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**The path towards
environmental and social sustainability:
the case of manufacturing companies and their suppliers**

Doctoral Dissertation

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“Honey you are a rock, upon which I stand”

Coldplay, Green Eyes

Quanto è difficile prendere decisioni?

Ciascuna nasconde piccoli e grandi cambiamenti.

*A Cassandra, dolce e rassicurante compagna,
stimolo e ragione su cui si fonda ogni mio cambiamento.*

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ABSTRACT

In 2005, the Millennium Ecosystem Assessment reported that two-thirds of the world's ecosystems were being exploited well beyond sustainable levels. Given that manufacturing firms rely strongly on natural resources to conduct business, it is surprising that many have failed to make their supply chains more sustainable. I believe this occurs not because companies are acting in their own self-interests, but because understanding is still lacking on how to become sustainable. The Key is that good environmental and social performance are not simple to achieve, since 'new' practices have to be developed in a coordinated fashion. That is, most companies do not choose to ignore environmental and social harm, but the complexity is such that their knowledge is often insufficient.

The goal of this dissertation is to offer original insights on the supply chain sustainability phenomenon and translating them into practical guidelines which help companies to coordinate the complex bundle of practices which have to be adopted along the pathway that lead to high environmental and social performance in the supply chain. To do so, I develop three distinct but compatible papers. The first looks at the role of a company's willingness/ability to change, i.e. its innovativeness, as a distinguished factor whose absence may hinder, retard or even constrain the development of sustainable practices. The second paper acknowledges the globalization process that supply chains are undergoing, which creates the need for differentiated approaches to the management of sustainable supply chains. Evidence is provided on the effects of global sourcing (i.e., sourcing outside the continent where the company is located) and of supply management (i.e., series of activities that companies undertake to reduce their supply base and build a structured approach to empower suppliers) on environmental and social performance of buying firms. Third, the last paper looks at the inter-relationship between internal and external practices (i.e., activities within a company's direct control and without direct supplier involvement vs. activities that include transactions with suppliers) and at their specific impacts on sustainability performance.

Taken as a whole, this dissertation sheds some light on the pathway companies should undertake to boost their environmental and social sustainability while helping suppliers to develop their own capacity to deal with this matter.

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CHAPTER ONE.

Introduction

1.1 PURPOSE

In 1987, the World Commission on Environment and Development (WCED) of the United Nations raised attention on the ‘sustainable development’ concept. This concept indicates a type of development able to satisfy current needs without compromising the possibility for future generations to satisfy their own needs (Brundtland, 1987). In the management arena, this principle was soon translated into the triple bottom line approach (TBL) which synthesizes the important relation among economic growth, social equity and respect for the environment (Elkington, 1994, 1998). In order to grant a sustainable development, companies are suggested to adopt a long-term horizon and let the economic growth sustain the social progress and the environment, being social policy the base for economic indicators and being environmental policies effective in term of costs.

The initial focus on internal operations (Jiang and Bansal, 2003) has then broadened into a stronger external orientation (Linton et al., 2007): companies attempt to ensure that practices and operations adopted by their organization and upstream in the supply chain are more environmentally and socially sustainable. To illustrate, McDonald’s Europe had to address issues of soybean culture in Brazil because a report from Greenpeace suggested that its sourcing practices contributed to the depletion of the rainforest (Stoll, 2009). Mattel initiated a massive recall of products (made by a supplier in China) after discovering they contained lead paint provided by a second-tier supplier (Story, 2007). More recently, Victoria’s Secret was involved in a scandal regarding children picking cotton in Burkina Faso (Simpson, 2011).

In line with this trend and with several calls for investigation on how sustainable supply chains develop (American Chamber of Commerce of Europe, 2004; International Chamber Of Commerce, 2007; Krause et al., 2009; Linton et al., 2007; World Bank, 2003), the purpose of this thesis is to shed light on the pathway companies should undertake to boost their environmental and social sustainability while helping suppliers to develop their own capacity to deal with this matter. We argue that accomplishing this

goal is critical since companies need to continuously deliver social and environmental improvements in their supply chain.

An empirical investigation which mix qualitative (case studies) and quantitative (survey) research methods has been undertaken. Manufacturing industries (e.g., chemicals, automotive, electronics) constitute the environment selected for the fieldwork. Companies from this industries are responsible for severe impacts on the natural and human environment along all stages of the products' life cycle (Brickman and Ungerman, 2008). Therefore, they have faced increasing pressure for resolving salient environmental and social issues in the area of hazardous material substitution, health and safety, as well as recovery and recycling (Lee and Klassen, 2009). Since practices varied significantly and required companies to manage these changes, manufacturing industries offered significant potential for new insights.

In the next section further details are provided about the literature that has integrated social and environmental issues within the management of supply chains. Next, a more refined description of the goals of this dissertation will be provided. Finally, the methodology that has been leveraged to obtain a robust set of findings is illustrated.

1.2 BACKGROUND

In this section, the concepts of sustainability and supply chain management (SCM) are described in all their facets. These two concepts will be melt down into what the literature refers to as Sustainable Supply Chain Management (SSCM). A specific definition of SSCM will be proposed, which is used consistently throughout this research. Then, relevant literature on this topic will be discussed and summarized. Specifically, different SSCM practices will be described. Section 1.2.3 describe the factors that drive/enable SSCM. Finally, section 1.2.4 describe the relationship between SSCM and performance.

1.2.1 Sustainability Supply Chain Management (SSCM)

Sustainability is a term that seemingly has multiple definitions (Dryzek, 1997) and is evolved during time from being all about the natural environment (in the 70s), to essentially integrate “green” thinking and respect for human rights (today). Sustainability often associates with Sustainable Development (SD) i.e., meeting the

needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). Although SD points out an effective and easy to spread message, this concept has been criticized for being too broad, thus unable to shed light on what sustainability really means and how it can be continuously improved.

Thus, in the business world, the concept of sustainability, as SD, has been translated in what Elkington (1998) proposed as the triple bottom line approach (TBL). This author saw sustainability as the integration of Economic sustainability (i.e., create profit in a stable way during time), Environmental sustainability (i.e., do not harm the planet) and Social sustainability (i.e., respect human rights, health and safety). Essentially, “for the business enterprise, sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today [shareholders, customers, employees, suppliers, government and local communities] while protecting, sustaining and enhancing the human and natural resources that will be needed in the future” (International Institute for sustainable development, 1992). This approach has received a great deal of attention during the last two decades, with several authors building on it (for a comprehensive review see Ahi and Searcy, 2013).

Increasingly, practitioners and researchers in different fields are taking into account the impacts and implications of business sustainability on traditional assumptions and practices. Supply Chain Management (SCM) is one of these areas. Since its introduction in the early 1980s, SCM has been used to describe the planning and control of materials, information flows, and the logistics activities internally within a company and also externally between companies (Cooper et al., 1997; Gibson et al., 2005; Mentzer et al., 2001; Stock and Boyer, 2009). The key characteristics of SCM have always been (i) intra- and inter- organizational practices, (ii) process improvement orientation, as well as a (iii) focus on the business economic result. With the rising of sustainability, however, there has also been a growing effort to incorporate key TBL characteristics in SCM, such as an objective of Ecological efficiency and social responsibility. Eco-efficiency is the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the earth’s estimated carrying capacity (Glavič and Lukman, 2007). Social

responsibility has been mainly intended as safe, respectful, liberal, equitable and equal human development (Glavič and Lukman, 2007).

The topic of sustainability in the context of SCM has been discussed using a number of terms in the literature, such as environmental management, green process management, green purchasing, purchasing social responsibility, supplier socially sustainable management, green supply chain management and sustainable supply chain management (Bowen et al., 2001; Carter and Jennings, 2004; Carter and Rogers, 2008; Ehr Gott et al., 2011; Gavronski et al., 2011; Hajmohammad et al., 2012; Handfield et al., 1997; Hollos et al., 2012; Klassen and McLaughlin, 1996; Pagell and Wu, 2009; Seuring and Muller, 2008; Srivastava, 2007; Vachon and Klassen, 2006; Walker and Jones, 2012; Wu and Pagell, 2011; Zhu et al., 2005; Zhu et al., 2007, 2013). The term used that most closely and comprehensively links sustainability and SCM concepts is sustainable supply chain management (Ahi and Searcy, 2013).

Although there's still no consensus on its definition, Sustainable Supply Chain Management (SSCM) is here defined as *a new archetype for companies to meet stakeholder requirements and improve profit and competitiveness while raising ecological efficiency and social responsibility in the supply chain*. SSCM tackles environmental and social issues using supply chain management practices and can be viewed at multiple levels including internal and external practices (Darnall et al., 2008; Gavronski et al., 2011; Meehan et al., 2006; Pagell and Wu, 2009; Zhu et al., 2013). Internal practices, namely Sustainable Process Management (SPM), comprise those activities within a company's direct control and without direct supplier involvement. Practices that include transactions with suppliers have been seen as external supply chain activities, and are usually understood as Sustainable Supply Management (SSM).

More specifically, SPM refers to a firm's institutionalization of internal environmental and social management practices which aim to reduce a company's direct environmental and social impact. In essence, SPM entails the adoption of environmental management systems (ISO 14001) (Daily and Huang, 2001; Darnall et al., 2008), environmentally friendly eco design (e.g., eco-design, Design for Environment, Life cycle assessment) (Zhu and Sarkis, 2004), health and safety standards (Robson et al., 2007) and other social practices (e.g., codes of conduct, corporate social activities) (Zairi and Peters, 2002). Sustainable supply management (SSM), conversely, refers to

two complementary sets of programs implemented at the firm level to assess and improve the environmental and social performance of a supply chain (e.g., Ageron et al., 2012; Awaysheh and Klassen, 2010; Large and Gimenez Thomsen, 2011; Lee and Klassen, 2009): (i) activities conducted to assess (and control) suppliers sustainability performance (i.e., supplier assessment) and (ii) activities comprising the direct involvement of the focal firm in its suppliers' activities to improve environmental and social impacts of their products and operations (i.e., supplier collaboration). Supplier assessment includes the setting of supplier assessment criteria, the gathering and processing of supplier information, and the evaluation of environmental and social performance of suppliers. Differently, supplier collaboration is a support-based approach that includes activities such as undertaking joint development for greener product design or process modification, reducing waste in the logistics, sponsoring supplier summits to encourage the sharing of sustainability information and the management of environmental and social risks.

This view of the definition and composition of SSCM builds on the definition of green supply chain management proposed by Zhu et al. (2005, 2007, 2013) and extends it in several ways. Although far from being comprehensive, indeed, this view is in line with highly-cited literature which suggests that SCM should take goals from all three dimensions of sustainable development (Carter and Rogers, 2008; Seuring and Muller, 2008). Importantly, It also highlights the importance of stakeholders and the role that any company operating in a chain system can play in fostering sustainability (Pagell and Wu, 2009).

1.2.2 SSCM practices

In the previous section, several SSCM practices have been introduced that are detailed in this section. Starting from SPM, recent literature proposes the following set of practices (Gavronski et al., 2011; e.g., Klassen and Whybark, 1999; Lee and Klassen, 2009; Robson et al., 2007; Zairi and Peters, 2002; Zhu and Sarkis, 2004; Zhu et al., 2013):

- Environmental management system (EMS) consists *in a set of management tools and principles designed to guide the allocation of resources, assignment of responsibilities and on-going evaluation of practices, procedures and processes, and environmental concerns that industries, companies, or*

government agencies need to integrate into their daily business or management practices (Glavič and Lukman, 2007). The ISO14001 is a voluntary certification, introduced in 1996 and reviewed in 2004, that helps its adopters to implement and certify a systematic management system composed by such elements. What is important to underline since the beginning is that the standard does not prescribe or say anything about the environmental performances that a firm should achieve, but instead it is only focused on how an environmental management system should be. Third party assurance for ISO 14001 is not mandatory, but ideally confers a major credibility to the firm. A second voluntary environmental management instrument is Eco-Management and Audit Scheme (EMAS). This scheme was introduced in 1995 by the European Commission and was at first restricted only to companies belonging to the industrial sectors and afterwards expanded to all kind of companies. The standard, likewise ISO 14001, requires a third-party certification, but, in addition, EMAS asks for several other strict elements including also the delivery of a public document with the firm's environmental performance (Delmas, 2002). EMS can also be complemented with environmental practices denominated *pollution prevention* (i.e., a multi-media environmental management approach which emphasizes the elimination and/or the reduction of waste at the source of generation), *pollution control* (i.e., an approach that it is designed to reduce the impacts of pollutants that are produced, before they are released into the environment; this is accomplished by some type of treatment) *waste minimization* (i.e., measures or techniques that reduce the amount of wastes generated during industrial production processes) and *recycling* (i.e., a resource recovery method involving the collection and treatment of waste products for use as raw material in the manufacture of the same or similar product) (Glavič and Lukman, 2007).

- *Code of conducts and Occupational Health and Safety Assessment Series 18001* (OHSAS 18001). A code of conduct states in clear terms the value orientation of a firm and usually touches issues such as child labour, forced labour and discrimination, freedom of association, decent working hours and remuneration (Waddock et al., 2002). OHSAS 18001 has been instituted in

1999 and refers to the system by which a company manages health and safety of its employees. Likewise ISO 14001, can be third-party certified and it is based on a continuous improvement logic. This standard, whether integrated with a company's EMS, may enable better performance and reduced TBL's trade-offs (Robson et al., 2007; Zeng et al., 2007).

- *Eco-design (e.g., through Design for Environment and life cycle assessment)*, then, represent a set of effective internal practices composed of concepts and techniques to evaluate the environmental, social and economic impacts of products and services and to imply the minimisation of an organisation's negative externalities (Seuring, 2004a). The standards ISO 14040-14044 illustrate the four phases to be followed in the application of such practices. The first step is called *Goal and Scope Definition*. This starting step is fundamental because it is here that the scope of the analysis is declared, the unit of study decided, and any assumption or limitation made. The output of this phase is a document containing all the information on the issues just described. The second phase is named *Life Cycle Inventory*. In this phase, all the material flows with regards to a specific product are mapped. The third phase is the *Life Cycle Impact Assessment*. The aim of this phase is to quantify the potential impacts associated to the material flows identified. Several accounting principles and methods can be applied at this step (Lamberton, 2005). The last phase is the *Interpretation* phase. This phase has the objective to check and verify the information collected in the previous two phases and, ideally, points to potential improvements.

Internal practices can be complemented by SSM, which constitutes of the following two groups of levers:

- *Social and environmental assessment*. A first approach in SSM constitutes of evaluating suppliers' ability to manage sustainability. Supplier assessment includes the setting of supplier assessment criteria, the gathering and processing of supplier information and the appraisal of environmental and social performance of incoming goods and the suppliers. It typically attempts to control particular inputs, production activities or outputs through an arm's-length approach that might assess compliance with a purchasing contract,

“voluntary” code of practice, or public standard (Amaeshi et al., 2008; Bowen et al., 2001; Vachon and Klassen, 2006). Prior contributions on ‘non-economic’ supplier selection and monitoring have primarily focused on incorporating environmental aspects, and to a lesser extent, social aspects of the triple bottom line (Pagell and Wu, 2009). If integrated with rewards or punishments, such requirements can stimulate environmental and social innovations in products and processes (e.g., Hall, 2000).

- *Social and Environmental Collaboration.* In a potentially complementary manner, supplier collaboration is a support-based approach that encompasses a broad range of activities that tends to take place within a more partnership-oriented relationship (Seuring and Muller, 2008). Activities include training and education programs for suppliers; sponsoring supplier summits to encourage the sharing of sustainability information and practices; undertaking joint development for greener product design or process modification; and reducing waste in the logistics. Yet, in contrast to monitoring, collaboration focuses less on the immediate outcome of the suppliers’ environmental and social efforts (e.g. compliance to existing regulations), and more on the building of suppliers’ potential and on the process by which sustainable products and processes might be achieved. Collaboration can impact environmental performance while improving operational competitiveness in such areas as delivery, quality and flexibility performance of manufacturing systems (Vachon and Klassen, 2008). For instance, Ellram (1990) pointed out that suppliers are always more involved in the new products development because they possess relevant design and technology. Also, suppliers may create design constraints which limit the environmental initiatives available to focal firms and make collaboration necessary (Noci, 1997).

1.2.3 SSCM antecedents

As described above, SSCM is composed of several practices which can be leveraged to a different extent by manufacturing companies. In this section, thus, a comprehensive overview of the factors that foster (or constrain) the adoption of such practices is provided. Specifically, we will discuss the role of the pressure coming from

different stakeholder groups (government, customer, media and NGOs) as well as the role of resources and capabilities which enable the development of SSCM.

Pressures from the business environment are shown to induce/motivate the adoption of sustainable practices (Ateş et al., 2011; Deephouse and Heugens, 2009; González-Benito and González-Benito, 2006). Stimuli for sustainability come from several agents (i.e., government, consumers/customers, media, NGOs, local communities and interest groups/activists), which may drive environmentally and socially sustainable behaviors directly or indirectly (Sharma and Henriques, 2005). Legislations represent the means the government can use to directly control/shape companies' environmental and social conduct (Bansal and Roth, 2000; Barnett and King, 2008; Porter and Van der Linde, 1995; Zhu et al., 2007). Although regulations are often criticized for constraining innovative thinking about sustainability (i.e., they are not well tailored to specific industries and focus more on the solution rather than allowing freedom in the way companies may resolve environmental and social issues), avoiding penalties and liabilities is shown to be a good reason for engaging with pollution control practices, mostly in a 'passive' or 'reactive' stance (Buyse and Verbeke, 2003; Murillo-Luna et al., 2008).

Also, the growing importance that aspects such as workplace safety, working conditions and bad emissions characterizing production facilities play in customers buying decision is shown to directly stimulate the deployment of environmental investments and sustainable sourcing practices (e.g., Ateş et al., 2011; Christmann, 2004; Ehergott et al., 2011). Deephouse and Heugens (2009), for instance, argue that growing customer awareness of social conduct does not stop with scrutiny of firm's own manufacturing activities but extend to its social behavior and its indirect impacts on society. Once customers become aware of the availability of an innovation feature (e.g., "green" products, socially responsible businesses), they may no longer be willing to purchase any other product or service not containing the desired feature. Thus, all players in the market are required to adopt that innovation. For instance, the literature finds that one of the most important reasons for continued use of expensive recycled materials and adoption of environmental and social certifications was requirements from industrial customers (González-Benito and González-Benito, 2006).

Media, NGOs, Local communities and interest groups, differently, mainly exercise an indirect influence on a company's sustainability practices (Sharma and Henriques, 2005). Specifically, as a company or its supply chain generates significant negative externalities (bad emissions, waste, unsafe working conditions, child labour, etc.), these agents can respond by raising attention and influencing other stakeholders groups (i.e., customers, governments) to withhold legitimacy from the firm. Legitimacy, i.e., the appropriateness of its actions within an established set of regulations, norms, values or beliefs, is a necessary condition for companies survival (Suchman, 1995).

Beyond pressures from the business environment, studies show that the absence of an appropriate base of resources may hinder, retard or constrain SSCM development (Bowen et al., 2001; Carter and Jennings, 2004; Ehrgott et al., 2011; Gavronski et al., 2011; Hajmohammad et al., 2012; Pagell and Wu, 2009; Vachon and Klassen, 2006). First, organizational constituents' willingness to transact a business in a manner expected and viewed by society as being fair and responsible, a factor often referred to as *Ethical responsibility* (Carroll, 1991, 1999; Carter and Jennings, 2004), is a valuable resource for the development of SSCM. While the willingness of top-level managers to prioritize a specific set of resources (financial and human capital) inside the organization to improve sustainability performance is absolutely necessary (Gavronski et al., 2011; Klassen, 2001), middle management can be seen as "champions" in the organization and represent important motivators for sustainability practices (Carter and Dresner, 2001; Ehrgott et al., 2011). Nonetheless, employees themselves can likely play an important role in incorporating sustainability initiatives within the daily management of the business (Carter and Jennings, 2004).

Then, strategic supply approaches that enact the development of detailed purchasing policies and procedures, technical skills of purchasing personnel, liaison between purchasing and other functions, and partnership approaches crucially define the status-quo of what is feasible for individual companies when intending to conceive and implement SSCM practices (Bowen et al., 2001). Consolidated supply procedure (i.e., structured vendor rating) and partnering policies are better suited to accommodate sustainability goals. In addition, organizations may benefit from more intense interaction with suppliers through the identification and absorption of external

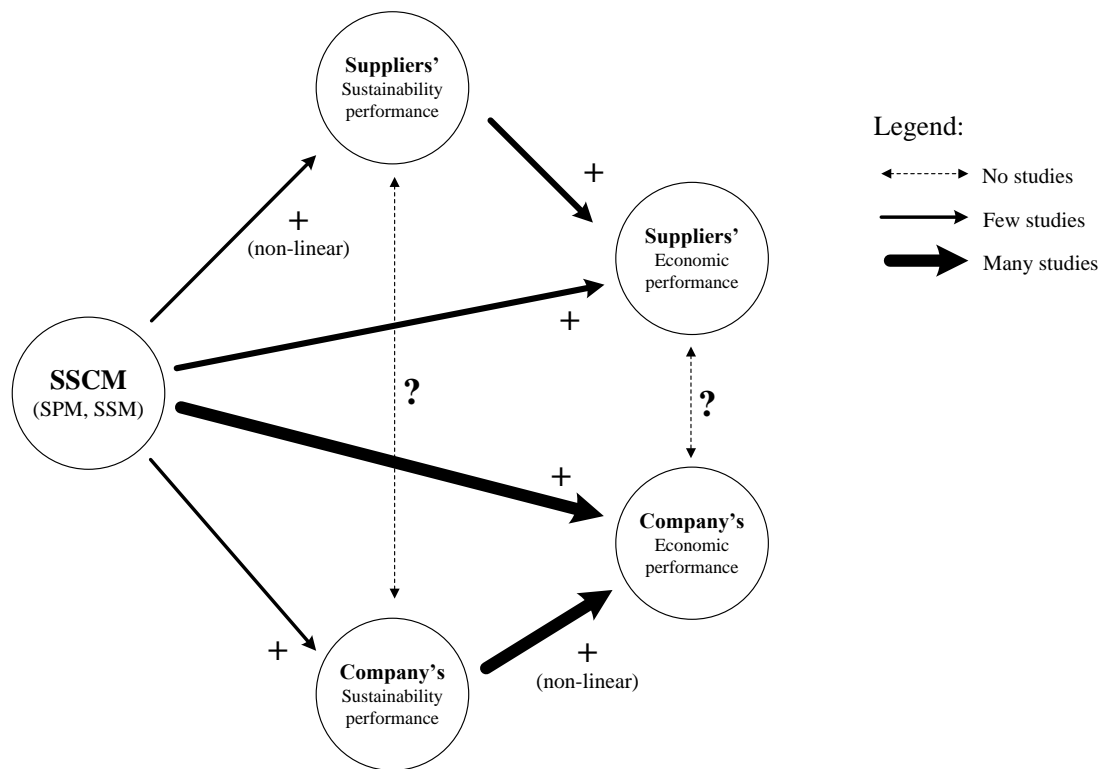
knowledge that can extend the capacity of a buying firm to effectively implement innovations that are beneficial for the environment (Hajmohammad et al., 2012). Supply management which results in high supply chain integration, transparency and supplier proximity and visibility as well as technical and relational capabilities are also shown to foster the adoption of environmental collaboration and supplier socially responsible practices (Awaysheh and Klassen, 2010; Parmigiani et al., 2011; Roberts, 2003; Vachon and Klassen, 2006).

Finally, flexible-mind sets and high stocks of knowledge are often responsible for the successful implementation of environmental technologies and socially sustainable practices. Porter and Van der Linde (1995) showed that companies that are able to generate new ideas and continuously transform them into new products, processes and systems are better at sustainability. Innovation, in other words, being at the base of any organizational change, is seen to be strongly related to the adoption of SSCM practices (Pagell and Wu, 2009). The literature, for instance, suggests that innovative companies, having state-of-the art technologies and high stock on knowledge, are able to extract economic value from environmental and social management, whose development, otherwise, would be constrained by this ‘apparently’ fixed trade-off (Christmann, 2000; Wu and Pagell, 2011). The strict-relationship between a company’s ability to innovate and its capability to address social and environmental issues is taken for granted by the literature; scarce insights, however, are provided to describe how innovation capabilities foster SSCM.

1.2.4 SSCM outcomes

So far we have noticed the existence of several types of SSCM practices (section 1.2.2). We have also described the main factors which drive/enable the adoption of SSCM (section 1.2.3). What is missing now is the understanding of the impacts produced by SSCM practices on performance, both at the buying firm level and at the suppliers level. Figure 1, specifically, has been built to provide a first-glance view of such impacts as portrayed by prior literature. The thickness of each arrow represents the amount of literature devoted to the study of the specific linkage.

Figure 1. The impact of SSCM on performance at the company and suppliers levels



First of all, disregarding the level of analysis (company or suppliers), the literature notes that the environmental and social dimensions of the triple bottom line strongly covaries. For instance, the adoption of new production processes that reduce pollution improves the working conditions for company employees (Elkington, 1994). Conversely, the improvement of employees' welfare (e.g., due to the adoption of fewer toxic materials and more green processes) can reduce the number of potentially damaging environmental actions undertaken by the company (Marshall et al., 2005). Moreover, employees' safety and satisfaction have been positively related to environmental improvements (Johnson, 2006; Rothenberg et al., 2001). Gimenez et al. (2012) found a significant relationship between environmental management programs and social performance. Therefore, in Figure 1 this two dimensions of the triple bottom line are melt down in a unique construct, i.e., sustainability performance.

Counter-intuitively, only few studies investigate the impact that SSCM practices has on a company's sustainability performance. Considering SPM, environmental management systems (Klassen and Whybark, 1999) and ISO 14001 certifications

(Babakri et al., 2004) were positively and significantly linked to the environmental performance of production plants. In the same vein, social certifications (e.g., OHSAS 18001) have contributed to the achievement of higher quality of life for employees, safer and healthier workplaces, more efficient work processes, improved employee perceptions of the working environment, and greater recruitment attractiveness (Robson et al., 2007; Zeng et al., 2007). For what concerns SSM, only limited evidence (mainly on the environmental side) is provided which suggests for a positive relationship with a company's sustainability performance (Vachon and Klassen, 2008). Further investigation is needed to conclude for a positive relationship as well as to compare the relative impacts that SPM and SSM have on a company's sustainability performance.

Then, empirical evidences have shown that buyer companies may find it difficult to influence suppliers' environmental and social commitment and performance. Supplier assessment can allow companies to guarantee the achievement of minimum performance in term of workplace safety, working conditions, CO₂ emissions, energy efficiency and waste disposal in the supply base (Corbett and Kirsch, 2001; Nawrocka et al., 2009; Stigzelius and Mark-Herbert, 2009). However, such link seems to be influenced by the 'conditions' surrounding buyer-supplier relationships (e.g., supplier dependency, relational governance mechanisms vs. market-based mechanisms) (Jiang, 2008; Roberts, 2003; Simpson et al., 2007). Further work is here required to shed further light on the 'conditions' under which SSCM practices impacts suppliers' sustainability performance.

When it comes to the direct and indirect effects that SSCM has on a company's economic performance, the literature is extensive, though results appear to be quite ambiguous yet. A first abundant group of works suggest for a positive linear relationship involving green practices, environmental performance and economic performance of the company which is leading it (Ambec and Lanoie, 2008; Carter, 2005; Carter et al., 2000; Golicic and Smith, 2013; Klassen and McLaughlin, 1996; Klassen and Whybark, 1999; Kumar et al., 2012; Molina-Azorín et al., 2009). By deploying resources that aim to develop advanced environmental management systems, companies can establish industry-wide standards for environmental technology or can differentiate products on final markets, benefiting from a strong competitive positioning. Environmental management also means reducing inefficiencies and

boosting employees satisfaction, which can be expected to translate into other performance dimensions such quality and flexibility. On the social side, prior studies indicate that the adherence to high social standards often requires organizations to handle complex business process (e.g., coordination of shift-work, design of employee benefit systems, implementation of safety guidelines), which can only be achieved through effective management systems and strong planning capabilities (e.g., Waddock and Graves, 1997). Companies that lead in social and environmental initiatives are likely perceived as attractive employers and can be expected to attract and retain a qualified workplace (Hillman and Keim, 2001). Despite this preliminary evidence and beyond obvious concerns related to the ‘chicken or the egg causality dilemma’ (profitable companies make green investments vs. green investments make companies profitable), a second group of studies suggest for a non-linear relationship between environmental and economic performance (Christmann, 2000; Fujii et al., 2012; Wagner and Schaltegger, 2004; Wagner et al., 2002; Wiengarten et al., 2012). According to this group of studies, elements such as strategic orientation, innovation capabilities, maturity of environmental approaches, and industry dynamics exert significant influence on the ‘potential’ positive effects discussed above.

The literature that takes a supplier perspective on the direct and indirect links between SSCM and economic performance is not so abundant. Only few works have been identified which suggest that (sustainable) supplier assessment and collaboration is likely to result in augmented supplier strategic capabilities (quality management, financial stability and technological capabilities) (Carter, 2005; Ehrgott et al., 2011). Supplier development, which can be defined as activities that include plant visits, suppliers audits and suppliers training (Krause et al., 1998, p.40) is indeed an indirect part of supplier sustainable practices. Further research is required here to extend our understanding of the phenomenon.

Noteworthy, although recent literature suggests that ‘a company is as sustainable as its suppliers’ (Krause et al., 2009), none empirical studies has been found that investigate the relationship between a company’s performance and suppliers’ performance under SSCM.

1.3 MY CONTRIBUTION

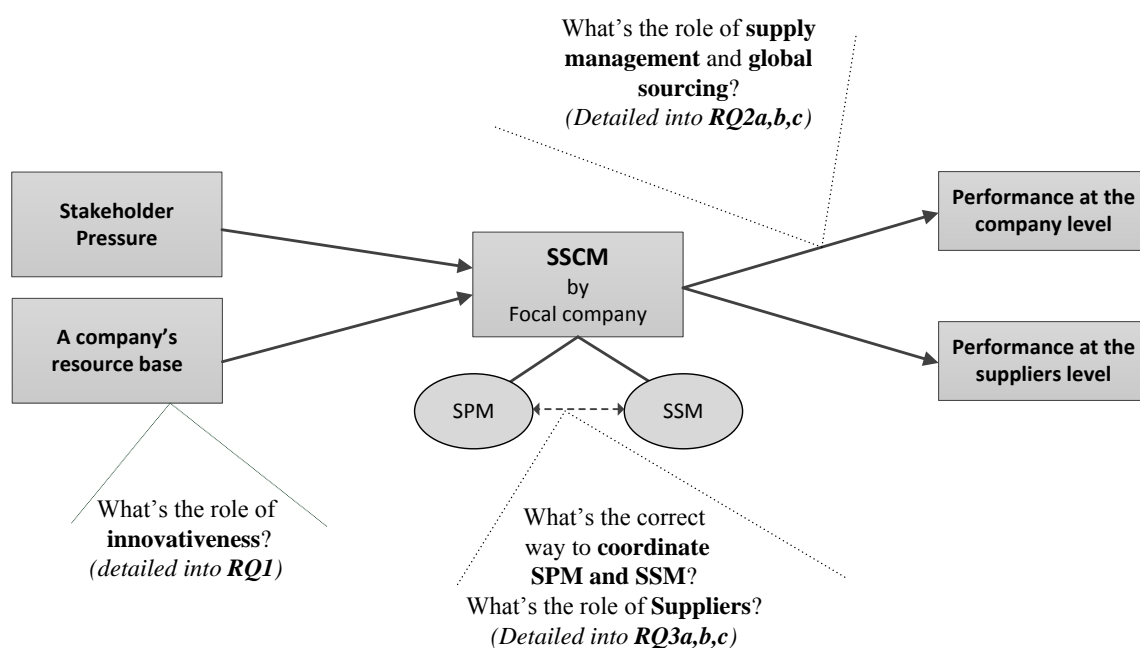
1.3.1 Objectives

Generally missing in the literature are observations and tests of specific contingencies that might mitigate the relationships between drivers, practices and outcomes. As said, the literature suggests that stakeholders pressure as well as a company's resource base influence the adoption of SSCM practices. Nevertheless, it does not shed light on the specific set of mechanisms that innovative firms are used to deploy which in turn foster their adoption of SSCM. Also, SPM and SSM have been shown to have potential for environmental, social and economic performance. Nevertheless, the literature does not consider today's trend towards global sourcing, which may require a specific managerial approach to sustainability. Furthermore, it is not yet clear how SPM and SSM practices should be coordinated so to continuously improve environmental and social performance in the supply chain. Here, an enhanced understanding of the suppliers' potential to support buying companies in delivering further sustainability improvements is required.

Despite the history of SSCM, there are gaps in the literature that makes suggestions on how to become more environmentally and socially sustainable difficult to disseminate. Thus, the main goal of this research is '*offering original insights on the supply chain sustainability phenomenon and translating them into practical guidelines which help companies to coordinate the complex bundle of practices which have to be adopted and leveraged along the pathway that lead to high environmental and social performance in the supply chain*'. While pursuing this goal, this thesis articulates along three papers to make three major contributions (Figure 2). In a first article, the following research question is addressed: **(RQ1)** How does innovativeness (i.e., an organization's willingness/ability to change) foster Sustainable Supply Chain Management? While supporting literature in stating that requirements from external stakeholders and ethical values of organizational constituents are necessary when pursuing sustainability, this study provides evidence of why SSCM develops more easily in innovative companies. A new conceptual framework will be proposed which describes how innovativeness influence the process through which companies make sense about sustainability and overcome barriers that oppose to its development (e.g., inertia and trade-offs).

In a second article, the following research questions are addressed: **(RQ2a)** Does the adoption of SSCM significantly impact the environmental and social performance of the company that is leading it? **(RQ2b)** What is the role of Supply Management (SM) in the context of sustainability? **(RQ2c)** Does global sourcing significantly influence the relationships involving SM, SSCM and sustainability performance (both environmental and social) of the company that is leading such programs? This second paper helps buying firms to understand the implications of supply management (i.e., supply base reduction and supplier coordination) for sustainability performance. Also, cases in which companies source regionally are compared with cases where firms maintain global suppliers (i.e., purchases sourced from outside the continent); this might help to understand if differentiated approaches to sustainability are required. Thus, a second framework which looks at the role of supply management and global sourcing in the context of sustainability has been drawn and empirically tested.

Figure 2. Three major contributions of this dissertation.



Finally, the following research questions are addressed in a third article: **(RQ3a)** What's the pathway of capabilities development a firm should follow to become environmentally and socially sustainable? **(RQ3b)** What group of SSCM practices

(SPM vs. SSM) should a firm leverage the most to become environmentally and socially sustainable? (*RQ3c*) Does trust between a firm and its key suppliers have significant implications when aiming at becoming environmentally and socially sustainable? Thus, indications are provided to companies which want to better coordinate the adoption of internal and external SSCM practices and effectively leverage suppliers to achieve better performance outcomes in the supply chain. A third model which explicitly considers alternative ways to improve sustainability performance while taking the role of suppliers into account has been operationalized and tested.

Overall, these three articles resolve relevant literature gaps and, most importantly, shed light on the pathway manufacturing companies and their suppliers should walk to become environmentally and socially sustainable.

1.3.2 Empirical design

The literature on SSCM was well developed and offered a robust basis for addressing the research questions discussed above. Thus, an exploitative research approach was employed. This approach combined inductive and deductive logics: first, inductive theory building produced new propositions and hypotheses from literature review and case studies; second, deductive theory completes the cycle by using empirical data from two different surveys (e.g., Scandura and Williams, 2000). Specifically, four steps were applied to arrive at a robust set of findings.

Reviewing the scientific literature to identify relevant factors and link them within three different nomological frameworks, each addressing a different set of research questions (*RQ1 vs. RQ2a,b,c vs. RQ3a,b,c*), constituted the first step of this research. Literature review also allowed to identify and (re)use constructs, research protocols and main methodologies that have been previously used, ensuring the reliability of the research instruments to be used in the empirical phases. The literature review was carried out according to the Systematic Review framework (Tranfield et al., 2003), based on strategies and pre-planned methods that limit bias and random error (Cook et al., 1997). The search for interesting publications was mainly conducted as a structured keyword search. Major database were used to search for related articles, such as those provided by major publishers, Elsevier, Emerald, Wiley or library services (e.g., Ebsco , Jstor). The keywords that were used can be categorized into three groups:

sustainable/environmental/green/social/responsible; supply chains/supply base/supplier; management/adoption/implementation/development. Different combination of these three groups of keywords were used to search for literature published from 1990. After a first quick content check, identified articles were in-or excluded from the analysis. While reading the included papers, cited references were used as secondary source. It should be noted that the literature review conducted in this study was extensive, but not exhaustive. As an illustration of this point, this study consider 140 papers. However, recent literature surveys identified more than 180 papers (Ahi and Searcy, 2013; Seuring and Muller, 2008). The difference in numbers may be explained by the use of different databases and search terms. Nonetheless the paper reviewed and summarized in the background section provided a reasonable representation of the research on SSCM.

Then, to address the first research question we leveraged a continuous process of theory generation and data collection through multiple case studies until external saturation was reached (i.e., when no new information or new themes emerge from data analysis) (Yin, 2009). Specifically, 10 case studies were developed in order to shed light on the role of innovativeness in the context of SSCM (i.e., RQ1). Since relationships among important constructs (i.e., innovativeness, SSCM practices, external pressure, ethical responsibility) were poorly understood, case studies were considered to be the best option for theory building (Eisenhardt and Graebner, 2007). Further details on the case-based methodology are provided in the second chapter (page 32).

Third, data collected by an international survey in 2009 (i.e., International Manufacturing Strategy Survey IMSS) were used to address the second set of research questions. By relying on such data we investigated the role played by global sourcing and supply management in the context of SSCM (i.e., RQ2,b,c). Originally launched by the London Business School and the Chalmers University of Technology, the IMSS project studies manufacturing and supply chain strategies within the assembly industry (ISIC 28–35 classification) using a detailed questionnaire that is administered simultaneously in many countries by local research groups. Details about the IMSS project are provided in the third chapter (page 61). In this second study, we performed a moderated-mediation model on a sample of 336 companies coming from 21 countries.

Preacher et al. (2007) provided the theoretical background and the framework for moderated mediation.

Finally, following the protocol proposed by Forza (2002), ad-hoc survey was developed to gather data from a sample of Italian manufacturing companies. The ad-hoc survey benefited from both the literature review and the cases, since the conceptual model and its operationalization within a questionnaire was developed during such stages. This final step of the research allowed us to deepen our understanding of the relationships involving SPM, SSM, suppliers' performance and company's performance (i.e., RQ3a,b,c). We performed PLS algorithms as implemented in the SmartPLS 2.0 software (Ringle et al., 2005). Further details about the methods applied at this stage are provided in the fourth chapter (page 87).

CHAPTER TWO.

How does innovativeness foster SSCM?

2.1 INTRODUCTION

Although there's still no consensus on its definition, sustainable supply chain management (SSCM) was recently advocated as a "new innovation" that allows the development of 'win-win-win' strategies (Ahi and Searcy, 2013; Pagell and Wu, 2009; Van Hoek, 1999; Wu and Pagell, 2011; Zhu et al., 2007). These strategies allow companies to meet stakeholder requirements and improve profit and competitiveness while raising ecological efficiency and social responsibility in their supply chain. SSCM tackles environmental and social issues using supply chain management practices and can be viewed at multiple levels including internal and external practices (Darnall et al., 2008; Gavronski et al., 2011; Meehan et al., 2006; Pagell and Wu, 2009; Zhu et al., 2013). Internal practices, namely Sustainable Process Management (SPM), comprise those activities within a company's direct control and without direct supplier involvement. Practices that include transactions with suppliers have been seen as external supply chain activities, and are usually understood as Sustainable Supply Management (SSM).

During the last two decades most contributions have been focusing on how firms manage direct and indirect social and environmental impacts of their business, shedding light on how SSCM develops (Seuring and Muller, 2008). Pressures from external stakeholders such as customers and governments were shown to influence companies' environmental and social management (Ateş et al., 2011; Bansal and Roth, 2000; Buysse and Verbeke, 2003; Carter and Jennings, 2004; Ehrgott et al., 2011; Klassen and Vachon, 2003; Murillo-Luna et al., 2008). A second group of authors suggested that environmental and social values of individuals operating at different level of an organization plays a significant role in the formulation of a company's set of environmental and social objectives and plans (Ateş et al., 2011; Bansal and Roth, 2000; Carter and Jennings, 2004; Ehrgott et al., 2011). Such objectives and plans then cascade down into the adoption of environmental and social practices (Ateş et al., 2011; Handfield et al., 1997; Klassen, 2001; Maignan et al., 2002; van Tulder et al., 2009).

Also, the literature acknowledges the relationship between a company willingness/ability to change, defined as innovativeness, and its ability to pursue environmental and social sustainability. Christmann (2000) shows that innovativeness represents a complementary asset of best environmental practices; it is a necessary capability to capture the economic benefits associated with environmental management. More recently, Pagell and Wu (2009) suggest that sustainability champions use to leverage their innovativeness to re-conceptualize who is in the supply chain, build a strong supply chain participation and leverage on the skills and abilities of non-traditional chain members (e.g., NGOs). Nidumolu et al. (2009) argue that, since the goal of innovative companies is to create new businesses or generate additional profit from better products and processes, they are best at changing the way they think about products, processes and technologies and “treat sustainability as innovation’s new frontier”. Finally, van Bommel (2011) proposes a theoretical framework entirely centered on the role of innovation in SSCM. The paper is based on a literature review and it stresses the need for further empirical investigation on the topic.

Although the literature has started to discuss the inter-relatedness between innovativeness and SSCM, still the following question remains open:

How does innovativeness foster sustainable supply chain management?

By addressing this question, the paper provides an important contribution to existing literature. Specifically, by leveraging on a continuous process of theory generation and data collection through multiple case studies, we propose a set of propositions and a conceptual framework that shed light on the role of innovativeness in the context of SSCM. Specifically, we found that innovativeness should be distinguished as a central factor in SSCM: innovative companies are facilitated in the adoption of SSCM practices since they develop mechanisms that allow to (i) capture weak signals from within and outside the organization and use them as inputs to anticipate/shape external pressures, and (ii) share and re-examine information over their sustainability strategy so to overcome inertia and trade-offs typically faced by an organization when adopting new business paradigms (e.g., sustainability). In line with several calls for investigation on how SSCM develops (American Chamber of

Commerce of Europe, 2004; International Chamber Of Commerce, 2007; Linton et al., 2007; van Bommel, 2011; Vermeulen and Seuring, 2009; World Bank, 2003), we argue that the enhanced understanding of the role of innovativeness is critical for fostering the ability of existing supply chain systems to deliver further improvements in social and environmental standards.

2.2 BACKGROUND

This section provides details about key terminology and conceptualization of the factors considered in this paper as implemented by the literature. We begin by reviewing the works that have investigated how SSCM develops, focusing on the main factors that were shown to determine a company adoption of SPM and SSM. Then, we present the literature about innovativeness; first, we summarize the few contributions that have started to address its role in the context of SSCM, while details about its conceptualization follow.

2.2.1 A preliminary model of how SSCM develops

As said, SSCM tackles environmental and social issues using internal and external practices. More specifically, SPM refers to a firm's institutionalization of internal environmental and social management practices which aim to reduce a company's direct environmental and social impact. In essence, SPM entails the adoption of environmental management systems (ISO 14001) (Daily and Huang, 2001; Darnall et al., 2008), environmentally friendly eco design (e.g., Design for Environment, Life cycle assessment) (Zhu and Sarkis, 2004), health and safety certifications (Robson et al., 2007) and other social practices (e.g., codes of conduct, corporate social activities) (Zairi and Peters, 2002). Sustainable supply management (SSM), conversely, refers to two complementary sets of programs implemented at the firm level to assess and improve the environmental and social performance of a supply chain (e.g., Ageron et al., 2012; Awaysheh and Klassen, 2010; Large and Gimenez Thomsen, 2011; Lee and Klassen, 2009): (i) activities conducted to assess (and control) suppliers sustainability performance (i.e., supplier assessment) and (ii) activities comprising the direct involvement of the focal firm in its suppliers' activities to improve environmental and social impacts of their products and operations (i.e., supplier collaboration).

Prior research on sustainability has identified three main antecedents of a company adoption of SSCM practices: external pressures and ethical responsibility result in a sustainability strategy which in turn cascade down into internal and external practices.

The role of *external pressures* in inducing/motivating SSCM has been widely recognized. Since managers don't discern the different sustainability demands coming from different stakeholders groups (Murillo-Luna et al., 2008), governments and customers were shown to influence a company adoption of SSCM in a similar way. Escalating penalties, fines and legal costs have punctuated the importance of complying with legislation (Bansal and Roth, 2000). In a similar fashion, social and environmental requests and requirements of customers have been highly regarded by managers so to maintain the necessary support from these key stakeholders (Ehrgott et al., 2011; Klassen and Vachon, 2003; Zhu et al., 2007).

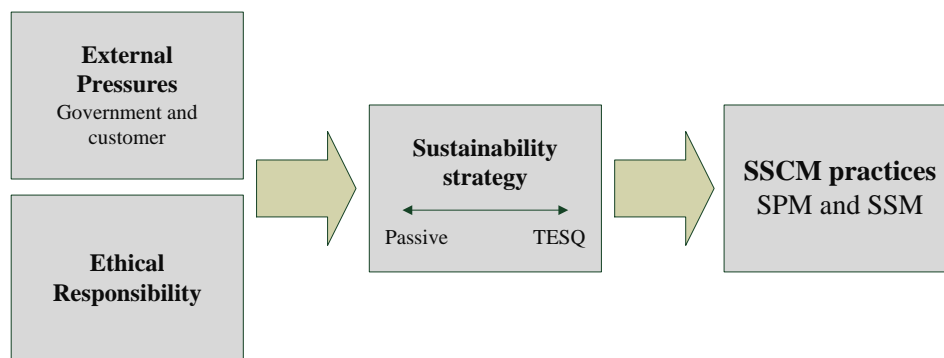
Ethically motivated companies adopt environmental practices because it is the "right thing to do" (Bansal and Roth, 2000). *Ethical responsibility* - the genuine intention and willingness of management and employees in a firm to be engaged in sustainability management (Carroll, 1991, 1999; Carter and Jennings, 2004) - is instrumental to prioritize sets of resources (e.g., financial or human capital) (Ateş et al., 2011; Gavronski et al., 2011) and incorporate sustainability in the daily operations (Carter and Jennings, 2004; Ehrgott et al., 2011).

External pressures and ethical responsibility influence a company *sustainability strategy* or its set of environmental and social objectives and plans (e.g., Klassen, 2001). When companies address environmental and social issues, they face different strategic options, which in turn determine the extent of investments into SSCM practices (Buisse and Verbeke, 2003; Handfield et al., 1997; Lee and Rhee, 2007; Maignan et al., 2002; Murillo-Luna et al., 2008; van Tulder et al., 2009). Some companies decide to comply with laws, regulations and react to environmental and social issues when explicitly required, whereas others approach the subject more strategically, adopting a 'total environmental and social quality' strategy (TESQ). According to the literature, developing this last option mainly means (i) considering environmental and social objectives that go beyond compliance as a top priority for the business, (ii) dedicating important budgets to improve ecological efficiency, health and safety or avoid

sustainability related risks, (iii) clearly assigning responsibility for environmental and social matters to one or various people of the firm who are specialized in the matter of interest.

Our preliminary model of how SSCM develops, derived from the literature reviewed above, is illustrated in Figure 1. The factors outlined in the figure suggest that legislations and customer requirements as well as the genuine interest towards environmental and social issues manifested by organizational constituents spark a company sustainability strategy, that in turn results in the higher adoption of SSCM practices. This model provides an important starting point to address our research question; it is necessary to isolate the causal relationship that characterizes the antecedents before isolating the role of innovativeness in the context of SSCM.

Figure 1. Preliminary model of SSCM antecedents



2.2.2 Innovativeness

Porter and Van der Linde (1995) suggested that “ignorance” and “a static mind-set” are what prevent companies to grasp the idea that environmental (and social) performance can be improved while lowering costs, thus constraining the development of SSCM practices. Innovative thinking, instead, seems to be key when addressing sustainability-related challenges. Christmann (2000), for instance, proposed *innovativeness* as a valuable, rare, inimitable and socially constructed capability that enables companies to overcome the fixed trade-off between costs and respect for the environment. Its presence may be not sufficient to ensure the achievement of high performance, but its absence may hinder, retard or even constrain environmental

management. More recently, others have also supported this view, suggesting that innovative companies are best at sustainability (Nidumolu et al., 2009; Pagell and Wu, 2009; van Bommel, 2011; Wu and Pagell, 2011).

The literature conceives innovativeness as an organization's willingness/ability to change, a conceptualization that is widely shared in the management literature (e.g., Calantone et al., 2002; Hurt et al., 2006). Innovativeness comes from a company's future orientation and learning orientation.

Future orientation, or corporate foresight, refers to the activities undertaken by a company to analyze long-term prospects in business environments, markets and new technologies, and their implications for strategy and innovation (i.e., multi-scenario analysis, innovation ideas, open dialogs with insiders and outsiders) (Ruff, 2006). Such activities provide useful insights into the future development of the context in which the company operates, which in turn induces ideas for new products and processes, as well as information on their technical and commercial viability (Rohrbeck and Gemünden, 2011; von der Gracht et al., 2010).

Learning orientation, differently, refers to "the set of organizational values that influence the propensity of the firm to create and use knowledge" (Sinkula et al., 1997). Specifically, the literature refers to three main organizational values (Calantone et al., 2002; Hult and Ketchen, 2003; Moorman and Miner, 1998; Sinkula et al., 1997; Verona, 1999): commitment to learning, shared vision and memory. Commitment to learning represents the degree to which company's members value and promote learning for the long-term benefit of the system. Shared vision refers to the organization-wide focus on learning. Memory refers to the collective beliefs or behavioral routines related to the spread of learning among different units within an organization. Organizations characterized by strong learning orientation have been shown to be highly innovative since they are more likely to have state-of-art technologies, a widespread understanding of goals and higher stocks of knowledge.

The literature does not provide sufficient evidence that would allow to pin point the role of innovativeness in the context of SSCM. Thus, further empirical work is needed to address this gap and provide a robust answer to our research question. In line with above literature and the resource based view of the firm (Barney, 1991), innovativeness is here investigated as a company's willingness/ability to change, i.e., it

refers to the capacity of organizational constituents to perform tasks and activities that allow to sustain their future and learning orientations.

2.3 METHODOLOGY AND DATA

We leveraged on a continuous process of theory generation and data collection through multiple case studies until external saturation was reached (i.e., when no new information or new themes emerge from data analysis) (Yin, 2009). We used case-based methodology for two reasons. First, case studies are widely considered to be better means of theory building where the relationships among important constructs are poorly understood. Second, the case-based method enables to analyze the phenomenon in its natural setting, based on firsthand observation and examination of numerous factors and nuances; accordingly, recent literature asked for case-based investigation of the role of innovativeness in the context of SSCM (van Bommel 2011).

2.3.1 Sample selection and data collection

We focused on Italian manufacturing industries. This allowed us to control for potentially confounding factors such as variation in economic conditions, regulations and culture. Importantly, these industries offered significant potential for new insights, since practices varied significantly and required companies to manage these changes. Supply chains within these industries directly and indirectly relate to economic wealth creation as well as are responsible for impacts on the natural and human environment along all stages of the products' life cycle (Brickman and Ungerman, 2008). Therefore, they have faced increasing pressure and several critical environmental and social challenges in the area of hazardous material substitution, health and safety, as well as recovery and recycling.

Table 1. Cases

Items	Cases									
	A	B	C	D	E	F	G	H	I	J
Foundation	1955	2000	1966	1870	1964	1975	1836	1988	1899	1956
Industry and products	ISIC 34 Light-heavy duty cranes	ISIC 29 Weaving systems and healed frames solutions	ISIC 34 Cabs, driver units for track loaders	ISIC 29 Cutting machine tools and energy solutions	ISIC 29 Pneumatic equipment for the automation	ISIC 31 Domestic appliances	ISIC 31 Network connectivity systems and circuit breakers	ISIC 31 Network connectivity systems and circuit breakers	ISIC 32 Home automation, and medical systems	ISIC 29 Air cooling and conditioning equipment
Employees	450	545	648	283	383	1000	700	7624	2439	220
DJSI	No	No	No	No	No	No	Yes	Yes	Yes	No
Certifications	ISO 9001	ISO 9001	ISO 9001, ISO 14001	ISO 9001	ISO 9001; ISO 14001; OHSAS 18001	ISO 9001; ISO 14001; OHSAS 18001; SA 8000	ISO 9001; ISO 14001; OHSAS 18001	ISO 9001; ISO 14001; OHSAS 18001	ISO 9001; ISO 14001; OHSAS 18001	ISO 9001; ISO 14001
Sustainability documents available on web	Sustainable development statement (2011)	Environment obligation statement (2010)	Supplier questionnaire (2010)	Corporate governance code (2011)	Code of Ethics (2011)	Sustainability reports (2001-2011)	Sustainability reports (2003-2011)	Sustainability reports (2011); Sustainability KPI indexes (2010-2011)	Sustainability reports (2009); Sustainability KPI report (2010); suppliers' code of conduct (2011)	Energy saving brochure (2010)
Interviewees	Purchasing manager; Plant Manager.	Operations manager; Senior buyer.	Purchasing manager; R&D manager	Operations manager; Senior buyer.	Plant manager; Senior buyer	Strategic sourcing manager; Technical Affair manager; R&D manager.	Purchasing manager; HR director.	Sustainability director; Supply chain director.	Purchasing manager; Plant Manager.	Purchasing manager; R&D manager

Cases were selected in order to obtain an heterogeneous sample in term of size and to provide a wide range of perspectives. Specifically, in selecting multiple cases, the “polar types” sampling approach was preferred since it leads to a very clear pattern recognition of the central variables, relationships and logic of the studied phenomenon (Eisenhardt and Graebner, 2007). Extreme cases (e.g., companies with scarce and extensive adoption of SSCM practices) were identified by considering data from third parties (e.g., Dow Jones Sustainability Index), obtained certifications, publicly available sustainability reports and the attitude of transparency on companies’ websites. Table 1 briefly summarizes the companies’ profile.

To ensure a high degree of consistency in the data from each company, a structured assessment framework was constructed to evaluate the extent of adoption of SSCM practices, the influence that the discussed antecedents exert on such adoption, and the degree of innovativeness. Data were collected using interviews and published documents.

In January-April 2012, a research team member interviewed at least two individuals for each company (Table 1). These interviews were designed to explore the role that innovativeness and the other antecedents play with respect to the company adoption of SSCM practices. All interviews were conducted on site and recorded electronically. Most of them have lasted for more than 90 minutes. After each site visit, each interviewer edited field notes and checked for accuracy. Questions arising from interview notes have been answered by interviewees through follow-up emails and phone calls. Data gathered from different interviews have been triangulated by means of overlapping interviews, archival documents when available and sustainability reports.

2.3.2 Assessment framework and data analysis

Drawing on the synthesis of earlier research (Ateş et al., 2011; Bansal and Roth, 2000; Buysse and Verbeke, 2003; Calantone et al., 2002; Gavronski et al., 2011; Lee and Klassen, 2009; Murillo-Luna et al., 2008; Ruff, 2006; Zairi and Peters, 2002; Zhu et al., 2013), the assessment framework was developed for the field-work that reflected the preliminary model presented in the background section and our conceptualization of innovativeness. Tables A1 to A5 respectively provide information about our assessment framework.

In our framework, each construct comprised a number of lower-level dimensions, and each dimension was rated separately on a scale of 1 to 3 (i.e., low, medium, high). For example, for SPM, lower-level dimensions were 1) hazardous material management within the product, 2) use of Eco-design (e.g., Design for Environment and Life Cycle Assessment), 3) building an environmental management system (EMS), 4) reduction of energy, water use and emission, 5) improving health and safety (e.g., obtaining OHSAS 18001), 6) improving corporate responsibility through social campaigns (e.g., codes of conduct, corporate social activities). Scores across the lower-level dimensions were averaged based on the assumption that each contributed significantly and more or less equally to one construct.

Based on collected data, the research team members independently assessed the extent of adoption of SSCM, the role of external pressures in inducing/motivating such adoption, the extent of ethical responsibility, the type of sustainability strategy, and the degree of innovativeness. Each independent assessment was then discussed collectively to resolve discrepancies; the final consensus-based ratings are reported in Table 2. A cross-case analysis was finally performed by grouping companies based on their degree of innovativeness (Table 2). Based on firm innovativeness, three groups have been identified: *Innovators*, *Middlings*, and *Laggards*. Grouping companies has been fundamental to discover similarities and differences among and within groups.

Innovators are those companies characterized by strong future orientation and learning orientation. They develop a TESQ strategy and achieve extensive adoptions of SSCM practices. *Middlings* are those companies characterized by medium levels of innovativeness. They adopt SSCM practices to some extent. Finally, *Laggards* are those companies characterized by scarce innovativeness. They adopt SSCM practices to a minimum extent.

Table 2. Cross-case analysis

Cases	Firm Innovativeness			SSCM adoption			External pressures			Ethical responsibility	Sustainability strategy	
	Overall	<i>FO</i>	<i>LO</i>	Overall	<i>SPM</i>	<i>SSM</i>	Overall	<i>GP</i>	<i>CP</i>			
Laggards	B	1.43	1.20	1.67	1.50	1.50	1.50	2.75	3.00	2.00	2.50	1.50
	A	1.44	1.00	1.89	1.42	1.83	1.00	2.58	2.67	2.50	2.50	1.00
	D	1.60	1.20	2.00	1.08	1.17	1.17	1.50	2.00	1.50	1.00	1.00
	C	1.69	1.60	1.78	1.67	1.83	1.67	2.50	3.00	2.50	2.00	1.50
Middlings	E	1.96	1.80	2.11	2.00	2.17	1.83	2.25	2.00	2.00	2.50	2.50
	J	2.32	2.20	2.44	2.17	2.33	2.17	1.83	1.67	1.50	2.00	2.00
	H	2.72	3.00	2.44	2.58	2.67	2.50	2.08	1.67	1.00	2.50	2.50
Innovators	G	2.79	2.80	2.78	2.83	2.67	2.67	1.92	1.33	1.50	2.50	3.00
	I	2.90	2.80	3.00	2.92	2.83	3.00	1.50	1.00	1.00	2.00	3.00
	F	3.00	3.00	3.00	3.00	3.00	3.00	1.92	1.33	1.50	2.50	3.00

Note that FO is Future Orientation, LO is learning Orientation, GP is Government pressure and CP is customer pressure.

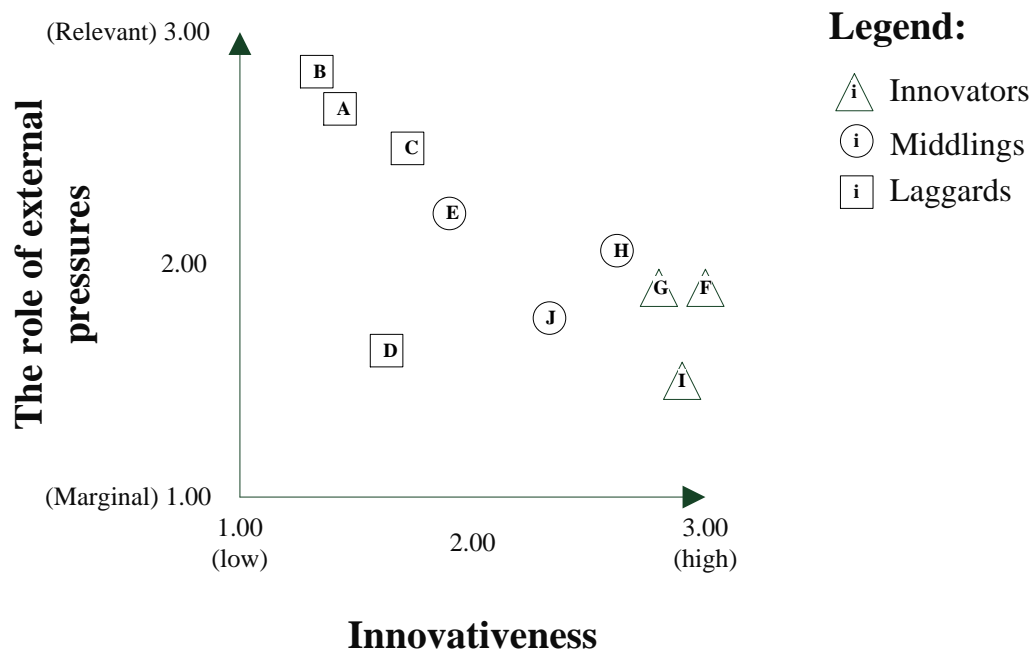
2.4 HOW INNOVATIVENESS FOSTERS SSCM

In this section, we synthesize and discuss our findings. First, we present differences among groups, which suggest that the degree of innovativeness influences the role played by external pressures and ethical responsibility with respect to a company's sustainability strategy. Then, we present within-group comparisons, which demonstrate that innovativeness also facilitates the translation of a sustainability strategy into the adoption of SSCM practices.

2.4.1 Innovativeness and the role of external pressures and ethical responsibility

Figure 2 provides a graphical representation of the cases based on the role of external pressures in inducing/motivating a company adoption of SSCM practices and on the degree of innovativeness.

Figure 2. Firm innovativeness and the role of external pressures



For *Innovators* and *Middelings*, legislations already in force as well as customer requirements for information to assure compliance do not significantly motivate the

development of sustainability plans and investments. For instance, an interviewee at company H reported that:

“Regulations simply require minimum levels of social and environmental performance ... they disregard the life cycle perspective of our products and the important role that our company can play in greening the supply chain” (company H, Sustainability Director).

Innovators have initiated the race for sustainability years ago, when the business environment started signaling a growing interest to environmental protection and decent work. Nowadays, rather than reacting, they are trying to shape future regulations and customers’ expectations by means of continuous dialogues and interactions. Specifically, an inclusive approach based on a two-way communication with external stakeholders is leveraged; *Innovators* engage external stakeholders in sense-making and sense-giving processes that offer the opportunity to understand and influence the vision external stakeholder have about sustainability. For instance, at company I they told us that:

“We try to seat in meetings of the national roundtable on environment and economy to convince government to endorse health and safety solutions that represent a standard in our organization” (company I, Plant manager).

Conversely, when considering *Laggards*, external pressures directly translate into the adoption of SSCM practices in an attempt to (i) maintain business with important customers, and (ii) avoid legal liabilities and supply disruptions. As described by the purchasing manager of company A, legislations are essential since they shed light on salient environmental and social issues and clarify the way they should be addressed:

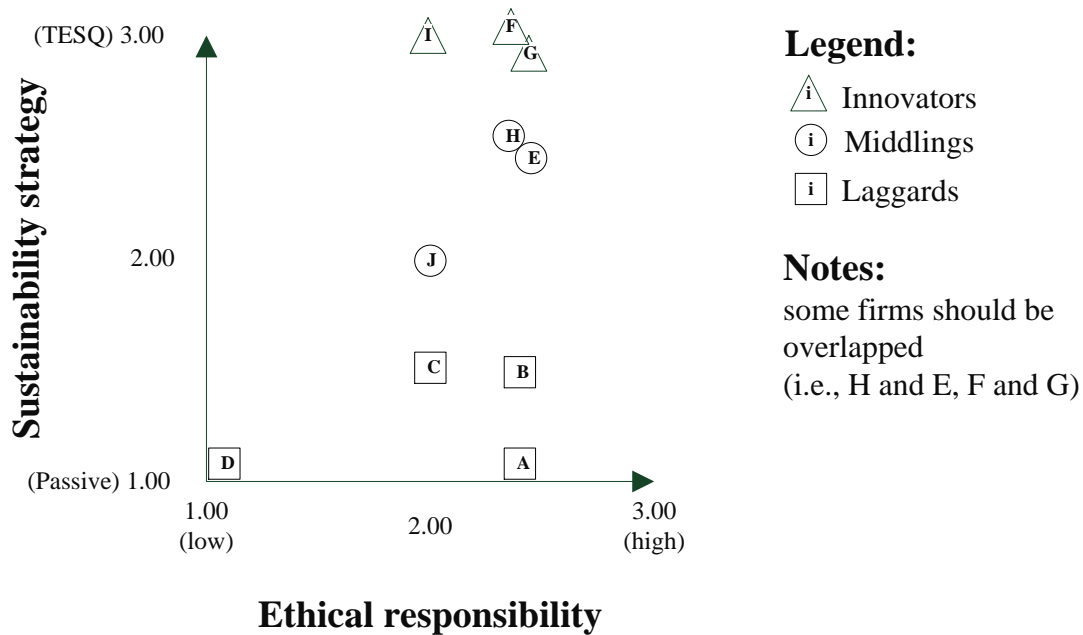
“The government endorsement of EMAS and ROhS reduced the cost associated with the integration of sustainability in our supplier selection process, since we realized what sustainability in our business meant and how we could improve it” (company A, purchasing manager).

Next, Figure 3 shows the distribution of companies in terms of type of sustainability strategy and extent of ethical responsibility. We observe that, although the

extent to which organizational constituents have interests toward the environment and society is uniform across cases, companies tend to diverge when it comes to their sustainability strategy.

This result might appear counter-intuitive: since the literature suggests that environmental and social values of organizational constituents drive sustainability strategies and supplier socially responsible practices (Amaeshi et al., 2008; Ateş et al., 2011), one should expect the same kind of sustainability strategy for all the companies in our sample. Observation, however, allowed us to clarify this point: *Innovators and Middlings* are able to amplify the genuine self-esteem that individuals within their organization derive from operating responsibly. Company I, for instance implements mechanisms that allow organizational constituents to manifest their values by developing their own ideas to improve sustainability. Specifically, internal Innovation Ideas Competitions take place frequently and employees are allowed to use 10% of their paid working time to pursue their intents. Employees also receive extra money (i.e., reimbursements) when small investments are required to refine and develop their ideas. Such mechanisms, which are the norm for *Innovators*, facilitate the diffusion of ethical responsibility throughout the whole organization, which in turn sparks the development of a TESQ strategy. *Laggards*, conversely, miss such mechanisms and develop a ‘passive’ sustainability strategy: individuals at different levels of the organization cannot find ways to manifest their genuine interest towards environmental and social issues.

Figure 3. Ethical responsibility and a company sustainability strategy



Overall, these findings complement prior research, which suggested that strategic attitudes and innovation capabilities influence the way external pressures and ethical responsibility stimulate environmental championing (Aragón-Correa, 1998; González-Benito and González-Benito, 2006; van Bommel, 2011). Furthermore, they offer an explanation of how innovativeness works in the context of SSCM. Our observations suggest that companies characterized by high innovativeness (*Innovators and Middlings*) are able ‘to obtain more’ out of external pressures and ethical responsibility; *Innovators* believe that sustainability is an evolving concept that needs to be discussed within and outside their organization. Therefore, inclusive approaches are leveraged in an effort to understand and influence stakeholders’ potential expectations, and conditions are created to let organizational constituents manifest and share their values:

“Learning in our organization includes obtaining and sharing information about the change in our customers’ needs ... our effort in trying to capture future insights is essential to understand market trends, create knowledge and properly develop our sustainability strategy” (company I, Plant manager).

“Creating an interactive dialog with customers provide ideas about what sustainability means and what to look for in business ... When sustainable alternatives are identified,

those are compared with current practices ... If a realignment [of our strategy] is needed, our effort in collecting new ideas from employees and partners and our effort in keeping on discussions provide arguments that allow for taking a conscious decision” (company F, Technical Affair manager).

Conversely, *Laggards* are myopic: they are more reliable and effective in identifying and predicting the outcomes of courses of action that lie in the neighborhood of their organization’s current activities than they are at estimating outcomes of more distant ones (i.e., new SSCM practices). Thus, they need legislations and customer requirements to reduce information asymmetries about profitable social and environmental improvements as well as to align organizational incentives with the goal of sustainability. Collectively, these observations lead to the following propositions:

P1. For companies with high innovativeness, a TESQ strategy is more likely to be developed.

P1a. For companies with high innovativeness, external pressures are less likely to influence a company’s sustainability strategy since organizations employ mechanisms that allow to anticipate/shape legislations and customer requirements.

P1b. For companies with high innovativeness, ethical responsibility is more likely to influence a company’s sustainability strategy since organizations employ mechanisms that allow individuals to manifest their values.

2.4.2 Innovativeness and sustainability strategy deployment

In order to better understand how innovativeness influences the development of a sustainability strategy, we performed within-group comparisons. Within the group of *Laggards*, innovativeness is pretty low and doesn’t seem to be differential when it comes to the deployment of a ‘passive’ sustainability strategy. Conversely, within-group comparisons between *Innovators* and *Middlings* show that for companies having a similar sustainability strategy the extent of SSCM practices is higher when the degree of innovativeness is also higher (i.e., consider at Table 2, company H vs. company E, and company F vs. company G). This suggests that innovativeness not only facilitates the development of a TESQ strategy, it also amplifies the effect that such strategy has on a company final adoption of SSCM practices. In the following paragraphs we provide details about this effect.

Company H vs. company E

In our observation we found that organizations are often characterized by complex internal and external structures (e.g., widespread organization, regionally differentiated product portfolio, globally spread supply bases). When taken-for-granted beliefs and ways of operate need to be disrupted, these structures introduce a relevant barrier, often defined as *inertia* (Gavetti, 2012; Perona and Miragliotta, 2004). For instance, an interviewee at company H stated the following:

“Each functional manager in our organization is subjected to pressures from different stakeholders and develops different specific and potentially misaligned goals ... in the past, this was a big source of inefficiency, especially when the market requires us to change our products” (company H, Supply chain director).

In order to resolve inertia, company H leverages on several mechanisms that enhance the company ability to continuously re-align objectives across organizational levels, functions and divisions. At company H, for instance, weekly meetings involving middle management and employees are organized to share KPIs trends, lessons learned as well as short and middle term objectives. Furthermore, posters positioned in recreation areas provide useful information on how the job of workers and managers operating in different functions fits into the value chain of the company. For what concerns the management of external structures, arm’s length instruments such as supplier questionnaires, which are typically adopted to control behaviors and proscribe opportunism, have been modified to include sections that allow suppliers to express their vision about the future developments of their business environment. A monitoring tool has become an external knowledge management instrument that enhance suppliers’ commitment to work with (rather than for) the company to improve products and operations sustainability.

Conversely, company E lacks innovativeness and, as a consequence, is not able to overcome the complexity of his internal and external structures. By way of illustration, the company was making an effort to involve Chinese suppliers, which represent the 25% of its portfolio, along recycling and DfE initiatives; the inability to manage cultural differences and motivate suppliers to the new objective has precluded the company to

achieve significant ecological efficiency improvements and has led to put such initiatives aside.

Company F vs. company G

In company F, fair-minded communication between managers and employees through formal meetings and playful activities are central to the organization life. Still, the relationship with external stakeholders is managed by formal communication lines (i.e., liaison roles, meetings) and by a web portal, which allow accessing external knowledge and generating synergies with outsiders. At company F, furthermore, collaborative scenario analyses are performed frequently, providing opportunities to improve internal and external coordination:

“The development of scenario analysis, the derivation of new business idea, the development of the final report and the follow-up activities promote common goals and provide the opportunity to improve intra and inter organizational coordination” (company F, Strategic sourcing manager).

Company G develops such mechanisms to a lower extent and, as a consequence, encounters more resistance in the deployment of its sustainability strategy.

When a new strategy has to be pursued, the “violation” of taken-for-granted identity codes, ways of thinking, routines or practices usually sets off cascades of changes that generally require firms to have sufficient innovativeness (Gavetti, 2012). Also, deploying a new strategy that aims at pursuing multiple objectives (i.e., economic, social and environmental) requires the ability to mitigate/overcome trade-offs. For example, some environmental friendly technologies to be adopted might require high investments and might increase the noise inside the plant, providing economic and social trade-offs (Pagell and Gobeli, 2009; Wu and Pagell, 2011). Case studies suggest that company F is better than company H at generating, sharing and re-examining information over the way its sustainability strategy should be translated into daily practice. Company F considers the deployment of its strategy as an on-going, cyclical process of continuous improvement and organizational learning. In this path, inclusive approaches and foresight provide managers, employees and outsiders (i.e., suppliers) with guidance, which encourage responsible practices and allow for trade-offs resolution. For instance, at company F, fair-minded internal and external

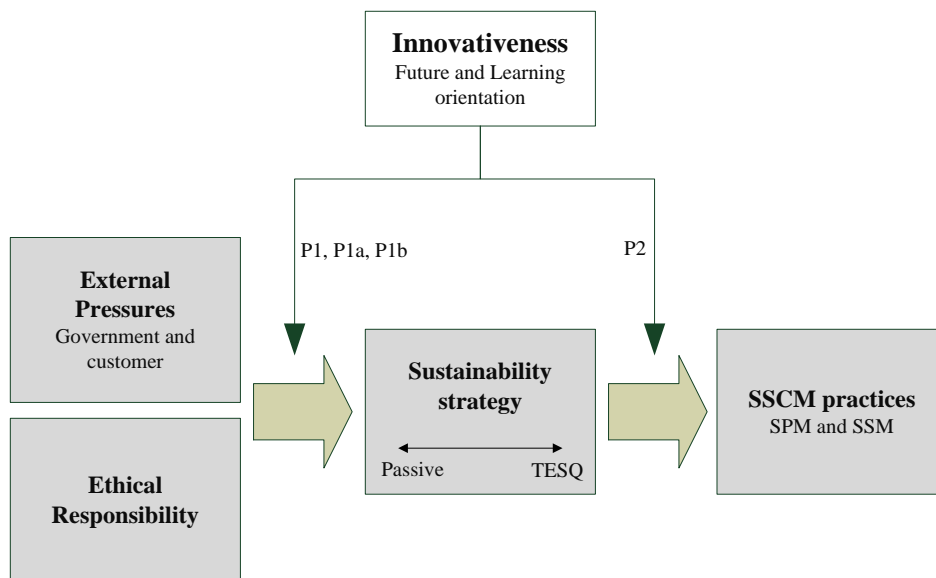
communications allow to evaluate SSCM practices from different perspectives, identify possible negative implications on internal and supply chain processes, obtain possible remedies from different sources (workers, managers and suppliers), as well as increase motivation. In its attempt to be more innovative, company F leverages on the mechanisms described above to mitigate the complexity of its internal and external structures as well as to overcome trade-offs, a behavior that in turn allows for extensive adoptions of SSCM practices.

These observations are aligned with those of prior research, which argued that complex internal and external structures and trade-offs constitute a main barrier to the adoption of SSCM practices (Bowen et al., 2001; Walker and Jones, 2012; Wu and Pagell, 2011) and that the misalignment between complexity and capabilities limits the deployment of a sustainability strategy (Aragon-Correa and Sharma, 2003). From this evidence, we propose the following proposition:

P2. For firm with high innovativeness, a TESQ strategy is more likely to result in a higher extent of SSCM practices adoption since organizations employ mechanisms that allow to overcome inertia and trade-offs.

Based on the described evidence, it is possible to build a conceptual model as provided in Figure 4.

Figure 4. The role of firm innovativeness in fostering SSCM



2.5 CONCLUSIONS

Our systematic analysis of the role that innovativeness plays along the development of SSCM at ten Italian manufacturing companies pointed to a number of results. First of all, our observation suggests that innovative companies are more likely to pursue a ‘total environmental and social quality’ strategy. *Innovators* maintain continuous dialogues with external stakeholders so to understand/influence sustainability trends and adjust behaviors before that new legislations are promulgated or customers express new coercive requirements. Innovativeness also allows ethical responsibility to emerge and permeate the organization, greatly impacting a company sustainability strategy. Individuals in innovative organizations can easily manifest their environmental and social values and pursue their intents by exploiting opportunities and resources their organization make available (e.g., Innovation ideas competitions). Second, we found that, as the degree of innovativeness grows, companies tend to be better equipped to overcome inertia and trade-offs that work against the deployment of a sustainability strategy. Collaborative scenario analysis, frequent meetings, liaison roles, playful activities and posters positioned in recreations areas represent effective mechanisms that can be used when deploying a sustainability strategy; they allow to re-align objectives, consolidate opinions concerning sustainability plans and subsequent actions, boost motivations, manage existing knowledge and improve coordination throughout the whole organization as well as in the relationship with suppliers.

These findings have significant implications in practice. First, “it is increasingly clear that organizations will need to deal with environmental and social issues” (Pagell and Wu, 2009). However, developing and deploying sustainability strategies are not easy tasks: (i) stakeholders’ expectation about sustainability needs to be understood, managed and, ideally, influenced; (ii) inertia and trade-offs need to be addressed and resolved. According to our observation, we recommend managers to prepare themselves to deal with the sustainability challenge by developing mechanisms that allow opening the company foresight and improving its learning orientation. Legislations and customer requirements can be anticipated/influenced by leveraging on an inclusive approach which makes use of open dialogs with external stakeholders and create strong communication ties with them. Ethical responsibility, which may trigger the development of a TESQ strategy, can be exploited by developing mechanisms (i.e.,

Innovation Ideas Competitions; expenses reimbursement) that allow organizational constituents to manifest and pursue their values and ideas. Finally, when a sustainability strategy has to be deployed, similar mechanisms (i.e., weekly meetings, playful activities, posters, communication lines, collaborative scenario analysis) allow to reduce inertia and find solutions to SSCM trade-offs.

To conclude, this study provides a conceptual framework for understanding how innovativeness foster SSCM. We conceptualized innovativeness as a company willing/ability to change. Then, we operationalized it in terms of two specific factors - future orientation and learning orientation. We also operationalized the most relevant constructs that should be taken into account when investigating how SSCM develops. We argue that our framework offers guidance for theory testing and further investigation. First, we found indications that innovativeness should be aligned with business complexity in order to allow for an extensive adoption of SSCM practices. Empirical literature on this issue is scarce and future works could focus on the effect that a misalignment between innovativeness and the complexity of a company's internal and external structures may have a company environmental and social performance. Second, our observation points out that inclusive approaches play a relevant role in the context of SSCM; innovative companies engage with stakeholders to identify salient sustainability issues and the way those should be managed. Future works should analyze how inclusivity, intended as the degree of stakeholder involvement along the SSCM development, influence the ability of the company to achieve superior environmental and social performance.

APPENDIX

Table A1. The extent of SSCM adoption

	Specific dimensions for SSCM adoption evaluation	Evaluation Guideline		
		1(Low)	2(Medium)	3(High)
SPM	<p>1) Hazardous material management within the product;</p> <p>2) Use of Eco-Design (Design for Environment and Life Cycle Assessment);</p> <p>3) Building an environmental management system (EMS)</p> <p>4) Reduction of energy, water use and emission;</p> <p>5) Improving health and safety (e.g., obtaining OHSAS 18001);</p> <p>6) Improving corporate responsibility through social campaigns (e.g., codes of conduct, corporate social activities).</p>	<p>- None;</p> <p>- None;</p> <p>- None;</p> <p>- None;</p> <p>- None.</p>	<p>- Limited consideration of hazardous material monitoring and elimination;</p> <p>- Limited and/or less important consideration of simple criteria regarding sustainability performance in the new product development process;</p> <p>- EMS implementation in some managerial processes (e.g., operations) and obtained environmental certification;</p> <p>- Energy and emission reduction practices in few operations;</p> <p>- Health and safety improvement practices in few operations;</p> <p>- Some effort is put in the development of a company code of conducts/ethics.</p>	<p>- Complete elimination of the current and likely-to-be hazardous materials;</p> <p>- Complete integration of sustainability performance evaluation and monitoring procedures into the new product development process;</p> <p>- Completed implementation of an EMS throughout the whole organization;</p> <p>- 'reduction at the source' practices embedded in every operation;</p> <p>- Health and safety improvement practices in the full-range of company's operations;</p> <p>- Established code of conduct/ethics.</p>
SSM	<p>Supplier Monitoring (environmental and social requirements):</p> <p>1) Greener part and material provide (e.g., harm-free or more recyclable products);</p> <p>2) A company-wide environmental management system or certification;</p> <p>3) A company effort to improve health and safety in operations and behave ethically;</p> <p>Supplier Collaboration (environmental and social support and co-development):</p> <p>4) Diagnosis and improvement of the environmental and social profile of supplier operations;</p> <p>5) Environmental and social certifications with suppliers;</p> <p>6) Collaborative greener product development;</p>	<p>- A company hardly requires or considers those factors when selecting or evaluating suppliers;</p> <p>- A company does not provide any managerial or technical assistance, to its suppliers or even work with them to implement such practices.</p>	<p>- A company officially requires its suppliers to improve their performance in those elements;</p> <p>- A company works with suppliers to implement such practices, but there is a lack of structured procedures and the collaboration is limited to a small portion of suppliers.</p>	<p>- A company demands its suppliers to undertake environmental and social practices very seriously. Also, the portion of environmental and social criteria in a company's procurement process is very substantial;</p> <p>- A company have clear procedure and extensively work with a substantial number of suppliers for improving environmental and social performance.</p>

Table A2. The role of external pressures

Specific dimensions for external pressures role evaluation	Evaluation Guideline		
	1(Marginal)	2(Medium)	3(Relevant)
<p>Government Pressure GP (the role of the local government in inducing/motivating a company to address environmental and social issues through regulations and laws):</p> <p>1) The extent to which environmental and social laws and legislations already in force are responsible for a company's adoption of SSCM;</p> <p>2) The extent to which the threat that laws and legislations might disrupt the supply chain motivates a company's adoption of SSCM;</p> <p>3) The extent to which the prospective tightening of laws and legislation determines a company adoption of SSCM;</p>	<p>- Environmental and social laws and their prospective tightening do not motivate a company adoption of SSCM;</p>	<p>- Environmental and social laws and their prospective tightening are in part responsible for a company adoption of SSCM;</p>	<p>- Environmental and social laws and/or their prospective tightening substantially motivate a company adoption of SSCM;</p>
<p>Customer Pressure CP (the role of main customers in inducing/motivating a company to address environmental and social issues through request and requirements):</p> <p>1) The extent to which request and requirements by customers to reduce environmental and social impacts of products and processes determine a company's adoption of SSCM;</p> <p>2) The extent to which customers' request of detailed information to assure sustainability compliance motivate a company adoption of SSCM.</p>	<p>- Request and requirements by customers to reduce environmental and social impacts of products and operations, and/or to produce detailed information to assure sustainability compliance do not motivate a company adoption of SSCM.</p>	<p>- Request and requirements by customers to reduce environmental and social impacts of products and operations, and/or to produce detailed information to assure sustainability compliance are in part responsible for a company adoption of SSCM.</p>	<p>- Request and requirements by customers to reduce to reduce environmental and social impacts of products and operations, and/or to produce detailed information to assure sustainability compliance substantially motivate a company adoption of SSCM.</p>

Table A3. The extent of ethical responsibility

Specific dimensions for ethical responsibility evaluation	Evaluation Guideline		
	1(Low)	2(Medium)	3(High)
<p>Ethical responsibility (the genuine intention and willingness of the top management, middle management and employees in a firm to be engaged in environmental and social management):</p> <p>1) The extent to which top and middle management in a company believe that caring about environmental and social issues is 'the right thing to do';</p> <p>2) The extent to which a company's employees express genuine interest toward sustainability issues.</p>	- Lack of genuine interest toward sustainability issues by a company's organizational constituents;	- Some individuals (at different organizational level) within a company believe that environmental and social issues are important;	- A company's organizational constituents strongly believe that caring about environmental and social issues is the right thing to do;

Table A4. Type of Sustainability strategy

Specific dimensions for sustainability strategy evaluation	Evaluation Guideline		
	1(Passive)	2(Medium)	3(TESQ)
<p>Sustainability strategy (the set of environmental and social objectives, plans and procedures of a company):</p> <p>1) The extent to which sustainability represent an order winner in a company business;</p> <p>2)The amount of time and financial resources a company allocates to plan and implement sustainability-related actions;</p> <p>3) The extent to which a company assigns responsibilities for environmental and social matters.</p>	<p>- A company sustainability objective consists of complying with legislations;</p> <p>- A company dedicates minimum time and/or financial resources to improve environmental and social performance;</p> <p>- A company does not have any person who is responsible for dealing with environmental and social matters.</p>	<p>- A company sustainability objective is not just limited to complying with legislations, but rather it also attends to the requirements of external stakeholders (e.g., customers);</p> <p>- A company dedicates the necessary time and resources to sustainability performance in order to attend external pressure;</p> <p>- A company requests the services of external professionals and/or has qualified internal personnel to take care of sustainability matters.</p>	<p>- The sustainability objective is one of the priority objectives of a company;</p> <p>- A company dedicates important budgets to sustainability for reasons that go beyond attending external pressure;</p> <p>- A company clearly assigns responsibility for sustainability matters to one or various persons of the organization who are specialized in this matter.</p>

Table A5. Degree of Innovativeness

Specific dimensions for innovativeness evaluation		Evaluation Guideline		
		1(Low)	2(Medium)	3(High)
Future Orientation (FO)	<p>1) Dominant paradigm; 2) Perspective; 3) Foresight process; 4) Outsiders; 5) Output activities.</p>	<p>- A company believes that the future can be known by means of expertise; - Exploring change; - Collect and compare the opinions of experts; - Outsiders (experts) are responsible for both contents and outcomes of the foresight process; - Scarce investments in building roadmaps, scenarios and Delphi.</p>	<p>- A company believes that the future can be known by means of projections and calculations; - Reacting to change; - Use quantitative models to estimate the future (e.g., S-curve); - Some of the foresight activities are outsourced to outsiders which generate foresight knowledge; - Trend-databases, matrices, monitoring systems.</p>	<p>- A company believes that the future can be shaped by means of interaction with the business surrounding environment; - Understanding and anticipating/shaping change; - Open and continuous dialogue to leverage sense-making and sense-giving processes; - Strong collaboration with all relevant stakeholders (in and out-side); - Scenarios, innovation ideas, wild card, action plans.</p>
Learning Orientation (LO)	<p>Commitment to learning: 1) Perceived importance of the organization's ability to learn; 2) The sense associated to continuous training and learning by organizational constituents;</p>	<p>- A company perceives continuous learning as an expense;</p>	<p>- Limited consideration of continuous learning processes;</p>	<p>- A company perceives learning as a key investment (not an expense) to guarantee organizational survival and competitive advantage;</p>
	<p>Shared-vision: 3) Degree of commonality of purposes; 4) Degree of agreement on the organizational vision; 5) Degree of employees commitment to organizational goals;</p>	<p>- A company misses efficient and effective mechanisms to share and consolidate its vision throughout the organization;</p>	<p>- There is communality of purpose and intent in a company;</p>	<p>- Organizational constituents across levels, functions and divisions are committed to the company's vision and have a clear understand of how their work fits into the value chain of the company;</p>
	<p>Memory: 6) Degree of organizational conversation; 7) Degree of organizational transparency on unsuccessful endeavors; 8) Degree to which lessons learned are shared throughout the whole organization.</p>	<p>- A company never analyzes unsuccessful endeavors and its members do not stress the distribution and preservation of knowledge.</p>	<p>- Some mechanisms for sharing and reexamining information are developed which allow to accumulate knowledge.</p>	<p>- A company always analyzes unsuccessful endeavors, has specific mechanisms for sharing lessons learned and maintains organizational conversation to keep alive such lessons from history.</p>

CHAPTER THREE.

Do supply management and global sourcing matter for firm sustainability performance? an international study

3.1 INTRODUCTION

Increasing demand from a variety of stakeholders has pushed companies to initiate the adoption of sustainable supply chain management (SSCM) to augment their environmental and social performance (Sharma and Henriques, 2005).

Although there is still no consensus on its definition, SSCM is advocated to allow the development of 'win-win' strategies. These strategies achieve higher profit and market share objectives by lowering environmental and social risks while raising the ecological efficiency and social responsibility of the focal organisation and its supply chain (Pagell and Wu, 2009; Van Hoek, 1999; Zhu et al., 2005). SSCM tackles environmental and social issues using supply chain management levers and can be viewed at multiple levels, including at the level of internal and external practices (Gavronski et al., 2011; Hollos et al., 2012; Zhu et al., 2013).

The literature on SSCM is quite extensive, and different topics have been addressed by researchers in this field (for a comprehensive review, we refer to Seuring and Muller, 2008). However, despite the knowledge created by scholars during the last two decades, firms operating within industrial supply chains still need guidance to find better means of improving the environmental and social performance of their focal organisation (e.g., United Nation Global Compact and Business for Social Responsibility, 2010). For this reason, this work focuses on the impact of SSCM on the environmental and social performance of the company that is leading it. Specifically, this work addresses the impact of supply management practices – SM (e.g., supply base reduction, supplier selection, integration and development) – and global sourcing on the relationship between SSCM and a company's environmental and social sustainability. In fact, it appears that the literature has disregarded the direct impact of SM on final performance and its potential interaction with SSCM. In addition, supply chains have been undergoing a process of increasing globalisation, which has created the need in the

literature for differentiated approaches for firms sourcing globally (*Globals*) rather than regionally (*Locals*) (Caniato et al., 2012; Meixell and Gargeya, 2005).

In the context of sustainability, for instance, the level of globalisation plays an ambiguous role in relation to a company's environmental and social performance. On the one hand, global sourcing can make supply management necessary and can pose barriers to the improvement of a company's footprint. In addition to longer transportation routes, visibility and cultural differences between the firm and its suppliers are accompanied by several drawbacks (Ghemawat, 2001): it is difficult to assess what suppliers are doing and to stimulate suppliers' commitment to sustainability. Moreover, exploiting suppliers' know-how with the aim of improving internal environmental and social performance can be more challenging. On the other hand, global sourcing can make SSCM more compelling and can therefore facilitate the achievement of higher environmental and social performance at the company level. As a matter of fact, global sourcing provides companies with resources (e.g., suppliers' technologies) that are not available regionally and may be used inside a company's boundaries to improve its performance. This paper thus attempts to address the following research questions:

Does the adoption of SSCM significantly impact the environmental and social performance of the company that is leading it?

What is the role of SM in the context of sustainability? Does it significantly influence the effectiveness of SSCM?

Does global sourcing significantly influence the relationships involving SM, SSCM and sustainability performance (both environmental and social) of the company that is leading such programs?

To answer to these research questions, we elaborate a conceptual framework and a set of research hypotheses. Then, we test our model by using empirical data from the fifth edition of the International Manufacturing Strategy Survey. The sample consists of 336 companies from the assembly manufacturing industry belonging to 21 countries. We conducted a moderated mediation analysis to explore the relationships involving SM, SSCM and sustainability performance. We then performed a multi-group analysis

to explore the moderation effect played by global sourcing. Thus, we aim to provide a tri-fold contribution: first, we provide evidence of the power that SSCM has to improve the environmental and social performance of a company. Second, we carefully explore the complex role of SM. In particular, our results show that SM contributes directly to sustainability performance, acts as an antecedent for SSCM and also renders it more effective. Finally, we shed light on the role of global sourcing when improving environmental and social performance of the company implementing SM and SSCM programs. Specifically, we find that despite the difficulties, *Globals* perform SSCM more effectively, thus achieving sustainability performance that is comparable to that of *Locals*.

The remainder of the paper is organised as follows. First, we discuss the extant literature, and based on the research gaps, we present a conceptual model and a set of research hypotheses. Next, we explain in detail the sample and the methodology, and we then present our results. Finally, we discuss the results and provide the conclusions of this work.

3.2 RESEARCH BACKGROUND AND HYPOTHESIS DEVELOPMENT

Literature on sustainability and sustainable management is vast and complex. Here, attention is paid mainly to SSCM; therefore, the research background is structured as follows. First, attention is devoted to the evaluation of companies' environmental and social performance (paragraph 2.1), then (paragraph 2.2) we focus on the relationship between what companies do to manage sustainability along the supply chain (i.e., SSCM) and their sustainability performance. Paragraphs 2.3 and 2.4 focus on the role of SM and global sourcing.

3.2.1 Companies' environmental and social performance

After Brundtland's report (1987), sustainable development has become a major concern for companies. According to this report, sustainable businesses are those that aim to continuously improve their environmental, social and economic performance, providing the possibility that future generations will be able to meet their needs. To support the development of sustainable organisations, scholars have largely investigated the interrelatedness of environmental, social and economic dimensions of the triple bottom line (Elkington, 1998). Much of the existing research has focused on the

question of whether being environmentally or socially sustainable offers positive returns (Klassen and McLaughlin, 1996; Molina-Azorín et al., 2009; Pullman et al., 2009). More recently, however, it has been shown that environmental and social issues are becoming competitive priorities *per se* and that further support is needed to understand how these priorities should be accomplished (Pagell and Wu, 2009). Thus, the environmental and social performance of the company that is dealing with SM and SSCM programs constitute the unit of analysis for this research. The economic dimension, although crucial to the companies' survival, will be considered as a prerequisite (i.e., control variable).

Environmental performance and social performance are usually seen as two separate concepts: performance indicators usually pertain to different sustainability areas, such as ecology (e.g., poor emissions, consumption of resources) and decent work (e.g., health and safety, training and education). The literature, however, notes that such performance strongly covaries. For instance, the adoption of new production processes that reduce pollution improves the working conditions for company employees (Elkington, 1994). Conversely, the improvement of employees' welfare (e.g., due to the adoption of fewer toxic materials and more green processes) can reduce the number of potentially damaging environmental actions undertaken by the firm (Marshall et al., 2005). Moreover, employees' safety and satisfaction have been positively related to environmental improvements (Johnson, 2006; Rothenberg et al., 2001). In line with these arguments and recent publications (Pagell et al., 2007), this research considers environmental and social performance to be part of a unique construct, i.e., sustainability performance.

3.2.2 SSCM and a company's sustainability performance

SSCM can be analysed at multiple levels considering internal (i.e., within the company) or external (i.e., among organisations) practices (Zhu et al., 2013, Gavronski et al., 2011, Hollos et al., 2012). Internal levers include environmental management systems, certifications, design for environment and life cycle analysis, which aim to reduce a company's direct environmental and social impacts. By adopting such practices, companies can develop innovative technologies to prevent pollution or minimise emissions, effluents and waste, thus improving the sustainability performance of their own organisations. For instance, in previous studies, environmental

management systems (Klassen and Whybark, 1999) and ISO 14001 certifications (Babakri et al., 2004) were positively and significantly linked to the environmental performance of production plants. In the same vein, the literature suggests that social certifications (e.g., OHSAS 18001) have contributed to the achievement of higher quality of life for employees, safer and healthier workplaces, more efficient work processes, improved employee perceptions of the working environment, and greater recruitment attractiveness (Robson et al., 2007; Zeng et al., 2007). Design for environment and life cycle analysis, then, is a set of effective internal practices composed of concepts and techniques to evaluate the environmental, social and economic impacts of products and services and to imply the minimisation of an organisation's negative externalities (Gavronski et al., 2011; Seuring, 2004; Zhu et al., 2013).

However, external practices include the mechanisms implemented at the corporate and plant levels to assess, and ideally improve, the environmental and social performance of a supplier base (e.g., suppliers' code of conduct and environmental requirements, collaboration with suppliers to anticipate/resolve environmental and social issues) (Awayshe and Klassen, 2010; Gavronski et al., 2011). Although such practices are mainly directed to support suppliers, they may also result in increased sustainability performance for the focal organisation. First, environmental and social requirements may result in a more integrated supply chain and an overall decrease in waste that includes water, energy, fuel consumption and decreased packaging for the focal company (Kumar et al., 2012). According to Pagell et al. (2007), for instance, lighter packaging for the supplier means fewer disposals for the focal firm, and removal of toxins by the supplier translates to simpler material handling and higher workplace safety and health for the buyer. Moreover, suppliers' environmental assessment and collaboration often entail joint problem-solving sessions and the application of collaborative efforts to reduce the environmental and social impacts of products and processes (e.g., Vachon and Klassen, 2008). Thus, it seems plausible that by pushing suppliers toward the adoption of environmental and social practices, focal firms could find new ways to directly improve their own footprint (Theyel, 2001).

In line with the above arguments, we formulate the following research hypothesis:

RH1. A higher adoption of SSCM implies higher sustainability performance of the company that is leading it.

Achieving superior sustainability performance is difficult, and the desired goals are not always met. The literature identifies two main causes for this result: inadequate supply management (e.g., Gold et al., 2010; Walker and Jones, 2012) and the global spread of suppliers (e.g., Roberts, 2003). The role of these factors is discussed in the following sections.

3.2.3 The role of supply management

Practices that promote closer involvement with fewer selected suppliers by establishing long-term relationships, information sharing systems and better coordination are generally termed supply management (Chen and Paulraj, 2004). Accordingly, we refer to supply management (SM) as a series of activities that companies undertake to reduce their supply base (Cousins, 1999) and build a structured approach to empower suppliers and coordinate with them (Krause et al., 2007). It is important to note that these activities are not directed toward environmental and social issues. For instance, a program that aims to restructure the supply strategy and develop effective information sharing with strategic vendors would be considered to be part of SM.

However, it can be argued that supply management directly and positively impacts the company's sustainability performance. By sharing information and improving coordination with suppliers, for instance, companies can optimise their inbound transportation flows and reduce the generation of by-products (e.g., packaging, CO₂) (Plambeck, 2007). Similarly, by guiding suppliers to improve manufacturing capabilities (for greater efficiency or quality), the buying organisation reduces its own waste significantly (e.g., scraps) (e.g., Pagell et al., 2007). Moreover, if the company looks at win-win solutions rather than potentially choking suppliers by asking for lower prices, it can benefit from an enhanced social reputation (Surroca et al., 2010). Furthermore, the adoption of SM may indirectly introduce environmental and social improvements. Hajmohammad et al. (2012) demonstrate that an organisation benefits from more intense interaction with suppliers through the identification and absorption of external knowledge that can extend the capacity of a buying firm to effectively

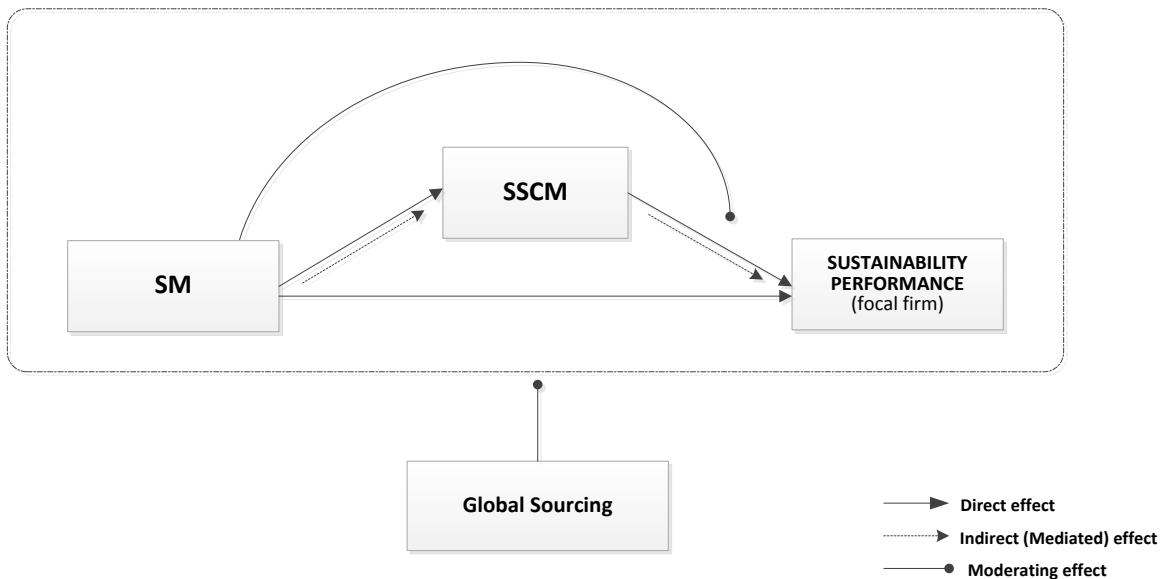
implement innovations that are beneficial for the environment. In addition, consolidated partnering policies and integration procedures are better suited to accommodate sustainability goals, fostering the adoption of external SSCM practices by the focal firm (Bowen et al., 2001; Vachon and Klassen, 2006). Building on evidence from case studies, Hall (2000) argues that a company’s understanding of its suppliers’ operations and capabilities is the key to increasing its ability to develop sustainable supply chains and that such an understanding can only be achieved through sound supply management. In conclusion, as summarised in the conceptual model presented in Figure 1, we argue that SM impacts sustainability performance; however, this direct relationship is partially mediated by SSCM that can be sparked by SM. Hence, we formulate the following hypotheses:

RH2a. A higher rate of SM adoption implies higher sustainability performance of the company that is leading it.

RH2b. A higher rate of SM adoption results in a higher adoption of SSCM of the company that is leading it.

RH2c. The relationship between the SM adoption and sustainability performance is mediated by SSCM adoption.

Figure 1. Research framework



Finally, we argue that SM not only facilitates the implementation of SSCM but also makes it more effective. SSCM should be developed in a participatory environment: in fact, it is fundamental to involve supply chain partners in the decision-making processes to gain a broader perspective on the environmental and social consequences of redesigning products and processes (Lamming and Hampson, 1996; Seuring, 2004b). Involving suppliers in these analyses, however, can be difficult or ineffective if the company does not understand their capabilities, if the company is unable to obtain their commitment and if effective coordination mechanisms are missing. In this sense, SM facilitates closer cooperation with fewer upstream partners and allows the sharing of key resources, technologies, risks and rewards. According to the literature that relies on socio-relational arguments (Simpson et al., 2007; Jiang, 2009), these elements encourage suppliers toward sustainability and make their involvement easier. Furthermore, the companies that undertake SM might have a much clearer sense of how environmental and social issues should be balanced with the potential increased costs for the company and its suppliers (Wu and Pagell, 2011). Therefore, although this linkage has not yet been explored in the literature, we can argue the following:

RH2d. The adoption of SM positively moderates the relationship between the adoption of SSCM and the sustainability performance of the company that is leading these programs.

Our hypotheses highlight that the relationship among SM, SSCM and sustainability performance is complex and, specifically, that it is characterised by a moderated-mediation effect.

3.2.4 The role of global sourcing (GS)

As outlined in the conceptual model (Figure 1), global sourcing is a factor that can influence the relationship discussed so far. Global sourcing (i.e., purchasing outside of the continent where the company is based) is always a more diffused practice (Caniato et al., 2012; Roland Berger, 2011); therefore, it is particularly worth investigating its potential implications for sustainability performance. From a theoretical point of view, this issue can be analysed using a contingency perspective: contingency theory argues

that the best way to organise depends on the nature of the environment to which the organisation must relate (Donaldson, 2001). Specifically, contingency theory posits that the relationship between the relevant dependent variable (i.e., sustainability performance) and the independent variables (i.e., SSCM and SM) will not be simply linear but will be influenced by the critical contingency (i.e., global sourcing).

The impact of global sourcing on the considered relationship is complex and not completely straightforward. First, global sourcing may act as a barrier in achieving high sustainability performance. Global sourcing implies the difficult management of economic, financial, information and material flows across wider spatial horizons, the greater exposure to environmental factors and risks of all types and cultural and linguistic differences (Nassimbeni, 2006; Wagner and Bode, 2006). When suppliers are globally distributed, SM is necessary to address the complexity of the network and mitigate its negative implications on operational performance (e.g., cost and reliability of deliveries) (Golini and Kalchschmidt, 2011). Thus, we can argue that companies that rely significantly on global sourcing will implement SM to solve operational issues rather than to create collaboration platforms with suppliers. Therefore, we argue that firms that source globally will not be characterised by a strong impact of supply management on sustainability performance. For instance, a company providing financial or managerial help to a supplier will gain more reputational recognition in the surrounding community if the supplier is local. Alternatively, reducing the company's carbon footprint is more problematic if the company sources globally because it is constrained by long transportation routes.

In conclusion, we argue that the effect of global sourcing may occur both directly on the relationship between SM and sustainability performance and on the moderation effect of SM on the relationship between SSCM and sustainability performance. Accordingly, we consider two tentative hypotheses:

RH3a. For firms engaged in global sourcing, the adoption of SM will not be directly associated with the sustainability performance of the company that is leading it.

RH3b. For firms engaged in global sourcing, the adoption of SM will not moderate the relationship between the adoption of SSCM and the sustainability performance of the company that is leading these programs.

From another perspective, however, global sourcing can have a positive effect on companies' sustainable development. Global sourcing implies difficult communications and relationship management with remote partners that belong to different economic and socio-political contexts (Holweg et al., 2011). This issue can represent a relevant barrier to the effective development of SSCM: controlling and prescribing sustainable behaviours to suppliers that are far away is more difficult, and dealing with different cultures can diminish the effectiveness of transferring/absorbing best practices to/from suppliers (Pagell et al., 2005). Past and recent scandals that have hit large and successful corporations such as Nike, Apple, Mattel and Victoria's Secret¹ because of the practices of their global suppliers are clear evidence of the difficulties companies face in motivating foreign suppliers towards sustainability.

However, companies are usually aware of the drawbacks of global sourcing and might want to develop the extensive capabilities necessary to mitigate them. Global sourcing, indeed, is always considered to be a strategic decision that leads companies toward "proactively integrating and coordinating common items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering and operating locations" (Trent and Monczka, 2002). Moreover, playing on a global scale means to have contacts with different cultures and institutions: firms with international experience can leverage the knowledge acquired in different jurisdictions and develop a set of best practices based on their collective learning (Bansal, 2004). Thus, global sourcing can also be considered a factor that supports the full exploitation of SSCM. Finally, the impacts of SSCM on the global scale can be larger. For instance, a company that sources from a developing country in an ethical fashion (e.g., checking

¹ Nike: in the 1990s, Nike was involved in a scandal involving children producing Nike products in Cambodia and Pakistan in the suppliers' factories. <http://web.mit.edu/ipc/publications/pdf/02-007.pdf>
Apple: beginning in 2006, Apple faced increased problems because of their Chinese supplier Foxconn, which was accused of worker exploitation. <http://www.nytimes.com/2012/01/26/business/ieconomy-apples-ipad-and-the-human-costs-for-workers-in-china.html?pagewanted=all>
Mattel: in 2007, Mattel initiated a massive recall of products (made by a supplier in China) that were discovered to contain lead paint. <http://www.nytimes.com/2007/08/02/business/02toy.html>
Victoria's Secret: in 2011, Victoria's Secret was involved in a scandal involving children picking cotton in Burkina Faso. <http://www.bloomberg.com/news/2011-12-15/victoria-s-secret-revealed-in-child-picking-burkina-faso-cotton.html>

that workers' rights are respected) can contribute to the well-being of those workers to a greater extent than a company sourcing from a supplier in a developed country. This contribution could, in turn, enhance the satisfaction of the focal company's employees, who act in a responsible and desirable way. Conversely, companies that operate in emerging countries, by sourcing in developed countries, can be more exposed to state of the art technologies and safety procedures with potentially higher returns on internal performance. In conclusion, our last research hypothesis states the following:

RH3c. For firms engaged in global sourcing, the adoption of SSCM will be more positively associated with the sustainability performance of the company that is leading it.

3.3 METHODOLOGY

To investigate the above research hypotheses, we used the data from the fifth edition of the International Manufacturing Strategy Survey (IMSS 5) collected in 2009. Originally launched by the London Business School and the Chalmers University of Technology, this project studies manufacturing and supply chain strategies within the assembly industry (ISIC 28–35 classification) using a detailed questionnaire that was administered simultaneously in many countries by local research groups. The responses were gathered in a unique global database (Lindberg et al., 1998), which was available only to those who had actively participated in the data collection. The basic structure of the questionnaire was as follows: the first section of the questionnaire pertained to the business unit and gathered general information (e.g., company size, industry, production network configuration, competitive strategy and business performance) on the context in which the manufacturing takes place, whereas the other sections referred to the plant's dominant activity and focused on manufacturing strategies, practices and performance. The dominant activity is defined as the most important activity or the activity that best represents the plant. The plant was chosen as the unit of analysis to avoid problems related to business units with multiple plants that operate in different ways. In each edition, the questionnaire was partially redesigned to ensure alignment with the most recent research goals. This update was conducted by a design team composed of a pool of international researchers and thus avoided the researchers'

country-specific biases (Leung and van de Vijver, 1997). The data in each country were gathered in that particular country's native language, and the questionnaire was translated and back-translated to ensure consistency (Behling and Law, 2000). Companies were selected from a convenience sample or were randomly selected from economic datasets, and then the operations, production or plant managers were contacted and asked to assist in the research. If the respondent agreed, the questionnaire was sent and, when appropriate, a reminder was sent after a few weeks. The questionnaires that were returned were controlled for missing data, which was typically handled on a case-by-case basis by directly contacting the company. Every country then controlled the collected data for late respondent bias by company size and industry. The overall response rate was 18.3% of the questionnaires sent (10.6% of the contacted companies).

The sample used in this study is described in Table 1. In particular, 336 companies (from the 729 in the global database) provided information for this study (i.e., we dropped the records that did not provide information on the used variables, the cases with fewer than 20 or more than 16,000 employees, and the cases that did not provide the ISIC code classification). To verify the absence of bias in this final selection, we performed several tests on the variables of interest between the selected and the excluded cases. No significant difference was found (i.e., p-values always higher than 0.10). The sample consisted primarily of small companies (49.72% of the sample), but medium and large companies were also well represented. Different industrial sectors from the assembly industry in different positions of the supply chain were considered. This selection allows us to generalise our results to focal companies, i.e., any generic company operating in the value chain system (Lazzarini et al., 2001).

Table 1. Descriptive statistics in terms of (a) country, (b) size, (c) industrial sector (ISIC)

(a)						(b)		
Country	N	%	Country	N	%	Size*	N	%
Belgium	36	5.14	Korea	35	4.99	Small	166	49.40
Brazil	37	5.28	Mexico	14	2	Medium	70	20.83
Canada	19	2.71	Netherlands	51	7.28	Large	100	29.77
China	56	7.99	Portugal	10	1.43	Total	336	100.0
Denmark	18	2.57	Romania	31	4.42	(c)		
Estonia	27	3.85	Spain	40	5.71	ISIC**	N	%
Germany	38	5.42	Switzerland	31	4.42	28	115	34.23
Hungary	70	9.99	Taiwan	30	4.28	29	94	27.98
Ireland	6	0.86	UK	26	3.71	30	2	0.60
Italy	56	7.99	USA	48	6.85	31	47	13.98
Japan	22	3.14	Total	336	100.0	32	13	3.87
						33	18	5.36
						34	29	8.63
						35	18	5.35
						Total	336	100.0

* Size: Small: equal or less than 250 employees, Medium: 251-500 employees, Large: over 501 employees

**ISIC Code. 28: Manufacture of fabricated metal products, except machinery and equipment; 29: Manufacture of machinery and equipment not classified elsewhere; 30: Manufacture of office, accounting, and computing machinery; 31: Manufacture of electrical machinery and apparatus not classified elsewhere; 32: Manufacture of radio, television, and communication equipment and apparatus; 33: Manufacture of medical, precision, and optical instruments, watches and clocks; 34: Manufacture of motor vehicles, trailers, and semi-trailers; 35: Manufacture of other transport equipment.

With respect to the research framework shown in Figure 1, we defined different constructs for sustainability performance, SSM and SM. The variables and measures are described in detail below. Additionally, a proof of the validity and reliability of our measurements is provided. Finally, Section 3.4 discusses the moderated-mediation techniques employed in this study.

3.3.1 Measures

Sustainability performance was measured using a 3-item construct where the items represented how companies compared themselves with their direct competitors on environmental performance, employee satisfaction and overall social reputation. Specifically, sustainability performance was calculated as the average of three items measured on a five-point Likert scale where 1 indicated “much worse than competitors”

and 5 indicated “much better than competitors.” A similar type of measure was employed by Pagell et al. (2007). We decided to use measures that were relative to those of competitors because we aim to identify the factors that contribute to achieving superior sustainability performance and not just to improvement of this performance. Details on the sustainability performance items are provided in the appendix (Table A.1).

As noted earlier, *sustainable supply chain management* comprises a set of internal and external practices a company adopts to lower environmental and social risks and impacts, while raising the ecological efficiency and social responsibility of its organisation. In line with this definition and with measurements adopted by peers (Zhu et al., 2013; Seuring and Muller, 2008), our two-item scale measured the effort firms put into practices that aim at (i) improving environmental performance of products and processes (e.g., EMS, environmental certification, life-cycle analysis, design for environment) and (ii) monitoring the corporate social responsibility of partners along the supply chain (e.g., labour conditions, environmental impacts). Specifically, SSCM was calculated as the average of two items which were measured on a five-point Likert scale, where 1 indicated “no investment in the last three years” and 5 indicated “a very high investment in the last three years.” The descriptive statistics for the SSCM items are provided in the appendix (see Table A.1). Unfortunately, because the literature has not yet reached consensus on the definition of SSCM, better SSCM measurements are still lacking. We discuss future developments related to this issue in the last section of the study.

Supply management refers to activities that are not directed toward environmental and social issues and aim at promoting closer involvement with fewer select suppliers. In line with this definition and the extant literature (Chen and Paulraj, 2004; Swink et al., 2005), SM was measured using a three-item construct in which the items reflected the investments firms made (i) to restructure the supply strategy and the management of the supplier portfolio, (ii) to implement supplier selection and development and (iii) to increase the level of coordination for the planning decisions with suppliers (see Table A.1 for details). However, SSCM was calculated as the average of three items that were evaluated on a five-point Likert scale, where 1 indicated “no investment in the last three years” and 5 indicated a “very high investment in the last three years.”

Global sourcing was measured using the percentage of purchases made outside of the continent where the plant is based. A similar measure was used in other studies in the field (Cagliano et al., 2008). The descriptive statistics for the considered variable are provided in the appendix (see Table A.1). This measure has evident pros and cons. Among the cons, it does not capture the exact location of the suppliers, thus it loses the ability to control for the exact geographical location and the cultural or economical distance between the company and the suppliers. On the other hand, this measure is a good proxy for the geographical distance and possible supply issues. In fact, intra-continent trades are usually easier thanks to trade agreements (e.g., EU, NAFTA) and overland transportation. In addition, this way of assessing global sourcing is consistent throughout different industries and allows companies with multiple suppliers and mixed global-local supply strategies to provide an average value.

To avoid any influence of alternative factors that were not included in our model, we added several *control variables*, namely, company size, GNI per capita of the country where the plant is located, the companies' economic performance (i.e., the return on investment), "sustainability as a priority," product complexity and position of the decoupling point.

First, there was a control for company size (measured as the number of employees in the company) because it is generally considered to be a relevant contingent variable affecting both SSCM (e.g., Pagell et al., 2004) and SM (e.g., Cagliano et al., 2008).

Second, given the international nature of the sample, we also controlled for GNI per capita (World Bank 2009 data measured in US dollars, Atlas method). The evidence suggests that companies in different countries show, on average, different attitudes toward both globalisation (Cagliano et al., 2008) and the implementation of practices belonging to SM and SSCM.

Third, we controlled for the companies' return on investment (ROI) (see table A.1 in the appendix). The literature, indeed, notes that a significant relationship could exist between the economic standing of the company and its environmental and social performance (e.g., Klassen and McLaughlin, 1996). Furthermore, one can argue that a company that performs well economically has more financial resources available to employ in the adoption of SM as well as in the implementation of SSCM.

Fourth, we controlled for the effect of “sustainability as a priority,” i.e., the importance put at the business unit level on environmental and social issues. “Sustainability as a priority” was calculated as the mean of two items based on a Likert scale ranging from 1 to 5, which measured the importance of environmental and social attributes of products and processes to win orders from major customers. Summing these items was justifiable because the factor’s Cronbach’s alpha equalled 0.85 (further details and descriptive statistics are shown in Table A.1). This variable approximated the commitment conferred by top management to environmental and social issues and, thus, may be related to SM, SSCM and sustainability performance (Gavronski, et al., 2011; Hajmohammad et al, 2012).

Finally, other possible confounding effects relate to contingencies such as the product complexity and position of the decoupling point. Product complexity was found to be a relevant variable affecting sourcing decisions (e.g., global sourcing) and the adoption of SM practices (Chung et al., 2004). In fact, companies that manufacture complex goods are usually positioned closer to the final market and have more suppliers. Product complexity was measured as the mean of four items based on a five-point Likert scale: type of product design (modular or integrated); type of product (component or finished product); number of parts/components (few or many); and number of production phases (few or many). Summing these items together was justifiable because the factor’s Cronbach’s alpha equalled 0.74 (further details and descriptive statistics are shown in Table A.1). The position of the decoupling point, similarly, may influence the way buyer-supplier relationships are managed (i.e., supply management). For instance, companies producing in purchase-to-order systems need a more reactive supply base, while companies producing in make-to-stock systems can privilege efficient supply relationships. This variable was measured by the proportion of customer orders that were produced to stock.

3.3.2 Common Method Bias

The study was tested for common method variance, which could pose problems for survey research that relies on self-reported data. One important concern in such cases is that common bias may artificially inflate observed relationships between variables. Ex-ante, the questionnaire itself is designed to minimise the issues that occur in survey-based studies with single respondents and perceptive scales. In fact, following

the guidelines provided by the literature (Malhotra et al., 2006), we guaranteed the anonymity of the respondents and the questions were clear and concise. Moreover, the questions about the variables included in this study were asked in different sections of the questionnaire, separated from the questions about performance. We also checked ex-post that Common Method Bias did not represent an issue using Harman's single factor test. The results showed that a single factor accounts only for the 27% of the variance, confirming the absence of biases (Podsakoff et al., 2003).

3.3.3 Factor Analysis for sustainability performance, SSCM and SM

To understand whether Sustainability Performance, SM and SSCM are separate constructs, we used exploratory factor analysis (EFA) (principal component with varimax rotation) and confirmatory factor analysis (CFA). Many criteria were considered to guarantee the reliability and validity of these measures. First, reliability was guaranteed by adequate Cronbach's Alpha scores (see Table 2). Then, the convergent validity of the constructs was assessed by the total variance explained, with factor loadings always higher than 0.72 and higher correlation coefficients among the items belonging to the same construct (see Table A.2 in the appendix). The separation of the construct into distinct factors with minimal cross loading provides support for discriminant validity. According to the literature (Bagozzi et al., 1991; Nunnally et al., 1967), the results show that all items consistently refer to their respective constructs. Table 2 shows the results of EFA.

Table 2. Exploratory factor analysis with varimax rotation

<i>items</i>	<i>Sustainability performance</i>	<i>SM</i>	<i>SSCM</i>
SP1. Environmental performance (Relative to competitors)	<u>0.78</u>	0.08	.34
SP2. Employee satisfaction (Relative to competitors)	<u>0.81</u>	0.16	-0.09
SP3. Social reputation (Relative to competitors)	<u>0.86</u>	0.08	0.23
SM1. Supply strategy	0.05	<u>0.84</u>	0.07
SM2. Supplier development	0.17	<u>0.78</u>	0.28
SM3. Coordination with suppliers	0.14	<u>0.80</u>	0.20
SSCM1. Improving the environmental performance of processes and products	0.14	0.14	<u>0.88</u>
SSCM2. Monitoring CSR of partners	0.21	0.33	<u>0.72</u>
Cronbach's Alpha	0.80	0.79	0.69
Variance explained (cumulative)	0.43	0.62	0.73

Finally, in order to assess uni-dimensionality of these three constructs, CFA was then conducted. The literature recommends using a non-normed fit index (NNFI) and comparative fit index (CFI) together to evaluate model fit. NNFI is 0.98 and CFI is 0.99, which allows us to consider the model as acceptable (Hu and Bentler, 1999). In addition, RMSEA is 0.05, which further suggests that the CFA's overall fit is satisfactory (Hair et al., 1998).

3.3.4 Moderated-mediation procedure

To test our model, we performed a moderated mediation model. Moderated mediation occurs when a moderator variable (i.e., SM) interacts with a mediator variable (i.e., SSCM) such that the value of the indirect effect (i.e., the path composed by SM-SSCM-Sustainability performance) changes depending on the value of the moderator variable (i.e., SM). Preacher et al. (2007) provide the theoretical background and the framework for moderated mediation.

We first considered a model (Model 1a) where Sustainability Performance (i.e., the dependent variable) was regressed on the control variables (Size, GNI, ROI, and “sustainability as a priority”), global sourcing and SM. Then, to estimate the moderated mediation effect, we performed two seemingly unrelated regressions (Model 1b):

1. The first regression with SM as an independent variable and SSCM as a dependent variable. Here, we controlled for size, product complexity, decoupling point and “sustainability as a priority”.
2. The second regression with sustainability performance as a dependent variable and SM, SSCM and their interaction effect as independent variables. Here, we controlled for size, GNI, ROI, and “sustainability as a priority.” We also accounted for potential direct effects by global sourcing.

To consider the impacts of global sourcing, we created a dummy variable by identifying two groups of companies according to the percentage of purchases outside of the continent where the company is based. To identify a proper threshold, we analysed the distribution of the global sourcing variable. We identified that the variable is highly asymmetric (see Figure A1 in the appendix), with 135 companies that source regionally (i.e., global sourcing equal to 0%) and a significant decrease in the density of the distribution after the median (only one company had a percentage of global sourcing between 5% and 10%). The two samples were thus identified according to the median

of this variable in the overall sample. In particular, we identified *Locals* (dummy=0) as those that purchase less than or equal to 5% of their needs outside of the continent where the plant is based. On the contrary, *Globals* (dummy=1) are those that purchase over 5% outside of the continent. Thus, we performed a multi-group analysis: the moderated mediation analysis was run using *Locals* and *Globals* divided into two sub-samples.

All of the variables employed in regression models, except Global sourcing, were standardised. We controlled for homoscedastic residuals in the regressions by means of the Cameron-Trivedi test (Greene and Zhang, 2003). We also performed the Variance Inflation Factor (VIF) test to detect multicollinearity among our regressors (Greene and Zhang, 2003). The p-values of Cameron-Trivedy tests were always higher than 0.07, allowing us to accept the null hypothesis of homoscedastic residuals in regressions. Additionally, VIF indexes always below 1.44 demonstrated that multicollinearity is not an issue in our analyses.

3.4 RESULTS

3.4.1 Testing the effect of SM and SSCM on sustainability performance

The results of the moderated mediation model when the entire sample is considered are provided in Table 3.

Table 3. Regression analysis results
(bold characters represent significant effects, p-values < 0.05)

	Model 1a	Model 1b
<i>SSCM as dependent</i>		
Size (ln)	-	0.02
<i>p-value</i>		0.503
Product Complexity	-	0.02
<i>p-value</i>		0.551
Decoupling point	-	0.07
<i>p-value</i>		0.059
Sustainability as a Priority	-	0.42
<i>p-value</i>		0.000
SM	-	0.30
<i>p-value</i>		0.000
Constant	-	-0.26
<i>p-value</i>		0.109
<i>R square</i>		45.90%
<i>Sustainability performance as dependent</i>		
Size (ln)	0.01	-0.02
<i>p-value</i>	0.861	0.503
GNI	-0.02	0.02
<i>p-value</i>	0.550	0.551
ROI	0.22	0.20
<i>p-value</i>	0.000	0.000
Sustainability as a Priority	0.16	0.05
<i>p-value</i>	0.000	0.270
Dummy_Global Sourcing	-0.01	-0.05
<i>p-value</i>	0.861	0.548
SSCM	-	0.23
<i>p-value</i>		0.000
SM	0.19	0.12
<i>p-value</i>	0.000	0.024
Interaction (SSCM-SM)	-	0.17
<i>p-value</i>		0.000
Constant	-0.01	0.03
<i>p-value</i>	0.945	0.855
<i>R-square</i>	20.64%	27.61%
<i>R-square change (p-value)</i>		0.009

SSCM and SM are significant (Model 1b): the companies that rely on SSCM and on SM appeared to out-perform their competitor(s) in terms of sustainability performance (supporting RH1 and RH2a). As expected, the effect of SM on sustainability performance was significantly lower than the effect of SSCM (Wald test's p-value < 0.001).

Thus, to test the possible mediating effect of SSCM, we adopted the procedure proposed by Baron and Kenny (1986). First, an assessment of the path between SM and

the mediating variable (SSCM) was needed: according to Model 1b, the path is positive and significant ($p < 0.01$) (supporting RH2b). The second step was to assess the direct path from SM to sustainability performance when SSCM is not included in the analysis (Model 1a): the path is also positive and significant. The results presented in Table 3 indicate that the path between SM and sustainability performance in the full Model 1b is still significant: when combined with the result of the first two steps, it can be concluded that a partial-mediated effect is present. A Sobel test was also conducted to confirm that the indirect path was significant (Holcomb et al., 2009). The test was significant, corroborating the partial mediating effect and providing support for RH2c (Sobel t-statistic: 3.66).

Importantly, the interaction between SSCM and SM is positive and significant. Thus, we can conclude that SM has a positive moderating effect on the direct relationship between SSCM and sustainability performance, confirming RH2d. This result can also be defined as a positive and significant conditional indirect effect of SM on sustainability performance (Preacher et al., 2007).

We also noted that the inclusion of SSCM and of the interaction effect produced a significant improvement in the variance explained by the model (Vuong test's p-value = 0.009) (Dechow, 1994).

3.4.2 Testing the effect of global sourcing

A moderated mediation analysis was then run using *Locals* and *Globals* divided into two sub-samples (Table 4). We checked the reliability, the validity and the unidimensionality of the constructs within each of the two sub-samples. In both cases, the factor loadings, reliability scores and fit indexes were above the thresholds recommended by the literature (Hair et al., 1998; Hu and Bentler, 1999; Nunnally et al., 1967).

The results show that global sourcing influences the impact of the considered variables on sustainability performance. Looking at SM, we found an interesting result. The direct effect of SM on sustainability performance, which was significant for the overall sample and for *Locals* (Models 1b and 2b), disappears for *Globals* (Model 3b). This result means that the *Globals* that outperform their competitors do not receive any direct benefits from SM: thus, global sourcing exerts a negative moderation effect on the relationship involving SM and sustainability performance (supporting RH3a).

Table 4. Regression analysis results for Locals and Globals
(bold characters represent significant effects, p-values < 0.05)

	LOCALs (186)		GLOBALs (150)	
	Model 2a	Model 2b	Model 3a	Model 3b
<i>SSCM as dependent</i>				
Size (ln)	-	0.00	-	0.08
<i>p-value</i>		0.984		0.045
Product Complexity	-	0.00	-	0.03
<i>p-value</i>		0.949		0.600
Decoupling point	-	0.07	-	0.07
<i>p-value</i>		0.167		0.319
Sustainability as a Priority	-	0.43	-	0.42
<i>p-value</i>		0.000		0.000
SM	-	0.29	-	0.28
<i>p-value</i>		0.000		0.000
Constant	-	-0.05	-	-0.48
<i>p-value</i>		0.829		0.067
R-square		44.81%		47.91%
<i>Sustainability performance as dependent</i>				
Size (ln)	0.01	0.01	-0.01	-0.06
<i>p-value</i>	0.901	0.002	0.768	0.175
GNI	-0.00	-0.01	-0.05	0.05
<i>p-value</i>	0.994	0.682	0.391	0.380
ROI	0.29	0.28	0.18	0.13
<i>p-value</i>	0.000	0.000	0.006	0.011
Sustainability as a Priority	0.19	0.11	0.13	-0.01
<i>p-value</i>	0.002	0.094	0.045	0.801
SSCM	-	0.16	-	0.35
<i>p-value</i>		0.049		0.000
SM	0.24	0.19	0.13	0.02
<i>p-value</i>	0.001	0.009	0.088	0.760
Interaction (SSCM-SM)	-	0.19	-	0.14
<i>p-value</i>		0.004		0.017
Constant	-0.06	-0.11	0.04	0.22
<i>p-value</i>	0.810	0.636	0.886	0.392
R-square	25.72%	28.92%	16.01%	29.70%
R-square changes (p-values)		0.045		0.025

Next, the interaction effect of SM and SSCM was confirmed for both *Locals* and *Globals* (and for the overall sample). Although RH3b was rejected, the interaction effect of SM and SSCM on performance was lower for *Globals* than for *Locals* (although the difference was not statistically significant, t-statistic 0.49).

Additionally, the significant positive effect of SSCM on performance was confirmed for both groups. Interestingly, for *Globals*, the effect of SSCM on performance was higher than it was for *Locals* (although the difference was not statistically significant, t-statistic 1.63) (partially supporting RH3c).

We also performed a sensitivity analysis on the threshold used to differentiate between *Locals* and *Globals*. The results did not change significantly for higher values of the global sourcing threshold (i.e., 33%).

To further understand these results, we performed comparative statistics between *Globals* and *Locals* (see Table A.3 in the appendix). This analysis shows that *Globals* were larger, based in higher GNI countries and managed more complex products. Our analysis next shows that *Globals* have invested significantly more in SM than *Locals*. The same can be argued for practices that aim at improving environmental and social performance of processes and products and that may require the involvement of suppliers. Nevertheless, *Globals* and *Locals* showed similar sustainability performance relative to their competitors.

3.5 DISCUSSION

In this work, we empirically investigated the direct influence that SSCM can have on the sustainability performance of the focal firm. Furthermore, we investigated the role played by two other factors: SM and global sourcing. Our results allow us to highlight several considerations.

First, SSCM has a positive and significant impact on companies' sustainability performance: SSCM represents a very important innovation for the companies that are willing to significantly improve their sustainability footprint. Consistent with the resource-based view of the firm (Barney, 1991; Shi et al., 2012), the adoption of intra- and inter-organisational practices, being socially complex and causally ambiguous, can instil additional capabilities in the company's organisation and lead the company to overcome competitors in terms of environmental efficiency and social responsibility.

Next, we reveal the multifaceted role of SM. First, SM is positively related to SSCM and sustainability performance. Consistent with the literature (Gold et al., 2010; Pagell et al., 2007), this result testifies that investments to restructure the supply base and to consolidate relationships with fewer selected suppliers contribute directly and indirectly (through SSCM) to the sustainability performance of the focal company. Next, and even more interestingly, we found a positive and significant moderation effect of SM on the direct relationship between SSCM and sustainability performance of the focal firm. This result suggests that the companies that are able to outperform their competitors on sustainability issues strongly support SSCM with SM practices that aim

to consolidate, upgrade and coordinate the supply base. Thus, this work contributes empirical evidence to the SSCM literature by expanding the suggestions from recent contributions on green management (Rao, 2002; Simpson et al., 2007): the companies that aim to enhance the effectiveness of their SSCM practices should continuously rely on SM to create a supply chain environment characterised by mutual understanding, goal alignment, easier coordination and the exchange of knowledge.

Although the moderating role of SM was confirmed for both *Globals* and *Locals* (highlighting once more that SM also matters when SSCM is already in place), we found some interesting differences between these two groups. In particular, we found that *Locals* (i.e., those that primarily source from inside of their continent) benefit from a positive and significant relationship between SM and sustainability performance. For *Globals*, SM is instead primarily intended as a way to reduce the negative operational impacts of globalisation, such as longer lead times and, in general, the lower responsiveness of the supply chain (Christopher et al., 2006). Therefore, the direct impact of SM on sustainability performance disappears. In this sense, SM represents a source of advantage in terms of sustainability for the companies that manage local suppliers, while it represents a preliminary and needed expenditure for those that are coping with global suppliers.

Our analysis finally suggests that although *Globals* do not receive any environmental and social benefit directly from SM, they can still achieve high levels of sustainability performance (see Table A.3). Specifically, we found that *Globals*, which tend to be larger companies operating in developed countries and managing more complex products (see Table A.3), have relied more on SM (e.g., to manage the higher complexity of their widespread supply relationships) (see Table A.3) and receive greater benefits from SSCM (Table 4). Aragon-Correa and Sharma (2003) Aragon-Correa and Sharma (2003) theoretically posit that complexity in the general business environment strengthens the association between proactive environmental strategies and performance. For instance, when the degree of environmental regulatory complexity increases, the first mover in pollution prevention has a competitive advantage due to the learning curve he/she has generated. In a similar fashion, global sourcing contributes to the structural complexity of the supply chain (Wagner and Bode, 2006) and allows companies to acquire/develop rare and valuable resources/capabilities (e.g., by

exploring/exploiting know-how that is not available regionally). Thus, firms that had started looking for opportunities outside their regions may leverage the learning curve they generated and may thus obtain more benefits from SSCM.

3.6 CONCLUSION

This paper contributes to the literature by providing further empirical evidence for the impact of SSCM on the sustainability performance of companies operating all around the world. Moreover, we were able to expand the literature by elucidating the pivotal roles of SM and global sourcing. We argue that these contributions support the findings of previous literature on the development of sustainable businesses, provide interesting new insights and extending them to an international sample of companies.

These results have significant managerial implications for companies that aim to augment the sustainability performance of their organisations. First, according to our work, the firms operating in industrial supply chains should leverage SM first: it enables, and sometimes sparks, the adoption of SSCM. We also strongly advise those companies that source regionally to leverage this set of practices to reduce ecological inefficiencies and identify suppliers' know-how that can be useful to improve sustainability performance of their organisations. Second, companies should leverage SM and SSCM simultaneously: continuous effort in building up closer and trustful relationships with key suppliers is essential for deploying SSCM more effectively. Last, but not least, when global sourcing is largely adopted and SM has already taken off for compensating for its potential drawbacks (e.g., high network complexity due to longer distances and socio-economical differences), firms are advised to focus more on SSCM. In such cases, companies can indeed explore and exploit resources and knowledge that are potentially valuable and are not available regionally without suffering the higher complexity surrounding their global environment because of the learning curves they have generated.

Finally, we would also like to address some of the main limitations of this work and to provide future perspectives. First, measuring sustainability performance is a complex issue and the literature lacks the proper measures to capture the complex dimensions of this concept. This study provides a first assessment of the inter-relatedness of social and environmental performance and can stimulate further research on this issue. However, we believe that future works will need to use more objective

and articulated measures to support our argument. A similar concern can be raised for the measurement of SSCM: in our research, we measured this complex construct with a quite simple scale. However, no clear direction is provided by current literature about what SSCM is or how it can be measured. For instance, certain authors share the definition provided in this paper (Zhu et al., 2013; Gavronski et al., 2011), while others focus their attention only on inter-organisational practices (Carter and Roger, 2008; Vachon and Klassen, 2006). Thus, we advise future research to converge towards a specific definition of SSCM and to develop more rigorous taxonomies and measurements of its underlying practices. This approach would support the advancement of the field together with more accurate results and practical implications. Next, even if we identified a clear impact from global sourcing on SSCM, we were not able to analyse in detail how this relationship occurs. In addition, the adopted measure of GS has some drawbacks (see Section 3.1). Further studies could focus on specific buyer-supplier relationships to check the effect of geographical and cultural distance as well as other specific factors (e.g., trust) that are usually considered antecedents for supply chain collaboration. Thus, further theoretical and empirical investigations are necessary to support or extend our results and arguments. Finally, our data are taken from a broad set of industries, all characterised by assembly manufacturing. Future efforts should be oriented toward checking the consistency of the results in other industries (e.g., process industries).

APPENDIX

Figure A1. Kernel density estimate for global sourcing

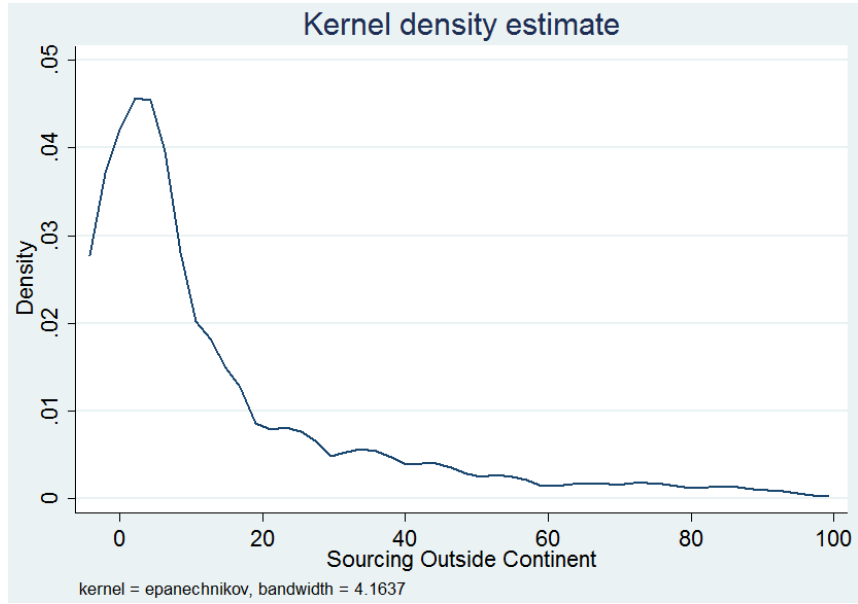


Table A1. Variables, measures and descriptive statistics

Var.	Item	Min	Max	Mean	SD
Sustainability performance	How your current environmental performance compare with main competitor(s) (1: much worse; 5: much better)	1	5	3.34	0.74
	How your current employees satisfaction compare with main competitor(s) (1: much worse; 5: much better)	1	5	3.29	0.74
	How your current social reputation compare with main competitor(s) (1: much worse; 5: much better)	1	5	3.45	0.79
SSCM	<i>Indicate the effort put into implementing the following action programs in the last three years (1:none; 5:high):</i>				
	Improving the environmental performance of processes and products (e.g. environmental management system, Life-Cycle Analysis, Design for Environment, environmental certification)	1	5	2.90	1.22
	Monitoring corporate social responsibility of partners along the supply chain (e.g. labor conditions, environmental impacts)	1	5	2.60	1.17
SM	<i>Indicate the effort put into implementing the following action programs in the last three years (1:none; 5:high):</i>				
	Rethinking and restructuring supply strategy and the organization and management of supplier portfolio through e.g. tiered networks, bundled outsourcing, and supply base	1	5	3.03	1.12
	Implementing supplier development and vendor rating programs	1	5	3.10	1.16
	Increasing the level of coordination of planning decisions and flow of goods with suppliers including dedicated investments (e.g. information systems, dedicated capacity/tools/ equipment,	1	5	2.93	1.10
GS	Percentage of raw materials, parts/components, subassemblies/systems purchased outside the continent	0	95	13.49	20.08
Size	Number of employees of the plant	22	15000	963	2088
GNI	Gross National Income per capita of the country where the plan is located (World Bank 2008 data, measured in American Dollars, Atlas method)	2940	58800	29115	17786
ROI	How your current return on investment compare with main competitor(s) (1: much worse; 5: much better)	1	5	3.20	0.77
Product Complexity	<i>How would you describe the complexity of the dominant activity:</i>				
	1: Modular design – 5: Integrated product design	1	5	3.26	1.28
	1: Single manufactured component – 5: Finished assembled	1	5	3.77	1.36
	1: Very few parts/materials – 5: Many parts/materials	1	5	3.71	1.31
	1: Very few steps/operations required – 5: Many steps/operations required	1	5	3.81	1.10
Decoupling point	Proportion of customer orders that are produced to stock (%)	0	100	17.81	27.89
Sustainability as a priority	<i>Consider the importance of the following attributes to win orders from your major customers (1:not important; 5:very important)</i>				
	Environmentally sound products and processes	1	5	3.15	1.15
	Committed social responsibility	1	5	2.98	1.24

Table A2. Inter-item correlation matrix

	SP1	SP2	SP3	SM1	SM2	SM3	SSCM1	SSCM2
SP1. Environmental performance (Relative to competitors)	1							
SP2. Employee satisfaction (Relative to competitors)	0.45**	1						
SP3. Social reputation (Relative to competitors)	0.71**	0.54**	1					
SM1. Supply strategy	0.22**	0.11*	0.18**	1				
SM2. Supplier development	0.28**	0.22**	0.28**	0.57**	1			
SM3. Coordination with suppliers	0.25**	0.23**	0.23**	0.52**	0.57**	1		
SSCM1. Improving the environmental performance of processes and products	0.38**	0.13*	0.29**	0.25**	0.39**	0.30**	1	
SSCM2. Monitoring CSR of partners	0.35**	0.23**	0.35*	0.32**	0.43**	0.44**	0.52**	1

* sig. < 0.05 ; ** sig.< 0.01

Bold estimates demonstrate higher correlations between items belonging to the same factor

Table A3. Mean comparison test between *Locals* and *Globals* on model's variables.

	Locals	Globals	<i>KS-test</i> ¹
<i>% of sourcing outside the continent</i>	1.19	28.75	0.000
SP1. Environmental performance (Relative to competitors)	3.30	3.37	0.943
SP2. Employee satisfaction (Relative to competitors)	3.27	3.30	1.000
SP3. Social reputation (Relative to competitors)	3.44	3.47	0.997
SM1. Supply strategy	2.88	3.24	0.011
SM2. Supplier development	2.91	3.34	0.012
SM3. Coordination with suppliers	2.72	3.18	0.013
SSCM1. Improving the environmental performance of processes and products	2.73	3.09	0.019
SSCM2. Monitoring CSR of partners	2.55	2.66	0.941
Size (N° of Employees)	711	1275	0.000
GNI per capita (Euro)	26071	32889	0.000
ROI	3.18	3.22	0.477
PC1. type of product design (modular or integrated)	3.17	3.36	0.72
PC2. type of product (component or finished product)	3.59	4	0.045
PC3. number of parts/components (few or many)	3.55	3.89	0.047
PC4. number of production phases (few or many)	3.70	3.94	0.312
Decoupling point (% of PTS)	14.51	21.89	0.061
Priority: Environmentally sound products and processes	3.20	3.07	0.932
Priority: Committed social responsibility	2.96	2.99	0.980

¹ **p-value of Kolmogorov-Smirnov test – Bold characters identify statistically significant differences**

CHAPTER FOUR.

Do as I say and not as I do: an effective pathway to become environmentally and socially sustainable

4.1 INTRODUCTION

Sustainability, intended as the management of the environmental and social dimensions of the triple bottom line, is a major concern for the business world. In every industry, managers aim at improving the environmental and social performance of their organization and working with suppliers that are able to pursue this mission (Ferrer, 2008; International Chamber Of Commerce, 2007; Krause et al., 2009; Linton et al., 2007; United Nation Global Compact and Business for Social Responsibility, 2010; World Bank, 2003). Potential positive returns in terms of augmented efficiency, flexibility and productivity represent only one of the elements that may motivate businesses to embark for the long pathway to become environmentally and socially sustainable (Hall et al., 2012; Kumar et al., 2012; Vachon and Klassen, 2008). Requests and requirements from different stakeholder groups such as governments, customers and societal organizations (NGOs and Local community representatives) need to be addressed for the sake of reputation and legitimacy (Ateş et al., 2011; Ehr Gott et al., 2011; Seuring and Muller, 2008). Also, ethically motivated companies care about sustainability because it is ‘the right thing to do’ (Ateş et al., 2011; Carter and Jennings, 2004).

Although “it is increasingly clear that organizations will need to deal with environmental and social issues” such as bad emissions, resource consumption and decent work (Pagell and Wu, 2009), still companies struggle to find effective ways to do so. Although consensus is still lacking (Ahi and Searcy, 2013), Sustainable supply chain management (SSCM) has been advocated as a ‘new archetype’ for companies to achieve profit and market share objectives by tackling environmental and social issues using supply chain management levers (e.g., Carter and Rogers, 2008; Golicic and Smith, 2013; Hollos et al., 2012; Lee and Klassen, 2009; Pagell and Wu, 2009; Zhu and Sarkis, 2007; Zhu et al., 2013). It can be viewed at multiple levels, including at the level of internal practices (i.e., sustainable process management, or EMS, Health and safety standards, Eco-design, corporate responsibility campaigns) and external practices (i.e.,

sustainable supply management, or supplier assessment and collaboration for sustainability). Potentially, such practices allow to lower environmental and social risks while raising the ecological efficiency and social responsibility of the focal organisation and its supply chain. Scarce support, however, is given to firms when it comes to exploit the potential that lies behind them.

First, doubts still remain about whether internal and external SSCM practices can be undertaken jointly (Ateş et al., 2011) or, conversely, deployed subsequently (Gavronski et al., 2011). Second, it is not clear which of the two represent the main driver of a company environmental and social performance. Internal practices were shown to directly augment a company's sustainability (Babakri et al., 2004; Klassen and Whybark, 1999; Robson et al., 2007; Zeng et al., 2007; Zhu et al., 2013). External practices are mainly implemented to build up suppliers own capabilities to deal with environmental and social issues (Ehrgott et al., 2011; Lee and Klassen, 2009). Such capabilities, however, may translate in higher sustainability at the buying company, since it has been suggested that "a firm is only as sustainable as its suppliers" (Krause et al., 2009). Third, the "conditions" which make external practices more effective remain unclear; companies may leverage their power to proscribe suppliers' unsustainable behaviour (Gago and Antolín, 2004) or, conversely, may rely on relational norms of governance (i.e., trust) to prescribe commitment (Jiang, 2009; Simpson et al., 2007).

Overall, the discussed gaps provide a strong motivation for our research. This work, in fact, aims at providing guidance to firms that want to find an effective way to become socially and environmentally sustainable. Accomplishing this goal means essentially addressing the following research questions:

What's the pathway of capabilities development a firm should follow to become environmentally and socially sustainable?

What group of SSCM practices (SPM vs. SSM) should a firm leverage the most to become environmentally and socially sustainable?

Does trust between a firm and its key suppliers have significant implications when aiming at becoming environmentally and socially sustainable?

This work contributes by proposing a conceptual framework, which have been developed and tested by leveraging a survey approach (Forza, 2002). A set of hypotheses were built on the insights offered by existing literature and a questionnaire was also operationalized by leveraging reflective measurements. Then, data collected from a sample of Italian manufacturing companies were used to test the framework. This research complements the findings of prior studies, shedding further light on the role internal and external SSCM practices as well as trust and supplier sustainability play along the pathway through which a firm improve its environmental and social performance.

4.2 BACKGROUND AND HYPOTHESES DEVELOPMENT

Drawing from the literature, here we describe the constructs of interest (i.e., sustainability performance, internal and external SSCM practices and Trust) as well as the research hypotheses linking these constructs together in our conceptual framework.

4.2.1 Sustainability performance

Pagell and Wu (2009) argue that environmental and social issues are becoming competitive priorities *per se* and that further support is needed to understand how these priorities should be accomplished. Thus, sustainability performance such as energy efficiency, workplace health and safety, bad emissions (air and water emission, solid disposal) and employees satisfaction (e.g., Elkington, 1994; Pagell et al., 2007) constitute the unit of analysis for this research. Economic performance, although crucial to the companies' survival, will be considered as a prerequisite (i.e., control variable).

4.2.2 SSCM practices

As anticipated in the previous section, SSCM tackles environmental and social issues using supply chain management practices and can be viewed at multiple levels including internal and external practices (Darnall et al., 2008; Gavronski et al., 2011; Meehan et al., 2006; Pagell and Wu, 2009; Zhu et al., 2013). Internal practices, namely Sustainable Process Management (SPM), comprise those activities within a company's direct control and without direct supplier involvement. Practices that include transactions with suppliers have been seen as external supply chain activities, and are usually understood as Sustainable Supply Management (SSM) (e.g., Ageron et al., 2012).

More specifically, SPM refers to a firm's institutionalization of internal environmental and social management practices which aim to reduce a company's direct environmental and social impact. In essence, SPM entails the adoption of environmental management systems (ISO 14001) (Daily and Huang, 2001; Darnall et al., 2008), environmentally friendly eco design (e.g., Design for Environment, Life cycle assessment) (Zhu and Sarkis, 2004), health and safety certifications (Robson et al., 2007) and other social practices (e.g., codes of conduct, corporate social activities) (Zairi and Peters, 2002). By undertaking SPM, companies develop a set environmental and social capabilities, defined as the set of physical, financial, human technological and organizational resources coordinated by organizational routines and deployed inside a company to improve its environmental and social performance (e.g., Gavronski et al., 2011). Sustainable supply management (SSM), conversely, refers to two complementary sets of programs implemented at the firm level to assess and improve the environmental and social performance of a supply chain (e.g., Ageron et al., 2012; Awaysheh and Klassen, 2010; Large and Gimenez Thomsen, 2011; Lee and Klassen, 2009): (i) activities conducted to assess (and control) suppliers sustainability performance (i.e., supplier assessment) and (ii) activities comprising the direct involvement of the focal firm in its suppliers' activities to improve environmental and social impacts of their products and operations (i.e., supplier collaboration). Supplier assessment includes the setting of supplier assessment criteria, the gathering and processing of supplier information, and the evaluation of environmental and social performance of suppliers. Differently, supplier collaboration is a support-based approach that includes activities such as undertaking joint development for greener product design or process modification, reducing waste in the logistics, sponsoring supplier summits to encourage the sharing of sustainability information and the management of environmental and social risks.

Some studies indicate a link between internal and external environmental investments, suggesting that the latter fosters the former (Vachon and Klassen, 2008). Although there is some merit in that claim of causality, it is also argued that collaborative environmental activities with suppliers does not result in pollution prevention directly in the buying firm, but instead in the suppliers (Klassen and Vachon, 2003). More recently, Gavronski et al. (2011) suggest that internal environmental

investments have to be undertaken first in order to develop the set of skills and capabilities that can be then exploited in order to adopt external practices effectively.

Despite the effort spent by the literature during the last two decades (Seuring and Muller, 2008), further investigation is required to guide companies towards an effective adoption of these two group of SSCM practices.

4.2.3 Trust (TR) in buyer-supplier relationships

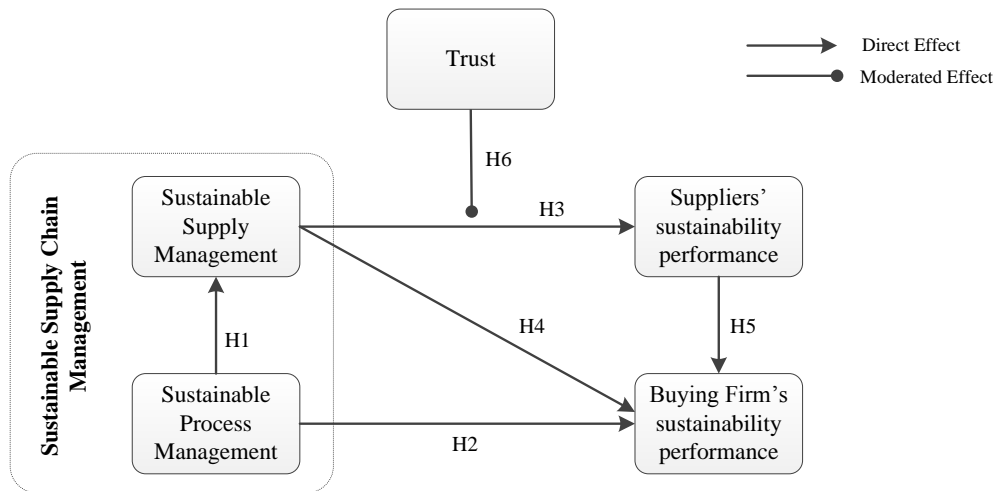
Although ‘trust’ is a term with many meanings, in this work it is seen as an informal safeguard and refers to one party’s confidence in the reliability and integrity of the other party in an exchange relationship (Gulati, 1995; Morgan and Hunt, 1994). According to the relational view theory of inter-organizational competitive advantage (Dyer and Singh, 1998), trust can generate relational rents by providing incentives to the parties in an exchange relationship for value creation initiatives, such as investment in relation-specific assets, sharing knowledge or combining complementary strategic resources. In the context of a buyer-supplier relationship, the supplier may rationally refuse to engage in costly knowledge sharing and improvement activities (i.e., value creation initiatives) if they are not satisfied or they do not expect to receive some benefit in return (i.e., knowledge and long term business perspectives). Here, trust represents an effective and least costly means of safeguarding specialized investments and facilitating complex exchange (Benton and Maloni, 2005; Sako, 1991).

Despite the contributions discussed above, the literature is not clear whether trust is the condition that can produce the best results for a company that desires to improve an element of a supplier’s operations performance (Williamson, 1993). Also, the role of trust in the context of SSCM has not been fully exploited.

4.2.4 Conceptual Model

The conceptual framework to be examined in this study is depicted in Figure 1. In extending the body of research devoted to sustainable supply chains, this research explores the pathway a firm should pursue to become environmentally and socially sustainable. Specifically, the framework shows that the adoption of SPM and SSM allows a firm to improve their sustainability performance. It further shows that SSM have a positive impact on the sustainability performance of its key suppliers, which in turn may be source of further performance improvements for the buying firm. This indirect path, however, is moderated by the presence of trust.

Figure 1. Conceptual Model



This framework is grounded into the resource based view of the firm (RBV) (Barney, 1991) and the relational view theory of inter-organizational competitive advantage (Dyer and Singh, 1998). RBV argues that differential firms performance is fundamentally due to firms heterogeneity and emphasizes that competitive advantage results from those resources and capabilities that are owned and controlled by a single firm. Resources are defined as the inputs to a process (e.g., capital equipment, human capital, financial capital), while capabilities are defined as the capacity of a group of resources to perform some tasks or activities (Grant, 1991). The relational view complements RBV by suggesting that performance gains in the supply chain are possible when trading partners are willing and capable to combine their resources in a unique way. Combining both theories provides a more holistic view for addressing our research questions.

The starting point for this work is the path-dependence model of Dierickx and Cool (1989). These authors suggest that companies evolves along a path of resource acquisition and re-combination that constrains its future development, favoring those pathways which are favored by resources and capabilities that have been already developed. Accordingly, firms may be constrained in their adoption of SSM, unless necessary environmental and social skills and capabilities have been developed by leveraging SPM. Zhu et al. (2013) argue that, although green purchasing is important for manufacturers to help improve their environmental performance, without eco-design

it is difficult to provide design specifications to suppliers when environmental requirements are an important consideration for their purchased items. Also, without environmental and social standards, firms may be reluctant to perform environmental and social evaluation of their suppliers. Conversely, for those firms certified with ISO 14001 or OHSAS 18001, they are required to identify important environmental and social issues in the relationship with suppliers. Furthermore, when implementing SSM, an organization may also need to help suppliers in acquiring new resources and developing new capabilities. For instance, when developing sustainability policies and tactics, strategic trade-offs among economic, environmental and social elements of the triple bottom line have to be carefully balanced (Wu and Pagell, 2011). Organizations that have already struggled with this issue in order to design and implement SPM may have developed the ability to balance priorities effectively and can then transfer it to suppliers. Therefore, the first hypothesis we consider is as follows:

H1. When sustainable process management in a firm is at a high level, sustainable supply management is also high.

Sustainable process management, however, is mainly directed towards the improvement of a firm's sustainability performance. Manufacturing structural investments aiming to reduce pollution at the source (Klassen and Whybark, 1999), ISO 14001 certifications (Babakri et al., 2004) and facility-level resource conservation practices (Pullman et al., 2009) were all positively linked to environmental performance. In the same vein, social standards (OHSAS 18001, SA8000) have contributed to the achievement of better employees' quality of life, safer and healthier workplaces, more efficient work processes, improved employee perceptions of the working environment, and greater recruitment attractiveness (Robson et al., 2007; Zeng et al., 2007). Thus, our second hypothesis states that:

H2. As the level of sustainable process management increases, buying firm's sustainability performance also increases

Then, sustainable supply management can be deployed in order to improve suppliers' sustainability. Supplier development, which can be defined as activities that include plant visits, supplier audits, and supplier training to improve suppliers' performance (Krause et al., 1998) is often an indirect part of SSM. Buying organizations, for example, might work with suppliers to make changes to production processes, packaging, and product design in terms of environmental initiatives and might visit and qualify supplier plants in terms of human rights issues (Carter, 2005). Existing research has also shown that suppliers' environmental and social commitment is positively related to the definition of minimum performance requirements by major customers (Simpson et al., 2007). Socially sustainable supplier selection may result By promoting a responsible culture among suppliers and requiring compliance with internally or externally endorsed sustainability standards (e.g., EMAS and RoHS certification), the firm actively contributes to the diffusion of ecological efficiency and workplace safety throughout the supply chain (Nawrocka et al., 2009). Accordingly, Lee and Klassen (2009) show that buyers' monitoring and collaboration based green practices positively influence the development of environmental management capabilities in suppliers.

SSM may also result in enhanced performance for the buying firm. The effort due to sustainable purchasing approaches may have a relatively low impact on supplier's performance but result in a more integrated supply chain and an overall decrease in waste that includes water, energy, fuel consumption and decreased packaging for the firm which is leading it (Kumar et al., 2012). Sustainable supply management also consists of a good understanding of each other's responsibilities and capabilities regarding environmental management, leading to inter-organizational learning in buyer-supplier relationships. Vachon and Klassen (2008) suggest that environmental collaboration with suppliers often entails joint problem-solving sessions, information sharing, establishing common goals, and personnel and equipment sharing with suppliers. For instance, environmental collaborations include the exchange of critical information and require a mutual willingness to learn about each other's operations to plan and set goals for environmental improvements (Gavronski et al., 2011). Thus, it seems plausible that by pushing suppliers toward the adoption of environmental and

social programs, buying firms could find new ways to directly improve their own footprint (Theyel, 2001).

Positive returns from SSM can come directly, or indirectly, having the possibility to work with well-selected and developed suppliers that are good at dealing with environmental and social impacts of products and processes. Operations management literature asserts that suppliers are a key determinants of a firm's ability to overcome its limits. Firms that are open to ideas from suppliers have found them to be an important source for novel ideas and process improvements. For instance, Paulraj and Chen (2007) show that strategic supply management initiatives including strategic purchasing, long-term relationship orientation, inter-firm communication and cross-organizational teams enhance supplier performance (i.e., efficiency, cost, quality, flexibility, delivery and responsiveness) and indirectly enact further improvements at the buying firm level. In the context of sustainability, Carter (2005) finds a significant relationship linking purchasing social responsibility, improved supplier performance (i.e., quality, efficiency) and lower production and quality costs for the buying organization. In the same vein, Geffen and Rothenberg (2000) indicates that more sustainable and innovative suppliers led to environmental improvements in the buyer organization. This discussion forms the basis for the following hypotheses:

H3. As the level of sustainable supply management increases, suppliers' sustainability performance also increase.

H4. As the level of sustainable supply management increases, buying firm's sustainability performance also increases.

H5. Under SSM, as the level of suppliers' sustainability performance increases, buying firm's sustainability performance also increases.

Finally, we investigate the role of trust as a relationship "condition" that encourages a supplier to meet a buying firm's performance requirements, determining a buying firm's influence over the supplier and its choices (Simpson et al., 2007). It is generally acknowledged that opportunism of suppliers poses a threat in buyer-supplier relationships (Das and Rahman, 2002). Kumar (1996) suggested that the exploitation of bargaining power may be beneficial in the short term, but tends to be self-defeating in

the long run since victims of exploitation can ultimately find way to resist. Accordingly, as summarized by Jiang (2009), while firms spend millions each year to enforce their environmental and social requirements, some suppliers have stepped up their detections.

The relational view of inter-organizational competitive advantage, however, suggests that trust allows linked companies to assume that each will take actions that are mutually acceptable, facilitating knowledge transfer and reciprocal learning (Dyer and Singh, 1998). The development of trust is subjected to considerable causal ambiguity, because it is highly complex and situation specific process, and to time compression diseconomies, because it cannot be developed quickly, nor can it be bought or sold in the marketplace. Thus, it can be source of competitive advantage for the buying firm and its suppliers. Trust, for instance, enables the development of partner-specific absorptive capacity, which refer to “the ability to recognize and assimilate valuable knowledge from a particular alliance partner and is generally related to the extent to which suppliers have developed interactions routines that maximize the frequency and intensity of sociotechnical interactions with a specific firm” (Dyer and Singh, 1998). Therefore, our last hypothesis states that:

H6. Trust positively moderates the relationship between sustainable supply management and suppliers' sustainability performance.

4.3 METHODOLOGY

4.3.1 Sample and data collection

Data were collected following a survey approach (Forza, 2002). First, we obtained an original sample of 500 manufacturing firms randomly selected from the Aida database (i.e., database containing information of over 700,000 companies operating in Italy, www.aida.bvdep.com). Attention was focused on manufacturing industries. Supply chains within these industries directly and indirectly relate to economic wealth creation and have faced several critical environmental and social challenges (e.g., hazardous material substitution, health and safety, recovery and recycling). Therefore, they could offer potential for understanding what companies should do when facing the challenge to improve supply chain sustainably. In order to obtain high external validity,

we made a stratified random sampling according to the expected proportion of manufacturing firms by industry provided by the Italian statistics agency (ISTAT).

To minimize key-informant bias, firms were contacted by phone calls in order to identify a reference person (i.e., purchasing manager or plant manager) and to describe the research to them (Dillman, 2007). An electronic version of the questionnaire was provided to the respondents who agreed to participate in the survey and, where appropriate, a reminder was sent after a few weeks. A total of 77 companies provided useful and complete information for this research. The effective response rate is 15.4%, which, although low, is considered sufficient for studying the research hypotheses. Given that senior executives are inundated with multiple requests to participate in surveys, this response rate is in line with what recent studies within the field of supply chain management have achieved (Large and Gimenez Thomsen, 2011). Although different manufacturing sectors were considered, the companies mainly belonged to the manufacturing of machinery and equipment sector (Table 1). The companies were mainly small sized (41.56% of the sample), but medium and large companies were also represented.

Table 1. Descriptive statistics in terms of (a) size and (b) industrial sector

(a)			(b)		
Size*	n	%	ISIC	n	%
Small	32	41.56	20	3	3.90
Mediu	18	23.38	22	4	5.19
Large	27	35.06	25	7	9.09
Total	77	100	26	5	6.49
			27	16	20.78
			28	33	42.86
			29	6	7.79
			30	3	3.90
			Total	77	100

* Size: Small: less than 250 employees, Medium: 251-500 employees, Large: over 501

** ISIC codes. ISIC 20: Manufacture of chemicals and chemical products; ISIC 22: Manufacture of Rubber and Plastics products; ISIC 25: Manufacture of fabricated metal products, except machinery and equipment; ISIC 26: Manufacture of computers and electronic and optical products; electro-medical equipment, metering equipment and watches; ISIC 27: Manufacture electrical equipment and non-domestic electric appliances; ISIC 28: Manufacture of machinery and equipment not elsewhere classified; ISIC 29: Manufacture of motor vehicles, trailers and semi-trailers; ISIC 30: Manufacture of other means of transport

4.3.2 Construct measurement

The development of the survey instrument follows the stepwise procedure of item generation (Churchill Jr, 1979). Before data collection, the content validity of the survey instrument was established by grounding it in the existing literature and by identifying existing and appropriate reflective measures (Benton and Maloni, 2005; Gavronski et al., 2011; Pagell et al., 2007; Paulraj, 2011). The questionnaire included multiple items for each of the employed constructs. All measures, except for the control variables, used a five point Likert scale. Pretesting the measurement instrument before the collection of data added further validation in terms of face, trait and content validity. Specifically, a total of ten field interviews with plant managers and purchasing managers were developed. Experts were asked to fill out the instrument in the presence of the researchers and were asked to follow a “think aloud” method (Benbunan-Fich, 2001). The method prescribes that when the respondents undertake a task (filling out the questionnaire), they should put into words any issues or ambiguities providing insights to the problematic area. This procedure was interactively repeated in the other firms. The manager of the last firm recommended no changes, thus indicating that the questionnaire had reached a steady state.

Table A1 in appendix provides an overview of the questions employed by the instrument and the reference from which measures were derived. Measures are also discussed below.

Sustainability Performance. Environmental performance and social performance are usually seen as two separate concepts: performance indicators usually pertain to different sustainability areas, such as ecology (e.g., bad emissions, consumption of non-renewable resources, energy and water) and decent work (e.g., workplace health and safety, education and human rights). The literature, however, notes that such performance strongly covaries. For instance, the adoption of new production processes that reduce pollution improves the working conditions for company employees (Elkington, 1994). Conversely, the improvement of employees’ welfare (e.g., due to the adoption of fewer toxic materials and more green processes) can reduce the number of potentially damaging environmental actions undertaken by the firm (Marshall et al., 2005). Moreover, employees’ safety and satisfaction have been positively related to environmental improvements (Johnson, 2006; Rothenberg et al., 2001). In line with

these arguments, this research considers environmental and social performance to be part of a unique construct, i.e., sustainability performance. Specifically, we investigate either the sustainability performance of the buying firm (i.e., a generic company operating in a supply chain system) and the sustainability performance of its key suppliers. In line with the literature (Pagell et al., 2007), this construct was measured by a four-item, five-point scale, in terms of improvements in (i) energy efficiency, (ii) workplace health and safety, (iii) bad emissions (air and water emission, solid disposal) and (iv) employees satisfaction. Consistently with Paulraj and Chen (2007), firms were asked to provide an evaluation of the performance of its organization and of its key suppliers.

Sustainable supply management. SSM mainly comprises a set of operating practices implemented at the firm level that aim at evaluating suppliers' environmental and social performance and collaborating with them to build up their capabilities and develop sustainable products and operations. Hollos et al. (2012), for instance, propose a scale of sustainable supplier co-operation that considers formal systems to track and improve ecological and social standards. In line with recent literature (Gavronski et al., 2011; Hollos et al., 2012; Lee and Klassen, 2009; Zhu et al., 2013), SSM is here measured by a six-item, five-point Likert scale that captures the effort spent by the company in (i) sending questionnaires in order to evaluate suppliers' socially and environmentally friendly practices, (ii) having environmental and social criteria in periodic evaluation of suppliers, (iii) performing environmental and social audits of suppliers' plants, (iv) working together with suppliers to reduce social and environmental impacts of our products and activities, (v) collaborating with them to develop socially and environmentally friendly products and operations, and (vi) conducting joint planning to anticipate and resolve sustainability-related problems.

Sustainable process management. It is operationalized based upon four activities that are commonly employed without direct supplier involvement to reduce a firm's direct environmental and social impacts. Specifically, a four-item, five-point Likert scale is used which captures the extent to which effort is put in (i) developing environmental management systems (ISO 14001) (Pagell et al., 2007; Gavronski et al., 2011), (ii) improving workplace health and safety (OHSAS 18001) (Pagell et al., 2007; Gavronski et al., 2011), (iii) designing environmentally friendly products (Ates et al.,

2011) and (iv) improving corporate responsibility through social campaigns (Gimenez et al., 2012). All the items comes from previously published literature.

Trust. In line with Benton and Maloni (2005), the buying firm's confidence in the reliability and integrity of the other party (suppliers) in an exchange relationship has been measured by a three-item scale, which captures the extent to which the buying firm believes that (i) suppliers are concerned about the firm's welfare, (ii) suppliers consider how their decisions/actions affect the firm and (iii) suppliers look for the firm's best interest.

Control variables: In this work, two control variables have been employed. First, there is a control for company size. Indeed, the development of SSCM practices might be explained by this factor, rather than the relationships modeled. For instance, large firms might have large resources to invest in SSCM and be under more external pressure from a larger variety of stakeholders. In this study, company size is measured as the natural logarithm of the number of employees (e.g., Vachon and Klassen, 2006). The second possible confounding effect relates to the importance senior management places on environmental and social issues. This concept is captured by asking respondents to provide the relative importance of sustainability against five other priorities (cost, quality, delivery, flexibility and innovation).

4.3.3 Assessment of Biases

We examined non-response bias in two ways. First, a comparison of number of employees across respondents and a randomly selected set of non-respondents from the overall sample frame revealed no significant differences. Second, we split the respondents into a group of early respondent ($n_{er} = 24$) and a group of late respondents ($n_{lr} = 24$). Since the survey was managed smoothly (i.e., no waves of call phones, but rather a constant effort), these groups were made based on the earliest 30% of collected questionnaires and the latest 30% of collected questionnaires. T-test analysis shows that these groups were not different from each other on the number of employees and the variables addressed in this study.

Further, the study was tested for common method variance, which could pose problems for survey research that relies on self-reported data. One important concern in such cases is that common bias may artificially inflate observed relationships between variables. Ex-ante, in order to minimize common method variance, the dependent

variables were placed after the independent variables in the survey instrument, which helps to diminish, if not avoid, the effect of consistency artifacts (Podsakoff et al., 2003). Ex-post, a Harman's single factor test was also conducted (Harman, 1976). If common method variance exists, a single factor would emerge from a factor analysis of all questionnaire measurement items, or one general factor that accounted for the most of the variance would result. The exploratory factor analysis revealed four factors with eigenvalues greater than 1 that accounted for the 71.89% of the total variance. This result suggested that common method variance does not represent a serious problem in this study.

4.4 DATA ANALYSIS AND RESULTS

To test our model we relied on partial least squares (PLS) (Chin, 1998). We performed PLS algorithms as implemented in the SmartPLS 2.0 software (Ringle et al., 2005). PLS is most appropriate when sample sizes are small, when assumptions of multivariate normality and interval scaled data cannot be made, and when the researcher is primarily concerned with prediction of the dependent variable. PLS is a relatively new method within operations management literature, nevertheless it has been used by a growing number of researchers from a variety of disciplines (Peng and Lai, 2012). While it is possible to test our proposition using a standard procedure (e.g., by means of explanatory factor analysis and OLS regressions), this can be viewed as not totally appropriate given that the model proposed in Figure 1 involves independent equations that need to be estimated simultaneously. Consequently, to obtain unbiased and consistent estimates, our model must be analyzed using a multivariate estimation technique such as two-stage least squares (Pindyck and Rubinfeld, 1981) or PLS. While both techniques will provide acceptable parameter estimates, the first requires the use of single measures for all dependent variables. In contrast, PLS permits multiple measures of both dependent and independent variables. Moreover, our sample size does not allow using a structural equation model based on the covariance matrix. For all these reasons, a partial least squares analysis was adopted to test our research model.

The general rule of thumb regarding an appropriate sample size when using PLS is to multiply by ten the greater number of paths leading to a dependent variable (Peng and Lai, 2012). In this study the highest number of paths leading to a dependent variable

is five (i.e., Firm's sustainability performance) meaning that a minimum sample size of 50 cases would be necessary. In order to further assure that our sample size is adequate for the analysis we used the G*Power 3 software (Faul et al., 2007) to conduct a power analysis, as proposed by Cohen (1988) for the F-test, pertaining to R^2 for the endogenous constructs. Assuming a medium effect size ($f^2 = 0.25$) for five predictors, a significant level of 0.05 and a desired power of 0.80, our analysis would require a sample of 58.

We present our results in two stages. In the first stage, we ensured that the measures used as operationalization of the underlying constructs are both reliable and valid. Once convinced of the adequacy of the measurement model, we can then proceed to test our model and to interpret the resulting coefficients.

4.4.1 Measurement model

A confirmatory factor analysis was not reasonable due to small sample size (Gagné and Hancock, 2010). Many criteria, however, were considered to guarantee the reliability and validity of our measures. First, individual items reliability in our case is testified by high items' loading on their respective construct (see Table 2). Only one item is lower than 0.7 (focal company's employee satisfaction); however, we could not find a good theoretical reason for dropping it out of the analysis. Second, convergent validity and uni-dimensionality (Fornell and Larcker, 1981) for all the constructs were confirmed by showing significant standardized item loadings on their underlying constructs in a simultaneous estimation of the measurement and structural models in PLS (Anderson and Gerbing, 1988). In support to convergent validity, the Average Variance Extracted (AVE) of constructs is always higher than the recommended minimum of 0.5 (Fornell and Larcker, 1981) (see Table 2). This means that the items share most of their variance with their assigned construct and not with the error variance of other latent factors. Composite reliability was then assessed by considering construct reliability (i.e., Cronbach's alpha) (Nunnally et al., 1967) and internal consistency (Fornell and Larcker, 1981). According to literature, the results show that all items refer consistently to their respective construct.

Table 2. Summary of measurement scales

	<i>Mean</i>	<i>SD</i>	<i>Loading</i>	<i>Internal consistency</i>	<i>Alpha</i>	<i>AVE</i>
<i>Firm's Sustainability Performance</i>				0.83	0.73	0.56
FSM1. Energy efficiency	2.78	1.01	0.77			
FSM2. Workplace health and safety	2.83	0.90	0.86			
FSM3. Bad emissions	2.80	0.75	0.83			
FSM4. Employee satisfaction	2.35	0.95	0.90			
<i>Suppliers' Sustainability Performance</i>				0.91	0.86	0.71
SSP1. Energy efficiency	2.51	0.85	0.72			
SSP2. Workplace health and safety	2.51	0.72	0.79			
SSP3. Bad emissions	2.45	0.81	0.85			
SSP4. Employee satisfaction	2.43	0.76	0.60			
<i>Sustainable Supply Management</i>				0.95	0.94	0.77
SSM1. Questionnaires	2.62	1.32	0.84			
SSM2. Supplier criteria	2.34	1.18	0.88			
SSM3. Audits	2.34	1.22	0.87			
SSM4. Reducing impacts together	2.54	1.16	0.90			
SSM5. Developing new products/operations	2.51	1.10	0.86			
SSM5. Anticipate/resolve problems	2.62	1.16	0.90			
<i>Sustainable Process Management</i>				0.90	0.86	0.70
SPM1. EMS	3.39	1.42	0.84			
SPM2. Health and Safety standards	2.74	1.41	0.82			
SPM3. DfE and LCA	2.93	1.28	0.82			
SPM4. Code of Conducts	2.98	1.18	0.86			
<i>Trust</i>				0.89	0.83	0.74
TR1. Concerning about the focal firm's welfare	3.51	0.83	0.87			
TR2. Considering decisions' effects on the focal firm	3.31	0.83	0.96			
TR3. Looking for the focal firm's best interest	3.49	0.77	0.64			

Finally, concerning to discriminant validity (Hulland, 1999), Table 3 shows that the correlations among the different constructs in the lower left off-diagonal of the matrix are lower than the square roots of the average variance extracted values calculated for each of the constructs along the diagonal (i.e., diagonals elements). This testifies the discriminant validity of our measures.

Table 3. Constructs' discriminant validity

	R ²	FSP	SSP	SSM	SPM	TR
Firm's sustainability performance	59.9%	0.75				
Suppliers' sustainability performance	19.2%	0.71	0.84			
Sustainable supply management	65.0%	0.44	0.37	0.88		
Sustainable process management	-	0.61	0.33	0.80	0.84	
Trust	-	0.12	0.16	0.30	0.26	0.86

Note: the square root of the AVE is reported on the diagonal. The latent construct correlations are reported off-diagonals

4.4.2 Structural model

The PLS structural model was assessed by examining the path coefficients (similar to the standardized beta weights in regression analysis) and their statistical

significance. For studying moderation effects, we included in the model an interaction factor and we examined its path coefficient (Henseler and Fassott, 2010). Then, bootstrapping was used to test the statistical significance of model paths. This procedure entails generating 500 sub-samples of cases randomly selected, with replacement, from the original data set.

Different models were also tested to verify whether alternative causalities among variables could increase the explained variance for exogenous factors. The analysis showed that our model represents the best solution. The Goodness of Fit was calculated following Tenenhaus et al. (2005). For our model, this fit is 0.58, which is above the large effect size cut-off value of 0.36 (Fornell and Larcker, 1981). Results for tests of the propositions are shown in table 4.

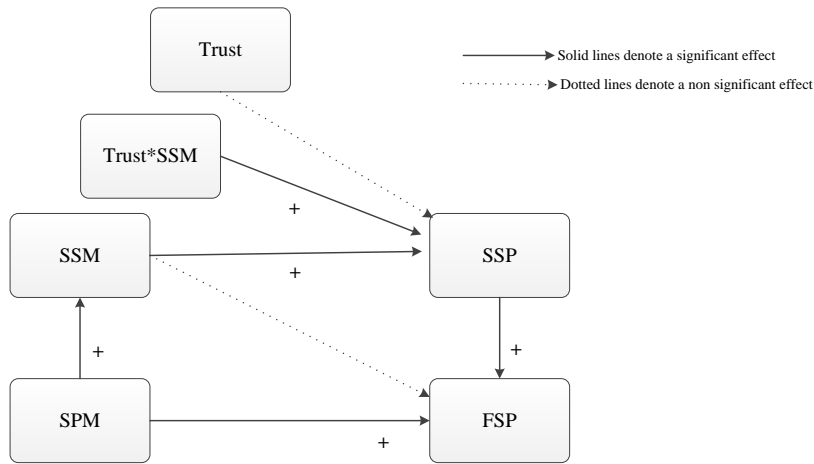
Table 4. PLS structural model

Paths	<i>Direct effects</i>		<i>Direct and moderated effects</i>	
	Standardized coefficient	t-value	Standardized coefficient	t-value
SPM → SSM	0.806	22.456	0.806	22.191
SPM → FSP	0.371	2.549	0.372	2.561
SSM → FSP	-0.107	0.680	-0.108	0.700
SSM → SSP	0.380	3.093	0.275	2.053
SSP → FSP	0.622	8.139	0.622	8.567
Trust → SSP	-	-	0.029	0.262
SSM*Trust → SSP	-	-	0.232	1.993
Variance explained in FSP	59.9%		59.9%	
Variance explained in SSP	14.4%		19.2%	
Effect size of the moderating variable			0.25 ⁺	

⁺ the effect size is calculated using the equation $f^2 = (R^2_{\text{included}} - R^2_{\text{excluded}}) / (1 - R^2_{\text{included}})$

First, the impact of sustainable process management on sustainable supply management is positive and strongly significant, supporting RH1. Also, SPM produces positive returns for a firm sustainability performance, supporting RH2. SSM do not directly impact a firm sustainability performance (rejecting RH3); however, it exerts a positive and significant effect on supplier sustainability performance (supporting RH4) which in turn significantly impacts a firm sustainability performance (supporting RH5). Noteworthy, the interaction term between SSM and trust positively and significantly impacts supplier sustainability performance (supporting RH6). Figure 2 shows the results for the structural model.

Figure 2. Results for the structural Model



4.5 DISCUSSION

According to the results presented in previous section, we can provide a robust answer to our three research questions. First, it appears that intra-organizational practices (SPM) have a direct and positive impact on a firm sustainability performance and on its capability to develop inter-organizational practices (SSM). By relying on the lenses of the path-dependence model of Dierickx and Cool (1989), we complement the findings of prior research (Gavronski et al., 2011; Hollos et al., 2012; Shi et al., 2012; Zhu et al., 2013) by suggesting that SPM should be seen as a factor that assists the firm in developing SSM practices. Thus, its presence may be not sufficient to ensure that SSM develops, since other capabilities may also be required (e.g., supply management) (Bowen et al., 2001), but its absence may hinder, retard or constrain SSM development.

SSM, then, does not directly result in enhanced sustainability for the buying firm, but rather enacts environmental and social improvements for suppliers. Nevertheless, when such improvements are achieved, suppliers may in turn become a source of superior environmental and social performance for the buying organization. Indeed, in line with recent literature (Krause et al., 2009), we found a positive and significant relationship between supplier performance and buying firm performance under SSM. These findings clarify the ambiguities that lies in previous research about the role SPM, SSM, supplier performance and firm performance (Hollos et al., 2012; Klassen and Vachon, 2003; Vachon and Klassen, 2008; Zhu et al., 2013): although supplier

knowledge and co-operation may spark environmental and social innovations at the buying firm, this does not essentially mean that external practices foster the internal ones, but rather that sustainable supplier may represent a source of idea and inspiration and provide opportunities that only a 'knowledgeable' firm (i.e., a firm that already has advanced skills and capabilities in sustainability management) is able to fully exploit.

Overall, this argument informs our first two research questions. SPM represents the set of practices a firm should leverage the most when it starts the pathway to become environmentally and socially sustainable. SPM directly impacts sustainability performance and builds up the set of skills and capabilities that enables the development of SSM. Conversely, SSM should be leveraged the most if the firm already has a good understanding of how its direct environmental and social impacts could be managed. SSM, indeed, allows (i) to transfer environmental and social skills and capabilities to suppliers and (ii) fully capture/exploit sustainability-related opportunities that lies behind the collaboration with them.

For what concern the third research question, empirical evidence is finally provided about trust, whose safeguard role can be confirmed also in context of SSCM. SSM was not resulting in homogenous performance across all suppliers as might have been expected from the findings described by previous research (Carter, 2005; Ehrgott et al., 2011), but was instead impacting supplier in a more heterogenous manner according to the level of trust characterizing their relationship with the buying firm. By relying on the relational view theory of inter-organizational competitive advantage (Dyer and Singh, 1998), we complement the findings of prior research which suggests that asset-specific investments and relational norms of governance, being at the same time consequences and sources of trust between a firm and its suppliers, allows to deploy SSM more effectively (Jiang, 2009; Simpson et al., 2007).

4.6 CONCLUSION AND FUTURE RESEARCH DIRECTIONS

Overall, our findings allow us to derive significant implications for a firm that wants to become environmentally and socially sustainable. Simpson et al. (2007) suggested that a firm "should remain conscious of the old adage 'Do as I say and not as I do' such that suppliers may become less responsive to the customer's environmental performance requirements where the customer does not demonstrate a level of commitment toward its environmental performance that exceeds its own requirements

for the supplier”. In a similar fashion, the business ethics literature suggests that “virtue is lived and not acted since one ‘does not offer what one does not possess’... in other words, the success of socially responsible buying is to a large extent dependent on the organizational context within which the policies are made. To be able to influence its suppliers effectively, a firm should exhibit high level of ethical orientation that is permeated in its culture” (Amaeshi et al., 2008). Here, we complement these views suggesting that the improvement of environmental and social sustainability performance requires the development of both internally and externally oriented practices as well as trust. Sustainable process management allows taking low hanging fruits and, most importantly, enacts the development of a good understanding on how environmental and social issue should be managed (i.e., environmental and social capabilities). Only if a firm ‘does something’ (i.e., SPM) and ‘has something to offer’ (i.e., skills and capabilities, a trustful relationship and related incentives), it can effectively walk with suppliers to gain further significant sustainability improvements. Conversely, all the effort put into SSM will not pay off.

Our study has limitations, which point to a number of avenues for future research. First of all, our results suggest some causal relationships among SPM, SSM, supplier performance and buying firm performance. However, our research design, a cross-sectional survey, does not allow the temporal sequence necessary to assess causality. Future research should include longitudinal designs (e.g., Lee and Klassen, 2009) to provide conclusive evidence of our model. Second, data has been collected only in one country and thus, even if the data collection process has been properly and accurately designed, still a country effect could be possible (e.g., due to national culture differences). Further data collection in other countries could verify whether these results could be generalized. A final issue is associated to the number of companies providing complete answers to our survey. Previous works allow us to consider the sample size acceptable for the purpose of this work. Obviously, a wider sample would allow to verify the reliability of our results. Finally, our analysis support the relational view’s argument that a singular focus on the firm as unit of analysis may limit the explanatory power of the model we develop to explain firm level performance. However, in this study we collect data from buying firms only. Future studies should collect data from both firms and suppliers, providing further support to the results of this research.

APPENDIX

Table A1. Survey items used in the multi-items scales

<i>In the last three years, to what extent has your organization's sustainability performance changed in the following areas (1: Much worse; 5: Much better)</i>			
FSP	FSP1. Energy efficiency		
	FSP2. Health and Safety of employees		
	FSP3. Bad Emissions (air and water emission, solid disposal)		
	FSP4. Employee satisfaction		
<i>In the last three years, to what extent has your key suppliers' sustainability performance changed in the following areas (1: Much worse; 5: Much better)</i>			
SSP	SSP1. Energy efficiency		
	SSP2. Health and Safety of Employees		
	SSP3. Bad Emissions (air and water emission, solid disposal)		
	SSP4. Employee satisfaction		
<i>Indicate the effort put into implementing the following action programs in the last three years (1: none; 5: very much)</i>			
SSM	SSM1. Sending questionnaires to suppliers in order to assess their environmental and social performance		
	SSM2. Having supplier environmental and social criteria in periodic evaluation		
	SSM3. Auditing suppliers' plant to assess their environmental and social performance		
	SSM4. Working together with suppliers to reduce social and environmental impacts of products		
	SSM5. Collaborating with suppliers to reduce social and environmental impacts of processes and operations		
	SSM6. Conducting joint planning to anticipate and resolve sustainability related problems		
SPM	SPM1. Environmental management systems (e.g., ISO 14001)		
	SPM2. Workplace health and safety (e.g., OHSAS 18001)		
	SPM3. Environmentally friendly product design (e.g., Design for Environment, Life Cycle Assessment)		
	SPM4. Corporate responsibility through the firm's direct contribution and other campaigns (e.g., codes of conduct, corporate social activities, etc.)		
<i>Please, indicate how much do you agree with the following statements (1: Strongly disagree; 5: strongly agree)</i>			
TR	TR1. Our suppliers are concern about our welfare		
	TR2. Our suppliers consider how their decisions/actions affect us		
	TR3. Our suppliers look out for our best interest		
Size	Approximately, how many employees (full-time equivalent) work in your company?		
Importance of Sustainability	<i>For each of the following competitive goals, please indicate the importance senior management places on each for your company. Allocate 100 points across the six priorities below to indicate their relative importance:</i>		
	(i) Manufacturing cost	(ii) quality,	(iii) delivery speed and timeliness,
	(iv) manufacturing flexibility,	(v) new product design/innovation,	(vi) sustainability

CHAPTER FIVE.

Final thoughts

5.1 THEORETICAL IMPLICATIONS

From a theoretical perspective, this dissertation provides both theoretical arguments and empirical evidence concerning the interplay of several factors in shaping sustainability performance in the supply chain. First, the study of innovativeness provides new insights to explain why certain firms are more effective than others in developing SSCM. Strong future and learning orientation translates into specific organizational mechanisms that reduce inertia and favor the resolution of trade-offs. These theoretical arguments and empirical observations can provide a foundation upon which to more deeply explore the processes that enhance or constrain a firm ability to identify and respond to emergent environmental and social issues. Also, an assessment framework is provided that can be of help for further empirical investigation that goes in this direction.

Second, supply management was found to affect sustainability performance, which provide new evidence that partnerships and structured supply procedures not just explain companies behavior (i.e., SSCM adoption) but, more important, their performance. Supply management has been presented as an enabler of sustainable practices (Bowen et al., 2001; Vachon and Klassen, 2006), while its role as a moderator should also be considered.

Third, this research shows that global sourcing affect the effectiveness of SSCM and SM, which provide new evidence that supply chain characteristics should be explicitly considered when trying to explain firm behavior and performance. Although suppliers' geographical dispersion has been often included in theoretical and empirical analyses (Awaysheh and Klassen, 2010; Reuter et al., 2010), prior works have not conceptualized global sourcing as a key contingency for the achievement of sustainability. Explicit consideration of this factor could alter results that today has been taken for granted.

Fourth, SPM was found to be the first necessary step for firms that aim at becoming environmentally and socially sustainable. SSM, then, was found to provide further indirect benefits, through enhanced suppliers' performance. These findings

suggest that when theorizing and testing the impact of sustainable practices on final performance, interdependency between different kind of SSCM practices should be taken into account to gain a much richer understanding of what really drive sustainability.

Finally, the study of buyer-supplier trust provides new insights to explain why similar adoptions of SSM practices may result in heterogeneous performance improvements across suppliers. These insights suggest that when theorizing and testing practices that affect sustainability performance in the supply chain, it is important to tease apart the role of factors at the interface between the firm and its suppliers (e.g., goal alignment, mutual dependency, power balance).

5.2 PRACTICAL IMPLICATIONS

From a practical perspective, across each study, the evidence suggests that regardless of whether organizations are trying to reduce impacts on the natural environment and society because ‘it is the right thing to do’ or as a way to reduce the potential for stakeholder punishment, not all the companies are able to effectively walk towards sustainability. The findings from this research suggest that the innovativeness affects firm’s ability to attend to sustainability issues, which is reflected in the firm’s adoption of SSCM practices. Much more focus on learning and on stakeholders continuous conversation should allow a company to explore and exploit ideas that come from the collective mind so to overcome relevant barriers to sustainability. Therefore, companies are encouraged to attain more inclusive approaches which in turn will allow to change their business practice in favor of more sustainable paradigms.

Then, results suggest that supporting SSCM with SM practices that aim to consolidate, upgrade and coordinate the supply base generates superior sustainability performance. In other words, SSCM is effective when the relationships with suppliers is well-established and go beyond sustainability objectives. Furthermore, results show that the direct benefits companies may derive from SM are reduced when global sourcing is extensively leveraged, while SSCM seems to be more effective. These insights should encourage companies to consider the implications that sourcing decisions (Global vs. Local) have on their sustainability performance and the different managerial approaches that should be developed according to them.

This research also found that suppliers' performance *does* matter, particularly when trust permeates supply relationships. It is argued that, when SPM is taken off, buying organizations that are knowledgeable in environmental and social management might pass this knowledge to suppliers and, also, work with them to produce further sustainability improvements. In this sense, companies are encouraged to develop sustainability-oriented collaborations while remaining conscious of the old adages (i.e., 'do as I say and not as I do' as well as 'one does not offer what one does not possess').

Overall, these practical considerations should help companies to coordinate the complex bundle of practices which have to be adopted and leveraged along the pathway that lead to high environmental and social performance in the supply chain.

5.3 LIMITATIONS AND FUTURE RESEARCH

The contributions made in this dissertation must be viewed in light of limitations associated with its research. First, since general consensus is not yet reached within the literature, this research builds on a specific view of the definition and composition of SSCM. Therefore, findings generalizability remains questionable: results would have been different whether other views would have been considered. Second, data are taken from manufacturing industries and most of them were collected in one country (i.e., Italy). Although this was considered appropriate in order to control for possible confounding effects coming from industry specificities and national culture, external validity results to be quite limited. Third, although our results suggest causal relationships, only cross-sectional data were analysed. Predictive validity of our results should be questioned by future research which should employ a longitudinal design. Finally, evidence is provided on the inter-relatedness of social and environmental performance. However, perceptual scales were used to capture these performance. Internal validity would benefit from employing objective indicators such as those found in GRI, SA 8000, UNGC, including energy use, water use, emissions, waste, transport, health and safety, zero tolerance for child or forced labor, diversity and equal opportunity.

Further research should try to overcome the aforementioned limitations but also walk along several trajectories provided by this dissertation. First, in study 1, while investigating the role of innovativeness, it was observed that innovative firms use to

rely on the resources and capabilities of non-traditional chain members through inclusive approaches. Speculating on this insight, one might argue that the degree of involvement and role of stakeholders (e.g., NGOs, Local communities) into SSCM could be substantial. N-tiered supply chain are complex systems where environmental and social issues can be difficult to assess, verify and improve. Here, stakeholders can be of help with their passionate support and specific knowledge (e.g., Greenpeace, Oxfam, etc.). Thus, a future work could move beyond the understanding of 'stakeholders' as 'drivers' and take a deep look into how they can actively take part into SSCM and shape the characteristics of its underlying practices.

Second, an interesting stream for future research could stem from exploring the effects of new supply chain characteristics on SSCM practices and sustainability performance. According to study 2, supply chain characteristics do in fact matter in the context of sustainability. Recent literature considered the role of factors such as supply chain structure (Awaysheh and Klassen, 2010; Roberts, 2003) and configurations (efficient vs. responsive) (Parmigiani et al., 2011). Beyond these factors, the rate at which products, processes and organizational systems evolve across the supply chain (i.e., clockspeed) can also be expected to influence the characteristics of SSCM (Fine, 1999; Wiengarten et al., 2012). For instance, turbulent business settings generate more uncertainty that organizations must take into account, thereby limiting management's ability to act decisively to resolve environmental and social concerns.

Third, exploring new units of analysis could serve as another interesting stream for future research inquiry. Manufacturing plants represented the unit of analysis in this research. Insights and guidelines put forward in this dissertation, however, do not consider that analysed firms might belong to the production network of a multinational organization (MNCs) and might assume and play different roles (e.g., more or less strategic) (Ferdows, 1997; Vereecke and Van Dierdonck, 2002). In this respect, the plant's willingness/ability to pursue sustainability might be strictly dependent on the role it plays within the network and on the production strategy developed by MNC it belongs to. This consideration opens new research horizons: how does an objective of sustainability alter the process through which MNCs assign responsibilities and resources to production subsidiaries? How do sustainability-related experience and knowledge is created and diffused throughout the network? How production

subsidiaries may help the MNC to address ‘local’ sustainability issues while responding to ‘global’ stakeholders’ concerns? These and other interesting research questions may benefit from the insights provided by this dissertation.

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