence of legislative or financial motivators
4. *Financial motivators*. They are related to subventions and financial help that can come from public, private or mixed entities. Several approaches have been issued of research and innovation project financed (totally or partially) by public entities (CB4, CB7, CB12, CB13).

Facilitators

The facilitators are the conditions and situations that have a positive impact on the daily operations of a sharing approach. They are similar to those of collaboration and logistics partnerships (Roy et al., 2000; Lambert, 2008). These factors are not only related to the logistics organization but also to the evolution of the strategic planning relations between sharing partners. The historic record of the relation between two actors can facilitate a durable partnership (Roy et al., 2006). For example, most transportation networks are born from a small group of "friendly" companies, which have collaborated or started cordial relations (CB10, CB11, CB12, CB16). Shared VMI approaches are related to grocery distribution, and have a central distribution company that organize the supply system for their collaborators. In general, a project where partners had already good relations have positive results in terms of collaboration management.

The frontier between the motivators and the facilitators is not always clear. However, we can distinguish these two categories of factors in the fact that the motivators have an impact on the strategic decisions before the project is operative, and the facilitators are factors which impacts are observed at the operational level for a given sharing approach.

Limitations and brakes

Closely related to the facilitators, the limitations and brakes are those factors that can become a handicap to the good development of a logistics sharing approach, and they have not been defined explicitly in precedent studies. We can find several types of restrictions and brakes, that can be grouped into the following categories:

1. *Legislation*. Restrictive legislation to sharing is that related to freight compatibility, i.e. the norms and laws that forbid to load a vehicle with products of different categories (as for example dangerous goods, fresh food, waste, raw materials, etc.) or to concurrence laws that can limit the development of sharing approaches (CB8, CB9, CB15).
2. *Organization*. In this category we find the physical and organizational conditions for freight compatibility, like dimensions, freight, type of packaging, loading unit and loading operations main characteristics. Other organizational factor is the acceptability of sharing approach, which has also to be taken into account while defining the main characteristics of the collaboration for logistics sharing (CB3, CB7, CB8, CB15).
3. *Confidentiality*. The main questions related to confidentiality can become a brake to logistics sharing when two concurrent actors decide to collaborate in a distribution system that implies sharing some of their logistics resources. Since information is the base of a good collaboration, if one or more partners manage confidential information that don't want to share for concurrence reasons, the efficiency of the sharing approach can decrease considerably. These questions are seen in most of the initiatives involving concurrent enterprises that don't have the support of public entities (CB1, CB3).
4. *Responsibility*. The factors related to the transportation operations responsibility are strictly derived from the contract between the different actors of these operations. If the collaboration for logistics sharing follow a contract or a chart where the questions of responsibility are well defined, these questions will not constitute a brake to sharing. On the opposite side, if these questions are not clearly specified in a contractual document, legal disputes related to responsibility can easily be identified or the quality of service decreases because of these questions (CB17).

Performance comebacks from experiences and practices

From the proposed experiences, we observe that sharing approaches are mainly developed to answer to economical performance questions, and are related to motivating contexts. Only few of them show the environmental performance as an important evaluation factor. Open marketplaces do not present very positive results, because of responsibility transfer aspects. We observe that most experiences present an important information sharing system, but only the transportation networks and some agreements involve more than one transportation operator. Only four of them present an important platform sharing approach based on collaboration. These results are related to facilitators and limitations. Sharing approaches among complementary actors seem to be more easy to implement than those that involve concurrent companies. However, these approaches are issued of economic factors that incite their development and effectiveness.

Another important question is the evolution of the sharing approach. In networks and agreements involving two or more transportation operators, if sharing is giving very good results, we observe two types of evolutions. One is the reinforcement of the network or the creation of strong partnerships. The second possible evolution is the fusion of the sharing partners into a group to optimize their overall resources and give a better service to their customers.

CASE STUDY: THE PRESS DISTRIBUTION IN FRANCE

Finally, we present the main results of a case study research (Eisenhardt, 1989; Yin, 1994) for the biggest press distribution company in France. This is a qualitative study (Mucchielli, 1991; Wacheux, 1996). We will present the main results of a on the organizational model, which methodology and extended results can be found in a recent study (Morana and Gonzalez-Feliu, 2009), and complete the study by an analysis of the logistics sharing approach using the conceptual model presented above.

The press distribution in France : general context

The press distribution sector presents decreasing trends in sells and distribution flows, because of internet information sources and free press. These facts have a repercussion in the distribution system. In France, there are only two distribution companies for classical press, i.e., written press except free journals, which are not real competitors (the competition is made at the editor level, but not in terms of distribution costs). Moreover, they are already collaborating in non-Parisian region areas. The specificities of the metropolitan region of Paris, which represents approximately 1/4 of the total population of France (overseas territories not included), justify the usage of separate distribution systems for each of the two distribution companies. The distribution system is based on intermediary platforms for storage and consolidation. Moreover, two different types of products are managed: daily press, which has very tight time constraints, and magazines, which can be managed with less restrictive time limitations. Another important characteristic of press distribution is the variability of magazines' quantities to distribute, which make the transportation demand difficult to estimate. Therefore, the last mile distribution system is rigid and based on small transportation operators, to assure a personal contact with selling points, that can need to give a key to the vehicle driver because of the distribution period (from 2:00 a.m. to 6:00 a.m.) and the risks of having the freight stolen.

Organizational model results

First of all, the strategic decisions have to be considered. Sharing is considered a good solution because of the system rigidity during the press distribution period, and the possibility to deliver other products after the last selling point has been visited. The risks of this approach have to be considered, and a proposed sharing distribution system has to be developed. To do this, the main tactical decisions have to be enounced, then, using the analysis model, the main strategic decisions can be defined.

Nowadays, the considered distribution company do not have very technological information systems. They use standard communication technologies (mobile phone for the terminal-vehicle

communication, e-mail and fax for the transportation plans exchanges), and the standard barcode system is used for freight traceability. Depots are managed manually and few automation systems are used. For transportation planning, two planning software tools are used, but they are closely related to the rigid transportation system.

Another interesting field is the sharing management module. Given the current transported freight (paper products), a sharing approach with similar products is naturally encouraged. These products are books, catalogues, stationery products, collectibles, CD, DVD and similar products. An important project has started in 2009 to find other products to increase their loading rates. The chosen system is based on bilateral partnerships in a first time, with the aim of constituting a small transportation consortium and find regular customers that assure the minimum freight volumes to justify a sharing approach like this.

The organization module contains several parties. The internal parties are all the echelons of the distribution system and their sub-contractors, i.e., their contracted transporters, their own logistics platforms and also their partners, and their current collaborators. These actors are not enough to maintain an efficient sharing system, so new collaborators have to be found. Four transportation operators have given an "a priori" agreement to implement a sharing system based on a consortium, and new potential customers are been examined. The public administrations are also an important party because normative depends on these entities.

Logistics sharing analysis

The motivators derive from the context. The rigidity of the current system and the economical and environmental factors motivate the development of a sharing approach (the economic efficiency has to be increased to maintain the current distribution costs or reduce them and the environmental efficiency is important to improve the company's popularity and quality).

The project is in an initial phase. At the current stage of progress, some experimentations have been made. An important internal organization and a good relation with partners are necessary to assure the system operability. For these, a preliminary study of the partners have been made. The chosen partners are enterprises that were already important collaborators of the distribution company or had similar and not contradictory aims in a potential sharing approach. The sharing approach design has been developed by the press distribution company and the partners have been chosen in base to their adaptability and compatibility respect to this system. In this way, the main limitations and breaks are supposed to be avoid. However, some legislation questions, specific to concurrence rights and to responsibility transfers, are under consideration and analysis because they are considered the main brakes to their system. These limitations are also considered in the risk analysis.

The first results are good but not enough to fill their goals. However, they show that the developed approach can be efficient and has to be extended to a bigger consortium. The main results are used to redefine some details of the main strategies and to focus on questions not initially taken into account, like some specific legislative questions, and the potential of other freight categories such as packaged non-fresh food, small electronic products, software or tobacco derivates, among others.

CONCLUSIONS, STAKES AND FUTURE DEVELOPMENTS

Logistics sharing is becoming a popular approach to reduce the distribution costs of a product. However, the subject has been not deeply studied in literature. In this chapter, we presented the main concepts of logistics sharing in the freight distribution sector, focusing on collaborating transportation-based sharing approaches. We presented both an organizational model for the development of a sharing-based information system and an analysis model for its strategic decisions, defining the categories of factors that can have an impact on them.

A collaborative sharing approach must pass through an efficient information sharing system. In this perspective, several aspects have to been considered in the different planning horizons. The tactical decisions deal with technologies and planning tools, with sharing management and with the possible actors of the sharing-based supply chain, both at internal and external levels. The strategic decisions consider the possible tactical choices to define the main objectives and define the sharing solutions to develop, considering also the risks of these choices.

The factors that influence strategic decisions can be grouped into three categories. First of all, the motivators, i.e. the reasons that incite the actors to collaborate in logistics sharing solutions. Then, the facilitators and the limitations and brakes, which have an impact on the evolution of a conceived sharing service.

Several stakes can be deduced from the presented models and examples of logistics sharing approaches. The first is to consider the transportation field explicitly in the supply chain management methods, providing multidisciplinary research that includes system engineering, information science, economy, management, sociology and decision sciences, among others. In this sense, group decision theory becomes a field of investigation that can produce interesting results for logistics sharing management decision support. The second stake, for the logistics strategic decision makers of enterprises, is to make a preliminary analysis of the factors having an impact on the main decisions in order to choose the best approach to met their goals. Third, for managers, to identify the external factors facilitating and limiting the logistics sharing solution in order of better assuring its performance. Finally, the public deciders have to consider the legislation that can have a positive or negative impact on the development of collaborative sharing services for freight distribution in the respect of the market and the concurrence rules of the current macroeconomic context.

However, the field is becoming to be studied and this work remains exploratory, aiming to establish standards and patterns to support logistics sharing decision making. New variables would appear with the development of sharing management and planning. Moreover, a measurement scale would be implemented to facilitate the evaluation and the strategic decision support. An extrapolation of the proposed models from (and to) other fields has to be considered to generalize and enrich them to other applications of sharing and collaboration.

REFERENCES

Ambrosini, C., & Routhier, J. L. (2004). Objectives, Methods and Results of Surveys Carried out in the Field of Urban Freight Transport: An International Comparison, *Transport Reviews*, 24(1), 57-77.

Aoufi, A., & Stumm, M. (2009). Les Places de Marché. Report LUMD EA-3.

Barrat, M. (2004). Understanding the meaning of collaboration in the supply chain, *Supply Chain Management: An International Journal*, 9(1), 30-42.

Brewer A. M., Button, K. J., & Hensher, D.A., ed. (2001). *Handbook of logistics and supply chain management*. London: Pergamon.

Crainic, T. G., & Laporte, G. (1997). Planning models for freight transportation, *European Journal of Operational Research*, 97, 409-438.

Dablanc, L. (2008). Urban Goods Movement and Air Quality Policy and Regulation Issues in European Cities, *Journal of Environmental Law* 20(2), 245-266.

Dalla Chiara, B. (2009). *Sistemi di trasporto intermodali: progettazione ed esercizio*. Milan: EGAF.

Depoers, F. Reynaud, E., & Schneider-Maunoury, G. (2003), Comment mesurer la performance durable des entreprises ? Proposition d'une grille d'indicateurs, *Gestion 2000*, 2003(2),13-29.

Dullaert, W., Bräysy, O., Goetschalckx, M., & Raa, B. (2007). Supply chain (re)design: Support for managerial and policy decisions, *European Journal of Transport and Infrastructure Research*, 7(2), 73-92.

Eisenhardt, K. (1989). Building theories from case study research, *Academy of Management Review*, 14(4), 532-550.

Fabbe-Costes, N. (2007). Systèmes d'information logistique et transport. Techniques de l'Ingénieur .

GCI, CAPGEMINI (2008), *Future Supply Chain 2016. Serving Consumers in a Sustainable Way*, Global Commerce Initiative.

Goetschalckx, M., Vidal, C.J., & Dogan, K. (2002). Modelling and design of global logistics systems: A review of integrated strategic and tactical models and design algorithms, European Journal of Operational Research, 143, 1-18.

Golden, B. L., Raghavan, S., & Wasil, E. A. (2008). Vehicle *routing: Latest advances and challenges*. Boston: Kluwer.

Gonzalez-Feliu, J. , Routhier, J. L., Rakotonarivo, D. (2009). La logistique urbaine. Report LUMD EA-1.

Hall, R., & Partyka, J. (2008), On the road to mobility, *OR/MS Today*, 35 (1).

Hockerts, K., O'Rourke, A., & Zingales, F. (2002). Balanced scorecard and sustainability: state of art review, Report INSEAD 2002-65/CMER.

Lambert, D. M., ed. (2008). *Supply Chain Management: Processes, Partnerships, Performance*. Sarasota, FL: Supply Chain Management Institute, 3rd edition,.

Laudon J. P., & Laudon K. C. (2007). *Management information systems*. London: Pearson Prentice Hall.

Leung, J. T. (2004). *Handbook of scheduling: algorithms, models and performance analysis*. Florida: CRC Press.

Marais, M., & Reynaud, E. (2007). Comparaison entre les entreprises françaises publiques et privées face aux exigences du développement durable, Report 800 IAE.

Min, S., Roath, A. S., Daugherty, P. J., Genchev, S. E., Chen, H., Arndt, A. D., & Richey, R. G. (2005), Supply Chain Collaboration: What's Happening, International Journal of Logistics Management, Vol. 16, n° 2, pp. 237-256.

Morana, J., Gonzalez-Feliu, J. (2009). Les décisions tactiques et opérationnelles d'une mutualisation d'un système de distribution : le cas du groupe NMPP. Research Workshop in Sustainable Transportation and Logistics, Paris, France (in French).

Mucchielli, A. (1991). *Les méthodes qualitatives*. Paris : Presses Universitaires de France.

Patier, D. (2004). La place du transport de marchandises en compte propre. Report DRAST.

Patier, D., Dufour, J. G., & Routhier, J.L. (2007). Du transport de marchandises en ville à la logistique urbaine. Techniques de l'Ingénieur.

Rakotonarivo, D., Gonzalez-Feliu, J., Aoufi, A., Morana, J. (2009). La mutualisation logistique. Report LUMD EA-2.

Roy J., Landry S., & Beaulieu M. (2006). Collaborer dans la chaîne logistique : État des lieux. Report 06-01, HEC.

Seiersen, N. (2006). Systèmes d'information logistique. Techniques de l'ingénieur.

Simatupang, T.M., & Sridharan, R. (2005). An integrative framework for supply chain collaboration, *International Journal of Logistics Management*, 16(2), 257-274.

Simonot, P.-Y., & Roure, J. (2007). *Logistique collaborative. Une question d'avenir*. Paris: Economica.

Toth P., & Vigo D., (2002) *The vehicle routing problem*. Philadelphia: SIAM.

Wacheux, F. (1996). *Méthodes qualitatives et recherche en gestion*. Paris: Economica.

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

Yin, R. (1994). *Case study research, design and methods*. Thousand Oaks: Sage Publications, 2nd edition.

APPENDIX 1 : LIST OF EXPERIENCES' COMEBACKS

Num.	Type	Description	State
CB1	Transportation agreement	Two concurrent logistics services companies made a transportation sharing agreement to avoid empty returns	Demand changed
CB2	Production platform sharing	Three concurrent automotive industry groups made almost identical models with the same patterns in the same factory	Strategies changed
CB3	Shared warehouse and distribution	Two concurrent tire brands built a particular shared warehouse to optimize the distribution operations by using the same transport operator	Operative
CB4	Shared VMI	Shared VMI between a cleaning products and a healthcare industry international groups	Operative
CB5	Shared VMI	Shared VMI among three non concurrent food industry companies	Operative
CB6	Classical VMI	A grocery distribution group developed a VMI approach with several furnishers and collaborators	Operative
CB7	Collaborative warehouse	First case of collaborative warehouses in the food industry (two non concurrent companies)	Simulation
CB8	Transportation agreement	Two non concurrent fresh food industry small enterprises developed a mutual transportation and representation strategy, sharing vehicles and sellers	Operative
CB9	Transportation agreement	Three concurrent fresh food transportation companies collaborated to increase their vehicle's loading rates, developing several sharing approaches	Changed. Partners' fusion
CB10	Network	Network of small and medium LTL transportation enterprises in France	Operative
CB11	Network	Network of LTL transportation enterprises in France	Operative
CB12	Consortium	Last mile distribution system based on a urban consolidation center and a consortium of transportation companies	Operative
CB13	Consortium	Last mile distribution system based on a multi-actor transportation sharing system organized by a consortium of small and medium transportation companies	Partner's search
CB14	Agreement	Printing and logistic chain solutions for two concurrent newspaper publishing companies in The Netherlands	Operative
CB15	Agreement	A newspaper distribution companies made collaboration agreements with book editors to increase their loading rates	Operative
CB16	Network	Closed e-marketplace (network with membership fees and entry conditions) for overseas transportation	Operative
CB17	Open e-marketplace	Open e-marketplace (no entry conditions) for national road transportation	Non efficient
CB18	Classical VMI	A chain of supermarket developed an inventory management system close to a classical VMI with several furnishers	Operative