THE RELEVANCE OF COLLABORATION IN A BTOB CONTEXT ON ENVIRONMENTAL PRACTICES AND CARBON EMISSIONS REDUCTION

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Abstract

Sustainable development has become critical to the design of globally integrated sustainable supply chain networks. The need for the introduction of sustainable development into the supply chain may require that companies reconsider their business models and adopt new collaboration strategies either proactively or responsively. Most academics focus on economic aspects one-sidedly, which is far from a thorough and holistic study of Sustainable Supply Chain Management (SSCM). Research on the relationship between environmental practices and collaboration in the supply chain has received limited attention. For environmental issues, companies not only focus their efforts on their direct greenhouse gas emissions, but also analyze emissions caused across the entire supply chain. To provide a valuable insight of sustainable practices, companies may require detailed information to identify the partners who deserve a special attention, and build consequently a significant sustainable relationship. By establishing sustainable collaboration, this study tries to understand how organizations could manage sustainability in their collaborative relationships and how it can empower partners in the supply chain to improve environmental performance and commitments. The commitments of the States with regard to CO2 emissions reduction normally come in the form of regulations and legislations that either proved and incentive or impose increasing pressure on most of companies. Particularly in the transport sector in France, a regulatory device was set up in 2013 that mandates the reporting of CO2 emissions from carriers. The objective is to share information with the buyers in order to encourage them to reconsider their choice regarding the design of their supply chains. The researchers investigate, in the context of buyer-carrier relationships in the supply chain, the impact of collaboration on their environmental practices. An explorative study is conducted based on interviews of fifty different organizations in private sector.

Keywords: Sustainability, Supply Chain, Collaboration, CO2 emissions

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INTRODUCTION

Against the backdrop of global warming, rising energy prices, GHG emissions and resource scarcity, the significance and practices of Sustainable Supply Chain Management (SSCM) has gained ample attention from both academic and business world. Since the early 20 hundreds, management research has addressed the multiple approaches a company might use to promote a SSCM (Seuring and Müller, 2008; Piplani *et al*. 2007). Several researches have been proposed through different activities along the supply chain like purchasing (Chen, 2005; Tate *et al*., 2010), sourcing (Roberts, 2003), operation and production (Kleindorfer *et al*., 2005), transportation (Murphy and Poist, 2000) and carbon reduction (Mc Kinnon, 2010). In the meantime, challenges arise from barriers that hinder the adoption of sustainable practices, like for example, high investment cost that yields no short-term economic return (Walker *et al.,* 2008, Evangelista, 2014), lack of expertise and standardization (Plambeck *et al.,* 2012, Colicchia *et al*., 2013), lack of infrastructure and trust mechanism (Zhang & Wang, 2014), lack of information and data to measure (McKinnon, 2008). For companies that seek to reduce cost and improve their environmental performance, integrating sustainable development into supply chain management may require them to reconsider their business models and to adopt new collaboration strategies either proactively or reactively. The study of the practices and collaborations between supply chain actors to promote SSCM is relevant on the environment of the Supply Chain.

Since the late 1990s, a number of government schemes have emerged in the forms of regulation and legislations (Kauffmann *et al.,* 2012) especially for environmental issues. Carbon taxes on fuels are common in many countries, UK mandatory reporting on Carbon Footprint (Dadhich *et al*., 2015) and the French Decree 2011-1336 that mandates CO_2 reporting in the transport sector in France. These regulations and legislations either provide an incentive or impose a great pressure that drives companies to adopt green and sustainable practices and collaborations along the supply chain. In particular in the sector of transport, a regulatory device was set up since October 2013 bearing on the obligation of calculating and reporting carbon emissions for every transport services having a point of origin or destination on the French territory (decree 2011-1336). Carbon reporting in transport services aims to improve information given to buyers to encourage them to reconsider their choice regarding the design of their supply chains. It should be noted that environmental posting in the transport sector generally concerns voluntary approaches (certification, notation). Thus, the obligatory character of carbon information from transport sector in France constitutes a major innovation, and offers an interesting scope of study, analyzing more closely the relations between the actors of the supply chain vis-a-vis the challenges of environmental development.

Many scholars have begun to recognize the potential capacities of carbon emissions reduction through supply chains. Most of the studies on carbon emissions reductions are combined with other environmental issues such as eco-product design, designs of sustainable supply chains (Chaabane *et al*. 2012), closed-loop supply chain (Plambeck, 2012). Recent literatures only studied collaborations of large focal companies with their suppliers and customers in terms of CO_2 emissions reduction (Vachon and Klassen (2008), Plambeck (2012), Zhang and Wang (2014), Dadhich *et al*., (2015). Some of them did contribute a certain portion with regard to buyer-carrier collaborations or relationships, for example, Evangelista (2014), Patier and Browne (2010), Colichia *et al*., (2013), however none has conducted a dedicated and thorough study. Moreover, it is not clear how buyers and carriers could collaborate through the supply chain in order to reduce their carbon emissions. Consequently, this paper is articulated around two main questions of research

which the application of the device raises:

- What are the characteristics of Carbon Emissions Reduction (CER) practices within the supply chain?

-What are the factors that can drive or hinder the implementation of collaboration for CER within a buyer-carrier relationship along the supply chain?

This research may have policy implications that could advance the move towards a low carbon society. Understanding buyer-carrier relationships in this context appears vital for the design of more effective policies. Furthermore, using a perspective of vertically (suppliers and customers) and horizontally (competitors) extended supply chains will construct a network of companies involved in the process and allows a more holistic investigation of the barriers and enablers to effective CO_2 emissions management along the supply chain.

This paper is organized into four different sections. Section 2 reviews academic literature in sustainable supply chain, purchasing and inter-organizational collaboration, that provides further insights into practices to reduce carbon emissions, and begin to identify the potential impact of collaboration on environmental practices. In this section a comprehensive framework is proposed to clarify the relationship between collaborative environmental practices and CO_2 emissions reduction. Section 3 describes the methodology used through an explorative study conducted based on interviews from 50 organizations from different sectors. Section 4 presents the analysis and findings.

SECTION 2. LITERATURE REVIEW

The concept of sustainability has been defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Applied in the corporate context, various definitions have been discovered by Roca and Searcy (2012). For example, "Corporate Sustainability", according to Steurer *et al.*(2005), addresses "the short- and long-term economic, social and environmental performance of corporations." These three dimensions were first coined as "triple bottom line" by Elkington (1998).

With such a broad definition, the integration of a supply chain is highly relevant to enhancing a firm's sustainable performance (Epstein and Roy, 2003; Porter and Kramer, 2006). Carter and Rogers (2008) addresses the importance of incorporating sustainability in internal and external supply chain management practices; they define a SSCM as "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 (Carter and Rogers, 2008)". The challenge for sustainable development is the integration of the global supply chain in order to coordinate activities across the supply chain so that the various enterprises can improve performance (Simchi-Levi *et al*, 2003) and implement sustainable processes.

The objective of the following review is (1) to identify practices for Sustainable Supply Chain Management and more precisely that for CER associated with transport. In an attempt to move toward environmental sustainability, corporations need to extend their efforts to improve environmental practices across their supply chain (Vachon and Klassen, 2008). Indeed, this will suggest (2) the relevance of supply chain collaboration to

promote environmental supply chain management and will clarify the drivers and barriers for environmental practices and collaborations.

Intra-organizational Practices for CER

In the literature, much attention has been paid to the significance of SSCM; various drivers have also been widely discussed and categorized (Zhu *et al*., 2006; Walker *et al*., 2008; Holt and Ghobadian, 2009). When practicing SSCM, many companies tend to focus on internal cost-saving activities as well as internal operational improvements (Holt & Ghobadian, 2009), which suggests a lack of outreaching and collaborative manners to improve the supply chain performance in terms of overall CO_2 emissions reduction. Historically most companies have only been internally focused (Betts & Hienrich, 2003).

Increasing fuel efficiency through the reduction of fuel consumption has a direct effect on CER (Holt and Ghobadian, 2009). The most promising fuel efficiency measures in the road freight sector can be divided into four categories: Vehicle design, eco-driving, the use of renewable or alternative energy and transport planning and optimization (McKinnon, 2008).

- Regarding Vehicle design, many literatures have proved that technological innovation can achieve great fuel savings therefore simultaneously contribute to CER, for example, the manufacturing or retrofitting vehicles with better aerodynamics (Zanni and Bristow, 2010; Colicchia et al., 2013). Norber Dentressangle, a major transport, logistics and freight forwarder in Europe, has developed an aerodynamic curved roof design to reduce wind resistance that makes is possible to lower fuel consumption by 5-8% (Colicchia et al., 2013). Reducing the tar weight of the vehicle through the use of lighter materials can also help reduce fuel consumption (McKinnon, 2008). Dadhich *et al*., (2015) also advocated the benchmarking of the trucks that have the best environmental performance.
- From social perspective, the development of eco-driving has been identified as one of the most important factors for freight operators to reduce both fuel consumption and CO_2 emissions (McKinnon, 2008; Zanni and Bristow, 2010; Plambeck, 2012). Using renewable energy, alternative fuels or alternative Vehicles (hybrid, electric) is another way to save fuel consumption thus to reduce CO2 emissions. Heavy truck manufacturer Volvo has launched the first parallel hybrid trucks in the UK market that are capable of carrying 26t and promises to reduce fuel consumption by up to 20% (Dadhich *et al*., 2015).
- Regarding organizational planning, various measures are adopted to achieve the optimization of transport flow. Inter-modal transport which promotes the shift from one mode with high carbon emissions to another with low ones can contribute to the decarbonization of the freight transport. (McKinnon, 2008). Increasing vehicle load factors can help reduce the energy consumptions and CO2 emissions per ton-kilometers (McKinnon, 2008). Reducing vehicle empty running will clearly reduce fuel consumption, therefore consequently CO_2 emissions (Litman, 2013). Other measures include the avoidance of emergency shipments as well as the reduction of waste the return flows (Agtmaal, 2008). The use of ICT in transport planning, computerized routing and vehicle tracking system, in particular, plays a significant role in achieving the optimization of transport flow (Zanni and Bristow, 2010).

Other managerial practices have also been observed and underlined by Agtmaal (2008) and Colicchia *et al*. (2013). They have taken into account environmental performance measurement and monitoring, personal training, internal communication to promote environmental awareness

among manager and also the integration of environmental value into decision-making process.

Development of CER practices also suggests that the design of the supply chain must be revised through the whole supply chain (Litman, 2013) with the collaboration of all of the partners in the supply chain.

Inter-firm collaboration in CER within the supply chain

The environmental performance of CER throughout the supply chain does not depend on how well each partner performs individually but on how well supply chain partners work together (Jayaram *et al*., 2010). Inter-firm collaborations have an objective to achieve an alignment among economic, social and environmental performance, which has been the subject for many literatures (Lambert *et al*., 2014; Barratt, 2004; Fawcett, 2012). Though barriers exist in great amount, different CER measures have been practiced and proposed.

As proposed by Zhang and Wang (2014), inter-firm collaborations can be classified into different categories. The purpose of this paper is to investigate the two different categories as follows:

(1) From the perspective of *vertical extended supply chains*, firms can cooperate on CER with their suppliers and customers, typical example being the collaborations to reduce fuel consumption during transportation (Zhang & Wang, 2014). Using a survey of North American manufacturers, Vachon and Klassen (2012) examine the impact of environmental collaborative activities on manufacturing performance. They propose to examine the relationship between environmental collaboration in the supply chain and manufacturing performance. They defined environmental collaboration to focus on inter-organizational interactions between supply chain members, including such aspects as joint environmental goal setting, shared environmental planning, and working together to reduce pollution or other environmental impacts. Generally, the benefits of collaborative green practices with suppliers were broadest. In recent years, environmental management has evolved to include boundary-spanning activities such as green purchasing requiring different degrees of interaction with other organizations in the supply chain. Environmental collaboration includes the exchange of technical information and requires a mutual willingness to learn about each other's operations in order to plan set goals for environmental improvement. It also implies cooperation to reduce the environment impact. Other form of collaboration consists of sharing policies and establishing common goals (Vachon & Klassen 2006). Current examples of companies extending their environmental management practices onto the supply chain are Walmart's scrutinizing and rationalizing the supply chain to identify emissions reduction opportunities (Plambeck, 2012), applying Life Cycle Analysis to identify emission hotspots (Dadhich *et al.*, 2015), helping business customers to monitor and measure the environmental impact of their business activities (Colicchia *et al*., 2013).

The introduction of a collaborative CO2 management approach with suppliers requires a comprehensive evaluation model; the existing supplier selection processes need to be revised and extended by integrating related criteria that are directly influenced by the supplier's CO2 management characteristics as well as indirectly affected by the firm's own carbon management characteristics. Theiben and Splinler (2014) developed a hierarchical decision model, through a case-based research, which enables partner selection for collaborative CO2 reduction. They also propose a collaborative mechanism

for CO2 reduction in the sense that both the focal firm and the supplier are going to benefit upon entering the partnership.

(2) From the perspective of *horizontal expanded supply chains*, firms can cooperate with their competitors in terms of carbon emissions reduction. Since they belong to the same industry thus face similar problems and pressures coming firm the industry. Therefore reducing carbon emissions could become their common ground. Due to high investment cost of R&D on energy efficiency, firms can also share the cost through collaboration with their competitors who have similar demand for technological innovation (Zhang & Wang, 2014).

Investing business collaboration to reduce CO_2 emissions from the perspective of vertically and horizontally extended supply chains may lead to a novel understanding of and more effective responses to increasing CO_2 levels in the atmosphere. The identification of the drivers and barriers for collaborative initiatives is relevant in this context.

Drivers and Barriers for Collaborative Initiatives

Faced with the current economic downturn, supply chain collaboration is of growing importance as an approach to gain competitive advantage through reducing costs and improving service levels. Supply chain collaboration has been the subject of a great deal of debate in the academic literature for many years (Lambert *et al*., 2004; Barratt, 2004; Fawcett, 2012). Previous research (Humphries and Wilding, 2004, 2007; Wilding and Humphries, 2006; Mena, *et al*., 2009) investigated the drivers for success and failure in long-term relationships. These researches demonstrated that often a cycle of failure within the relationship could develop, creating a situation where neither party would gain advantage and where the supply chain was therefore highly sub-optimal. However, while guidelines have been offered to support managers in setting up and running collaborative initiatives, the lack of industrial case studies prevents companies from understanding the true potential impacts and benefits. Fawcett *et al.* (2012) define supply chain collaboration as a vital dynamic capability, able to deliver differential performance. Collaborative initiatives can involve suppliers and customers - vertical collaboration - or competitors and other organizations in a similar supply chain echelon (Barratt, 2004), and the continuum of collaborative relationships spans from arm's length to vertical integration (Lambert *et al*., 2004).

In *Supply Chain Integration literature*, integration has been recognized as vital to SCM. Much of the SCM and logistics research has examined internal inter-functional integration with a focus on the interaction and collaboration between different departments (Kahn and Mentzer, 1998). Others have examined integration with external partners (Vachon and Klassen, 2006). Stevens (1989) emphasized that true supply chain integration includes both upstream and downstream players, while internal integration provides the foundation for both. Through an empirical study of 322 international companies, Frohlich and Westbrook (2001) have also demonstrated a strong linkage between higher degree of supply chain integration and the corresponding higher level of performance. More recently, Schoenherr and Swink (2012) analyzed the impact of levels of integration with customers and suppliers on the performance of quality, delivery, flexibility and cost performance. Other important issue discussed is the relation between business conditions and the optimum level of integration as well as the type of integrative activities employed. In general, in complex business conditions, higher levels of integration are

required and different SC practice are appropriate. Jayaram *et al.,* (2009) showed from their study that supply chain performance depends on how well supply chain partners work together and not on how well each partner performs individually. Flynn *et al.* (2010) show that internal integration is positively related to the operational and business performance of a given enterprise with a supply chain, including process efficiency. External integration involves the development of a close relationship with customers and suppliers to improve the accuracy of demand information, which reduces resources and minimizes costs, thus allowing the company to be more responsive to customer needs. This approach also allows the development of new sustainable processes and facilitates the management of the control and accountability in the entire supply chain. Chen *et al.* (2009) proposed a conceptual model that suggests that the implementation of supply chain process integration, encompassing various functional areas within and across firms, requires the incorporation of customer orientation at every step.

However papers that analyze the relation between supply chain integration and sustainability of the supply chain in its entirety are scarce. In most cases, only a single activity or operational level is considered (Svensson, 2007); the coordination between a company's sustainable strategy, and the external integration with suppliers, customers and other stakeholders is not well understood. Accordingly, Ageron *et al.* (2011) argue that it is currently essential and compulsory for companies to integrate sustainability issues in their upstream SCM. They found that sustainable sourcing can positively impact a company's image and enhance the drive for business sustainability.

The concept of *environmental sourcing* has been discussed through different aspects in the literature. Research on environmental aspects of sourcing centered on purchasing responsibility to facilitate recycling, reuse, and resource reduction (Carter and Carter, 1998; Min and Galle, 1997) and subsequently connected environmental sourcing to strategic topics, such as new product development or strategic risk minimization (Handfield *et al*., 2002; Vachon and Klassen, 2006).

The Purchasing function has undergone a remarkable ascent. Considered a few decades ago as an administrative function, it has become one of the core pillars of a company affecting operational activities and financial performance in a tangible way. However, often being focused on short term gains, purchasing strategies do not always go hand in hand with the preservation of the environment (Carter and Dresner 2001). The environmental purchasing concept appeared in the 1990's, and various studies have been conducted to evaluate environmental considerations in the purchasing process (Min and Galle; 1997, Carter and Smeltzer; 1998, Carter and Dresner; 2001, Maignan *et al.* , 2002). Several studies indicate therefore that purchasing departments are adopting environmental practices to comply with government directives (Murphy *et al*.;1995, Rao; 2005, Ageron *et al.* 2012, Giunipero *et al*., 2012), meet societal expectations (Reuter *et al*., 2012), minimize responsibility for any possible future prosecutions (Min et Gall , 1997), maximize profit opportunities (Reuter, Philipp Goebel and Kai Foerstl, 2012 ; Seuring and Muller, 2008) or simply to regain full control over companies' image (Maignan *et al.* ; 2002). Other recent academic research proves that the customer is the main driver towards the adoption of eco-efficiency purchasing policies followed by regulations and marketing (Rossi *et al*., 2013).

Analyzing different transport environmental purchasing academic studies, the process decision seems to mainly depend on the purchasing manager. By searching, evaluating, selecting the best offer and partner, and establishing the business contract, the purchasing manager remains the key partner when choosing a carrier (Rogerson, 2014). Yet, regarding freight transport buying process, environmental consideration does not seem to be a priority.

It has been proven that relationships between purchasing managers and carriers rely on criteria such as price, operational effectiveness, business relationships to the detriment of environmental concerns (Rogerson; 2014, Govindal *et al.*, 2013). Consequently, several doubts emerge due to the lack of environmental concern: Lammgard and Andersson (2014) recently pointed out that environmental factors such as CO2 emissions have garnered a consistently low level of importance when buying transport services. The acknowledgement of environmental efficiency has not increased over the years, as one might have expected.
Other results indicate that carriers still refuse to pay a higher price for more environmentally efficient logistics services (Lammgard, 2012; Rossi, Colicchia, Cozzolino and Christopher, 2013). Encouraged or constrained to implement environmental practices within their organization, purchasers play then a key role to integrate environmental issues when selecting a carrier. The main difficulty seems to lie at evaluating the transportation real value, due to the lack of transparency. Santén and Arvidsoon, (2011) highlight this argument: according to these authors, the main barrier that hinders the acknowledgement of environmental values comes from the fact that purchasers lack knowledge regarding the transport services they contract. Therefore, the lack of transparency that characterizes transport services seems to result in complete loss of attention and environmental improvement.
In order to get a deeper reflection of the relevance of transparency, it is worth pointing out that purchasers manage their suppliers in a precise segment. Depending on the marketing and product strategy, the final selection can be placed on privileged or regular suppliers (Calvi and Paché; 2010, Govindan *et al*, 2013; Hesping and Schiele, 2015). Indeed, by comparing these academic works, suppliers are often divided into two categories; regular suppliers (restricted to a financial transactions relationship) and privileged suppliers which have a collaborative relationship (Dyer *et al*, 1996). Transportation services are generally considered as regular transactions because of the lack of knowledge regarding the methods and the accurate cost of the services provided (Santén and Arvidsson, 2011; Rogerson, 2013). How is it possible to obtain precise information regarding the allocation of costs? Who gets the added value? These questions often remain enigmatic because of operations involving multiple intermediaries. As a result, buyers cannot control the price of the service provided and end up in a relationship with an arbitrage position (Santén and Arvidsson, 2011). It is now understandable that this lack of transparency is a huge challenge for companies that could affect the implication of purchase managers in environmental collaboration.

However, highly collaborative initiatives are costly, resource intensive and their outcomes are often unpredictable. Further, barriers to collaboration have been identified in the existing literature. They include the unwillingness to share information (Barratt, 2004), the lack of trust (Delbufalo, 2012), potential additional responsibilities and work (Merchant, 2011), perception of lack of mutuality and symmetry (Palmer *et al.*, 2012), the mistrust about the fairness of benefit, costs and risk sharing (Rossi, 2012). All of these barriers depict a high level of complexity that we try to understand through an exploratory study in a B2B relationship.

The literature review presented above examines a great deal of drivers and barriers for the implementation of CER collaborations which could be materialized through various practices. Though CER collaboration is positively linked to industrial performance (Vachon and Klassen, 2008), it is always with great complexity in implementation thus making it difficult for companies to identify the potential advantage (*et al.*, 2006). Lack of confidence (Walker, 2008) and poor amount of environmental information (Zhang and Wang, 2014) explains particularly why companies are reluctant to implement CER collaboration which carries all sorts of forms and concerns diverse actors in the supply chain.

The state of the art has enabled the identification of the themes and various questions tackled in the literature which has served as a framework for interviews carried out by the researcher. Does the implementation of a regulatory device will change behaviors and practices that have been identified in the survey ? A semi-structured interview will be especially capable of responding to this question.

SECTION 3. METHODOLOGY FOR AN EXPLORATIVE STUDY

Sample properties

As a first step in the development of a new research area, an explanatory research design is appropriate (Mc Cutcheon and Meridith, 1993; Yin, 1994). Even with a limited number of cases, the grounded theory-building approach seems to be accurate, provided that the conceptual framework is rational and stands on appropriate justifications. The cases are only used to strengthen the general argument (Glaser and Strauss, 1967; Siggelkow, 2007).

The company seems to be the logical unit to analyze how organizations have changed to incorporate sustainability at each level of the supply chain depending on the level of integration. This section describes the sampling approach used to identify companies for this study. First, we focused on exemplar companies, i.e. selected companies that appear to be leaders in their industries in terms of sustainability. To be considered an exemplar company, the organization must be proactive, achieving sustainable objectives beyond regulatory compliance.

A state of the art allowed the identification of the themes and the various questions tackled in the literature have been used as framework with the interviews carried out by the researchers. The sample used brings together exemplary companies regarding triple bottom line objective of sustainable development. The strategy of sampling has to be addressed to various actors: professional organizations of transport, professional organizations of the buyers and purchasing Transportation, public institutions, buyers companies in different sectors, carriers, service providers in IT specialized in CO2 Transportation. Various sizes and several sectors have been considered.

ACTIVITY	TYPOLOGY			
	LARGE FIRM	MEDIUM FIRM	SMALL FIRM	TOTAL
SHIPPERS (Buyers)	AutomotiveIndustry(B1, B4) Food Manufacturing(B3, B15) Luxury (B10, B11, B12) Supplies (B5, B13) InternationalDistributor(B2)	Wine Production(B6) Chemistry(B8) Furnitures(B7)	CLIM*(not coded)	16
CARRIERS	Logistics& Transport (T9, T10, T11, T12, T13, T15 to T 23)	Transport (T1, T2, T3, T5 T6, T7, T8, T14)	Transport (T4)	
CONSULTANTS &SSII			3	3
FEDERATIONS	Transport& Logistics(3)			3
ASSOCIATIONS	Shippers(3)			3
			TOTAL	**46 firms 51 interviews 48 coded**

Table 1. Sampling

All of the companies involved in the survey have a number of green initiatives in place and assume responsibility for coordinating transport and logistics network. The selection process included companies offering different ranges of services (pure haulage to value added logistics and SCM services) and also different ranges of transport service (Full Truck Load, Less Truck Load). The size of companies may have an impact on their attitudes toward green initiatives. Accordingly, companies of different sizes have been selected. Considering that the French transport and logistics market is predominantly populated by small and medium sizes enterprise (SMEs), most of the selected companies in Transport and Logistics fall into the latest European Union definition of SMEs (European Commission, 2005). Buyers have been selected for Large size enterprise with a higher level of green initiatives.

Interview protocol

The interviews have been carried out in a way structured according to competences of the interlocutors, of the field of intervention of the researchers, and the contacts established on previous research. These interviews have been conducted for 60 minutes each one and over one 5 months period from December 2014 to April 2015 with a total of 51 interviews. The process of the interviews has been stopped when the value of new information was not more sufficient. Companies were kept anonymous to encourage openness of response. All organizations were from France. Different profiles of respondents have been selected: Supply chain managers, transport purchasing managers, Sustainable Development Managers. The interview protocol was developed on the basis of the reviewed literature and discussions with researchers working for a research program funded by the ADEME in France (Agency of Environment and Management of Energy). This program aims to explore barriers and drivers to green supply chain management practices for freight transportation and carbon emissions reduction in France.

All interviews have been recorded and transcribed. Secondary data were collected such as annual environmental reports. The interview format covered the following areas:

TOPICS COVERED	THEMES
STRUCTURAL INFORMATION	Corporate data, business sector, governance modes, size of the company, department interviewed, transport share, Logistics share, relationship with suppliers , tenders
SUSTAINABLE DEVELOPMENT STRATEGY AND PRACTICES	Strategy, CO2 engagement, objectives of CO2 emission reduction, motivations linked to this reduction, practices settled on order to reduce the CO2 transport emissions, engagement in a voluntary program.
MANDATORY DISCLOSURE AWARENESS AND LEVEL OF INFORMATION	Decree awareness and identification of the barriers. Levels of information required. Motivations to obtain a better level of information.
CO2 DISCLOSURE, IT AND DATA USE	Data collection-tools, process and mecanisms of propagation.
CARRIER AND BUYER RELATIONSHIP	Common practices, drivers and barriers related to collaboration, identification of pressures, stakeholders involved,

Table 2: Topics and Themes covered

The transcripts involved that good transcript has to be aimed squarely at answering the research questions or addressing the research objectives (Robson, 2003). Two different teams of researchers independently coded and compared their coding structures to ensure similar themes were emerging. Quotes which best explained a particular situation were chosen to illustrate key points. The final stage involves the analysis of data based on and contrasting the main issues set out by respondents.

To analyze the content of the interviews, researchers have proceeded with a semantic analysis in three stages.

- Analytical Stage : to study profoundly the sub-categories
- Synthetic Stage: to substantiate the central ideas and categories with evidence.
- Explanatory Stage: to study the factors and approaches in relation between categories and sub-categories.

SECTION 4. FINDINGS AND ANALYSIS

Based on the analysis of the interviews, the pursuant paragraph provides a summary of the principle results and discussion. The results related to the Mandatory disclosure (level of information, drivers and barriers) are not presented here. It is organized into two parts concerning environmental strategy and adoption of green initiatives, drivers and barriers for green collaboration. All transcriptions collected by the researchers have been combined and integrated here. Conclusions are refined through collective discussions. Since all transcriptions have been examined and determined to be relevant, thus we have proceeded to realize the coding.

Sustainable Development strategy and adoption of green initiatives

Of all the companies investigated, we have identified the presence of sustainable strategy and practices. However these practices have been observed to be mainly intra-organizational in search of efficiency improvement for buyers like for carriers. Their implementations are mainly on a voluntary basis driven by the leaders and their environmental awareness. Inter-organizational practices in totality are observed to be focusing on the economic pillar and are initiated in majority by shippers. Table 3 and Table 4 summarizes the initiatives (or practices) implemented by each of the companies interviewed, columns from S1 to S15 for Shippers (Buyers) and columns from C1 to C23 for Carriers companies. Interviews provided for federations and consultants are not presented here because the results for this third group are related to the motivations and barriers for the implementation of the decree as stakeholders.

CATEGORY (AREA)	SUB-CATEGORY (Initiatives)	SUB-CATEGORY (Initiatives)	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
Strategy of sustainable development	C02 Engagement	C02 Engagement	●	●		●	●	●			●	●	●			●	●
	Objectives of CER	% of reduction	●	●		●						●	●				
Intra-organizational practices	Vehicle Efficiency	Changing vehicle specifications (engine, tyres…)															
		Improving rate loading						●				●			●	●	
		Reducing empty running	●	●		●										●	
		Mutualisation of the flows	●	●		●							●	●	●	●	
	Energy efficiency	Alternative fuels		●		●										●	
	Intermodality	Lower energy transport	●	●	●						●			●	●	●	●
	Recycling and Packaging	Reduction of waste										●					
		Innovation in Packaging											●				
	Environmental training & Information	Eco-driving				●											
		Communication for managers				●											
	SC Re-organization	Transport planning				●											
		IT information				●							●				
Inter-organizational practices	Collaborative SC and design	Collaborative Planning				●											
		SC collaboration on shared green targets		●													
		Dedicated transport organization	●		●	●											
	Environmental & social education	Customer/supplier education	●		●	●											
	Sourcing and performance control	Supplier selection criteria											●				
		Long term partnership (strategic suppliers)	●	●	●												
	Benchmarking of green practices	horizontal (competitors and other sectors)	●	●	●	●		●			●	●					●
		vertical (customers and suppliers)											●				
C02 Disclosure and IT	Calculating and reporting	Internal IT system			●			●									
		External IT system	●	●													
	Value and Impact of CO2 information	Control and Performance of suppliers	●		●	●											
		Supplier selection criteria	●	●													
		New SC organization	●	●													

Table 3 : CER initiatives adopted by the Shippers (Buyers)

For inter-firms collaborations and C02 disclosure 4 main results have been observed.

- The measurement of CO2 emission is not integrated into the criteria for selecting carriers.

- The decree has not forged an impact on the purchasing of transport services, nor on the modes of collaborations between shippers and carriers with regard to measuring CO2 information.

- Shippers and Carriers who have established privileged relationships (long-term contract, strategic carriers) tend to develop CER collaborations.

- The frequency and type of transport purchasing (perennial relations) have an impact on transport planning and related CER collaborations.

CATEGORY (AREA)	SUB-CATEGORY (Initiatives)	SUB-CATEGORY (Initiatives)	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23
Strategy of sustainable development	C02 Engagement	C02 Engagement		●	●				●	●	●	●	●		●	●	●	●	●			●	●		
	Objectives of CER	% of reduction							●			●			●	●			●			●	●		
Intra-organizational practices	Vehicle Efficiency	Changing vehicle specifications (engine, tyres…)	●	●	●	●	●	●	●	●		●			●	●	●	●	●	●	●	●	●	●	●
		Improving rate loading															●				●		●		
		Reducing empty running					●		●			●					●			●	●		●		
		Mutualization of the flows																●			●		●	●	
	Energy efficiency	Alternative fuels							●			●				●	●		●						
	Intermodality	Lower energy transport																				●			
	Recycling and Packaging	Reduction of waste																●							
	Environmental training & Information	Eco-driving	●	●	●	●			●	●	●	●			●	●	●	●	●	●	●	●		●	●
		Communication for managers																							
	SC Re-organization	Transport planning									●	●													
		IT information			●	●			●																
Inter-organizational practices	Collaborative SC and design	Collaborative Planning									●				●			●	●		●				
		SC collaboration on shared green targets																							
		Dedicated transport organization							●		●							●	●		●				
	Environmental & social education	Customer/supplier education									●														
	Sourcing and performance control	Supplier selection criteria																							
		Long term partnership (strategic suppliers)							●		●														
	Benchmarking of green practices	horizontal (competitors and other sectors)		●	●				●		●										●		●		
		vertical (customers and suppliers)										●				●									
C02 Disclosure and IT	Calculating and reporting	Internal IT system		●							●	●	●	●	●	●	●	●	●	●		●			●
		External IT system	●		●				●															●	
	Value and Impact of CO2 information	For reporting to customers (competitive advantage)	●	●	●		●		●	●							●	●							
		Competitive advantage																							

Table 4 : CER initiatives adopted by Carriers

For companies interviewed, sustainability is only positively related to the problem of efficiency especially for carriers that are probably exacerbated by the current economic context. Sustainability in transport sector is regarded as a way to reduce cost, especially through the reduction of fuel consumption thus ultimately reducing CO_2 emissions and improving environmental footprint. From this perspective, initiatives linked to CER exist in myriad amount but are disparate and fragmented. Sustainability strategy, in practice, is translated into organizational and technological innovations (renewal of the fleet, alternative energy, modal split etc.) without relying on precise figures. We have identified practices from both intra- and inter-organizational level that anchor on the three pillars of sustainability. However, the results of our study do not permit to establish the links between intra and inter-organizational practices.

The diagram below proposes a synthesis of all the practices observed throughout the first stage of the research.

Tripple Bottom Line Strategy	Intra-organizational practices	Inter-organizational practices
Environemental	- Recycling - Reduction of waste - Eco-conception - Packaging	- Environmental education (fundings) - Benchmarking of green practices

Economic	- Vehicle efficiency and Internal savings
	  - New Technology for trucks (Engine, IT…)
	  - Renewable energy
	  - Optimization of the flows
	  - Education (Eco-driving)
	  - Re-organization of the SC
	- Intermodality
		- Collaborative SC and design (Co-planning, green shared targets)
		- Mutualization logistics/transport
		- Co-implementation of renewable energy
		- Re-design of Supply Chains (dedicated transport flow)
		- Sourcing and performance control

Social	- Security - Training	- Education of drivers

Figure 1: Intra and Inter organizational practices for CER

As we have examined in the literature, *environmental vertical collaboration* implies the exchange of technical information and entails a voluntary engagement for mutual benefit as one can learn more from the operations so as to properly establish achievable objectives for the improvement of environment. Apart from managerial adjustment that, for example, permits the improvement of vehicle load factor and the reduction of empty running, our results have revealed very few vertical collaborations aiming at carbon emissions reduction. Information sharing, placing visibility of the organization in order to proceed to deeper reorganization seems a risk of opportunistic behavior or "a personal interest research obtained deceitfully "under Williamson (1985, p. 47).
The remarks from companies investigated also suggest that the development of regulatory sanctions on CO2 emissions can achieve a more forceful effect in driving companies to engage in collaborative actions.

Contrary to what has been affirmed by several authors (Theiben and Spinler, 2004), our study shows that CO2 transport information and CER have not seemed to be integrated into the criteria for selecting carriers. The engagement and practices of sustainability remain wide and general, which seems to be more important to carriers than concrete and measurable actions aiming at reducing CO2 emissions. Current methods for measuring CO2 emissions are insufficient, neither mature nor standardized. Therefore data produced using such method are not exactly very reliable.
Moreover, it seems that the quality of inter-organizational relations (length of relations, climate of relations, company size, and frequency of exchanges) among logistic chain actors could help develop a common mentality that could be shared between shippers and 3PLs/carriers. CER collaborations that indeed have been implemented are between companies with long-term relationships rather than that bound by contractual responsibility or obligations.
Therefore, introducing CER demand into the criteria, or to be more specific into the terms and conditions in selecting and purchasing transport service would drive transport service

providers to engage in more sustainable CER practices and activities. Unfortunately in reality, carriers' operations quite often span across different regions where there exist a great deal of discrepancies and heterogeneities of regulations on both national and international levels. Consequently data collected or produced by carriers are not standardized thus lack of merit. Therefore there is the need for the formulation and standardization in the cases of "calls for offers" and "terms and conditions".

Horizontal collaboration has a strong presence for Shippers but so far has not fully emerged to have a strong presence for carriers. Neither has the practice of benchmarking been very well developed. Associations dedicated to standardization could facilitate the development of common projects. There are several responses where the respondents indeed have expressed the desire to play a role in standardization so as to be able to measure CO2 emissions, to exchange CO2 transport information and to make CO2 reporting more precise and accurate. They also want to become the leaders to develop "pilot programs" that would enable them to measure the effect of certain CER practices and innovations.
The following diagram tries to summarize the results.

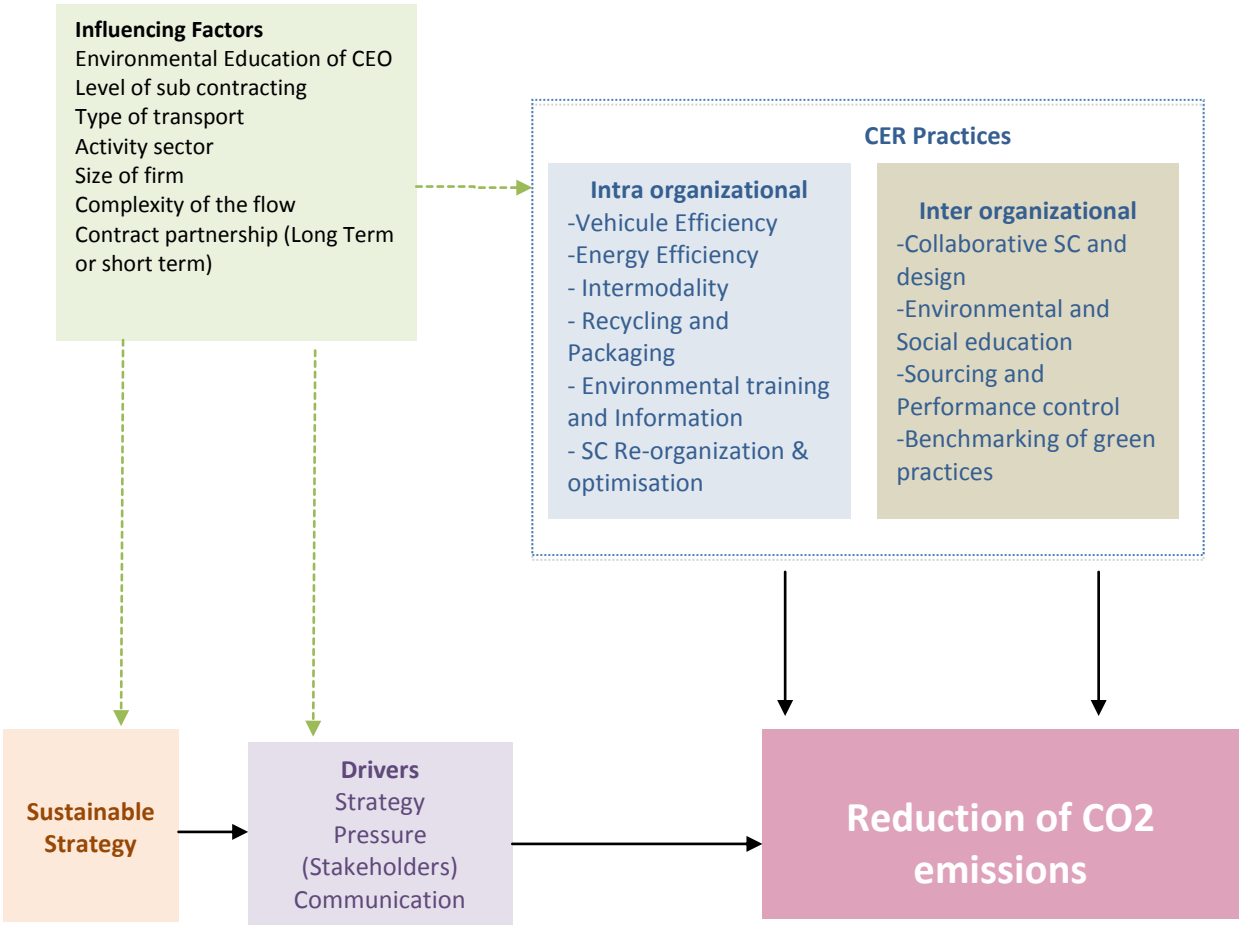

Figure 2. Practices and Influencing factors on CER

Drivers and barriers influencing the adoption of collaborative initiatives for CER

Practices on inter-organizational level is essential in reducing CO2 emissions, especially those undertaken by carriers. Apart from the barriers linked to information sharing, we have noted a lack of interest affirmed by some stakeholders, shippers in particular who are not so demanding on CO2 transport information from the carriers. Carriers do not seem to be willing to collaborate in these initiatives, nor in inter-organizational CER practices (redesigning of the logistic chain, intermodality, and mutualization, etc.).
However, there exists certain amount of collaborative projects undertaken between carriers in partnerships with other 3PLs associated with sustainability strategy. Representative examples being innovation projects such as Vehicles powered by liquefied gas, organization of dedicated transport flow, the mechanism that enables the systemization of multimodal transport. We can notify that the multimodal transport is initiated by the shippers.

Table 5 and table 6 summarise the drivers affecting the adoption of inter-firm green initiatives.

Drivers /Shippers	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
Green initiatives for performance and control	●														
Green initiatives for Competitive advantage		●													
Collaboration through industrial symbiosis			●										●		
Pressures from customer						●		●		●					
Pressures from the CEO								●							
Benefices of global strategy and innovation													●	●	●
Barriers /Shippers	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15
Lack of well understanding of the value of CO2 information	●														
Complexity of the relation shipper/carrier	●	●													
Lack of trust from the carrier	●			●											
No visibility on the information		●										●			●
Lack of customer environmental strategy						●									
High investment cost and lack of resources							●								
Lack of interest coming from the customer								●							

Table 5. Drivers and Barriers influencing the adoption of collaborative green initiatives for shippers

Drivers /Carriers	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23
Green initiatives for performance and control									●			●											
Green initiatives for economic advantage		●		●	●			●				●					●		●				
Pressures from customer	●					●																	
Pressures from consumers	●																						
Long term contract							●													●			
Barriers /Carriers	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23
Lack of well understanding of the value of CO2 information			●			●		●															
Lack of transport understanding by purchasing manager							●																
Lack of trust																	●		●				
High volume of sub-contractor									●				●	●									
Customer do not want to pay for environment initiatives										●	●					●							
High investment cost and lack of resources		●	●	●								●											
Organization in JIT and its impact																			●				

Table 6. Drivers and Barriers influencing the adoption of collaborative green initiatives for carriers

Considering the two groups of case companies above, shippers indicated that pressures from customer were the most influential driver affecting the adoption of inter-firm green initiatives. The benefits of a global environmental strategy and innovation are also considered critical for the implementation of collaborative green practices. In addition to customer and global management, the second group of firms indicated that the initiatives implemented must provide an economic advantage. This confirms that sustainability is only positively related to the problem of efficiency and regarded as a way to reduce cost, especially through the reduction of fuel consumption thus ultimately reducing CO_2 emissions and improving environmental footprint.

Table 5 and 6 show that the most important barriers were both internal and external to the company. Most of the carriers indicated the high investment cost and the lack of resources as a barrier for collaborative green initiatives. They also highlighted the problem of their uncertainty about their payback period and the engagement of the customer regarding the payment for environmental practices. Lack of environmental awareness is also a huge impeding factor where many industrial firms have not realized the effectiveness to reduce the carbon emissions through CER collaborations with other firms. The lack of human resources to support green initiatives poses as another internal barrier against environmental practices and collaborations. Other associated human resource constraints are lack of training and lack of management commitment. The lack of ICT skills may also hinder the adoption of green measures. Externally, Regulations and legislations could become barriers if they are not commensurate with reality

SECTION 5. CONCLUSION

This research tends to explore the consequences that arise from the implementation of the Decree for CO2 emissions in France. We also study how practices and collaborations will change and evolve in respond to the decree. Not so many researchers have dealt with this line of study. The majority maintains that the decree has not contributed to any actual evolution of the modes of collaboration, especially for companies whose operations span beyond the French territory.

The results presented above indicate a low engagement in environmental sustainability by the case study companies investigated. This confirms the immaturity of the french transport market regarding CER initiatives.

Carriers are more interested in greening on their vehicule operations and more concerned about cost efficiency than environmental initiatives. Initiatives linked to CER exist in myriad amount but are disparate and fragmented. Sustainability strategy, in practice, is translated into organizational and technological innovations without relying on precise figures and CER objectives. Thus, it is difficult to establish the links between intra and inter-organizational practices.

The motivations that drive companies to reduce their CO2 emissions essentially rest on the global engagements of strategy of the company as well as on the pressure from various parties involved. Our research has showed a broad range of CER motivations and found it difficult to trace their causality through simple linkage, which substantiates our choice to continue this research using a large scale survey.

The main managerial implications deriving from the study investigation may be summarized as follow. For the companies belonging to shippers group, the success of CER initiatives

depends primarily on the ability of management to develop a global and collaborative approach involving carriers. The suggestion here is to propose long term contracts in order to ensure an adequate return for carriers' green investments. Longer contracts could have a positive effect on encouraging a collaborative planning and environmental control, the development of a better understanding of the value of CO2 information in a win to win relationship. By proposing dedicated transport and pooling flows to the carriers, this will increase the visibility of carrier's sustainability efforts. These companies could also be encouraged to use a green reputation as a market differentiator. A collaborative approach has the potential to improve CER initiative within the supply chain and overall financial performance. The challenge here is to develop more integrated and collaborative business models. Second recommendation will be on the traditionally supplier focused purchasing function that has to expand its sensitivity and perceptiveness of sustainability. For successful implementation of sustainable sourcing, purchasing will have to communicate, interact and cooperate with suppliers and customers. Training programs may be utilized to extend purchasing manager's stakeholder perception.

While the developed study and research propositions contribute to theory building research in sustainable supply chain management, supply management, this research also presents some limitations and avenues for further research. Like all exploratory research findings, large scale survey research might offer interesting insights for CER intra and inter practices, drivers and barriers, according to company size, industry characteristics and other contextual factors. It would be also valuable to extend research analyzing the salience of different stakeholders and their role to promote the implementation of CER practices within the supply chain.

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