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Collaboration capacity for sustainable supply chain management: small and medium-sized enterprises in Mexico

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ABSTRACT

Sustainability calls for multi-stakeholder initiatives; hence a requirement for implementing sustainable management approaches is the capacity of different actors to collaborate with each other. This research tested a theoretical model of collaboration capacity as a multi-dimensional organisational construct to gauge cleaner production implementation within supply chains. The construct measured operational, cooperative, and communicative routines of small and medium-sized firms to design, implement and communicate the results of cleaner production projects. Assessment focused on the collaboration capacity of 177 suppliers that participated in the Mexican Sustainable Supply Programme from 2005 to 2008. The results of the study revealed how a supplier's collaboration capacity is influenced by characteristics of firms and managers, such as the firm's sector, the number of participating managers and their profiles. Following collaboration theory reasoning, the empirical findings support the notion that collaboration may contribute to inter-organisational dynamics by strengthening knowledge absorption capacity, structuring solutions, and motivating activity around a commonly defined problem or goal such as cleaner production. Therefore, collaboration capacity is essential for effective implementation of cleaner production. Such cleaner production actions provide competitive advantages for sustainable supply chain management.

1. Introduction

Multi-stakeholder initiatives have frequently been used in demonstration projects designed to accelerate the implementation of cleaner production (CP) approaches and other sustainability-related strategies to improve the environmental, economic, and social performance of firms (Stone, 2006; Baas, 2006). These initiatives included a wide range of mechanisms, including environmental clubs (Sage, 2000), waste exchange programmes (Paquin and Howard-Grenville, 2009), eco-industrial parks (Chertow and Ashton, 2009), and sustainable supply chain initiatives (Fayet and Vermeulen, 2012; Seuring and Müller, 2008; Carter and Rogers, 2008). These multi-stakeholder initiatives differed from traditional implementation approaches that rely on technical assistance and training employees of individual firms, by applying collective methods as a strategy for promoting sustainability improvement among larger groups of companies.

Collective methods were designed to reduce the costs of implementation derived from economies of scale, and recommended targeting small and medium-sized firms (SMEs) in emerging markets (Puppim de Oliveira, 2008; Blackman, 2006). Moreover, interactions with actors interested in firms' activities provided grounds for collaborative learning and action in sustainability (Clarke and Roome, 1999). Similarly, collaboration is a key element of problem-solving because it facilitates dynamic interactions where even incremental actions may produce significant and enduring improvements to help the transition towards sustainable organisations (Lozano, 2007).

Lozano (2007) also noted that developing a multi-dimensional organisational capacity to recognise value and collaboration skills is required for firms to collaborate in sustainability initiatives. Working together implies understanding each other, exchanging information, drawing and sharing group values, solving problems, and new reasoning. The readiness of firms to do so is defined as *collaboration capacity*. Following Huxham (1993), this construct outlines intra-organisational routines entailed in the transfer and absorption of knowledge, and capacity development for both

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sustainable and collaborative action; e.g., firms developing and implementing pollution reduction efforts that help fulfil shared objectives exhibit higher levels of collaboration capacity, while companies with low-level collaboration capacity fail to do so.

The literature generally focuses on technical stratagems to improve the sustainability performance of firms, overlooking organisational dynamics (Baas, 2006; Stone, 2006; Mitchell, 2006; Boons and Baas, 1997). Furthermore, the literature emphasises the role of anchor companies in sustainable supply chain management (Zhu et al., 2010; Vachon and Klassen, 2008; Seuring and Müller, 2008; Carter and Rogers, 2008; Sarkis, 2002; Bowen et al., 2001). But little is known about the collaboration capacity of SMEs, and their capability for successfully joining sustainable supply chain initiatives.

By focussing on the environmental dimension of sustainability, this study addresses this research gap by assessing the collaboration capacity of SMEs participating in the Mexican Sustainable Supply Programme (MSSP). The MSSP offered a unique opportunity to test the construct of collaboration capacity with SME suppliers in the context of an emerging economy. The research questions were: (1) What level of collaboration capacity did SME participation in the MSSP achieve? (2) Did the characteristics of participating companies and managers influence the collaboration capacity of individual suppliers, and if so, how? In order to answer these questions, the research method included the exploration of a conceptual model of collaboration capacity and its fit vis-à-vis MSSP empirical data. In the following sections these questions are addressed.

2. Collaboration theory and sustainable supply chain management

This section addresses collaboration capacity in sustainable supply chain management as a construct for understanding the ability of small and medium- sized firms to connect to multi-stakeholder initiatives. Literature on collaboration theory and sustainable supply chain management is reviewed.

2.1. Collaboration theory

Collaboration theory examines interactions among actors, such as in supply chains (Soosay et al., 2008; Gray, 1985). This social science related approach describes the process, forms, and elements of collaboration as a phenomenon that "occurs when a group of autonomous stakeholders of a problem domain engage in an interactive process, using shared rules, norms and structures, to act or decide on issues related to that domain" (Wood and Gray, 1991).

Collaboration focuses on networks rather than markets and hierarchical governance structures (Powell, 1990). Network partners are interdependent; they participate voluntarily, complement each other's strengths, aim at mutual benefits, and share mutual trust (Soosay et al., 2008; Blomqvist and Levy, 2006; Lambe et al., 2002; Powell et al., 1996). An underlying assumption of collaboration theory considers collaboration to be beneficial for competitiveness (Cao and Zhang, 2011; Huxham, 1993) that outweighs potential collaboration pitfalls, such as lack of control, loss of flexibility, and direct financial costs.

Moreover, collaboration theory highlights collective problem solving of complex issues by means of innovation (Storer and Hyland, 2009; Heimeriks and Duysters, 2007; Blomqvist and Levy, 2006; Inkpin, 1998; Powell et al., 1996). In this context, collaboration aims at confronting complex problems that exceed the capacity of individual firms (Gray, 1985). The problem domain addressed in this paper was defined as improving the ecological performance of SME suppliers. In this inter-organisational field, problem solving through effective collaboration (Lambe et al., 2002) is evidenced by the adoption by suppliers of high impact CP projects.

The preconditions for collaboration entail mutual trust among partners' rational and emotional elements, commitment in attitudes and behaviour, and communication of intention and outcomes (Blomqvist and Levy, 2006; Sharma et al., 1994). These collaboration competences are evidenced in intra- and inter-organisational activities and resources, such as information processing, knowledge absorption, management and control, as well as in communication and negotiation skills. Inter-organisational resources include common norms, the language needed for problem identification, direction setting, and structuring of solutions (Blomqvist and Levy, 2006; Gray, 1985).

Collaboration has been proposed as a pathway for sustainability (Lozano, 2008, 2007) by a change in paradigm from individual action towards joint efforts to achieve common interests. Significant and enduring improvements to transit towards more sustainable organisations are introduced by means of small, incremental actions. The concept entails a non-zero sum game where collective gains outweigh individual costs. To attain sustainable supply, winning or losing in negotiations with suppliers and anchor companies is not what matters; the aim is to reach a system optimum where all players develop sustained relationships.

2.2. Integration of collaboration theory into sustainable supply chain management

Sustainable supply chain management implies that chain partners, such as anchor companies and suppliers, improve their economic, environmental and social performance (Ahi and Searcy, 2013; Carter and Easton, 2011; Seuring and Müller, 2008). These improvements may involve organisational changes in individual companies, joint efforts by supply chain partners, or system-wide changes involving a wider range of stakeholders (Cai et al., 2010; Vachon and Klassen, 2007). Depending on how closely partners are integrated, benefits and efforts are shared or negotiated (Porter and Kramer, 2011; Carter and Rogers, 2008).

Within sustainable supply chain management, CP is viewed as a prevention-oriented environmental management approach, providing opportunities for resource efficiency and reduced environmental loads (Seuring and Müller, 2008; Vachon and Klassen, 2007). CP applications include adjusting operational procedures, technologies and/or developing new activities among supply chain partners, such as product re-use or waste recycling (Lee, 2008; Hirschhorn, 1997). The implementation of these CP measures in and among firms requires specific knowledge of the technical tools needed for priority setting, and the capability to change organisational routines (Stone, 2006; Hult et al., 2003).

Both collaboration and sustainable supply chain management, including CP, are considered as "higher level" organisational capacities (Gold et al., 2010; Gray, 1985): referring to the Japanese Koysei philosophy, Lozano (2008) identified "economic survival" and "internal improvements" as requisite organisational routines for "co-operation outside the company". Similarly, Boons (2009) wrote that the recognition of ecological value by firms is a precondition for deploying strategies aimed at improving their environmental performance. Moreover he argued that only firms with "higher-level" capabilities recognise ecological value as part of continuous operational improvement in implementation of pollution controls or prevention-oriented measures.

Building on these concepts, the new construct of *collaboration capacity for sustainable supply chain management* was developed. This construct integrates a firm's internal structures and processes, as required, to recognise ecological value and, by means of

improvements in environmental performance, contribute to such multi-partner initiatives. Based on Boons (2009) and Huxham (1993), the following organisational routines were used as dimensions of collaboration capacity for sustainable supply chain management:

- *Operational routines*: knowledge and organisational skills needed to operate efficiently while protecting ecological value. For this research, operational routines include knowledge of specific tools related to cleaner production, knowledge of operational processes, and organisational skills to innovate or re-design processes.
- *Coordinative routines*: knowledge and organisational skills required to develop partnerships with other firms and additional stakeholders, such as public agencies, non-governmental organisations, academic institutions, and consultancies. Coordinative routines involve knowledge and skills to identify the needs of others and align activities. In this research, coordinative routines were related to the capacity for developing collaborative CP projects that involve stakeholders in project design and implementation.
- *Communicative routines*: knowledge and organisational skills used to shape the value context. These types of routines are related to the way firms communicate sustainability. In this research communicative routines refer to the measurement of CP project impact, and information exchange between stakeholders.

These three organisational routines include both (a) the *intention* to carry out activities based on knowledge and recognition (CP intention), and (b) undertaking the *activity* in accordance with the intention and supported by the corresponding skills (CP action). These levels are interrelated, as intention is a precondition to performing an activity; nonetheless, the presence of intent does not necessarily ensure an activity will be performed (Boons, 2009). Table 1 summarises the framework of "collaboration capacity for sustainable supply chain management" as a social organisational construct, as used in this research.

3. Developing collaboration capacity in the Mexican Sustainable Supply Programme

The MSSP was designed as a voluntary inter-organisational initiative designed to facilitate implementation of CP practices within Mexican SMEs that are integrated into global supply chains.

Table 1
Key organisational routines involved in enhancing collaboration capacity for sustainable supply chain management.

Engagement in sustainable supply chain initiatives	Organisational routine	Related capacity
Collaboration capacity	Operational	• Intention to apply sustainability strategies and tools. • Skills to innovate operational processes.
	Coordinative	• Intention to create partnerships, to identify common goals, and to negotiate. • Skills to develop collaboration projects.
	Communicative	• Intention of information exchange with stakeholders based on measurements. • Skills to communicate across the organisation and among stakeholders.

Source: based on Boons, 2009

Stakeholders included the Commission of Environmental Cooperation in North America (CEC), the regional environmental authority of the State of Queretaro (SEDESU), the Mexican Chapter of the Global Environmental Initiative (GEMI), large corporations with operations in Mexico, and local suppliers. Research focused on the programme's pilot phase from August 2005 to May 2008. Participants included fourteen anchor companies and 177 suppliers.

The MSSP design featured several mechanisms related to the aforementioned competences to develop collaboration in sustainable supply chain management. Supply relationships between anchor companies and SME local suppliers were used to motivate the latter to improve ecological performance. Acceptance of invitations extended by anchor companies to suppliers was voluntary, aimed at assembling groups of about ten to fifteen firms per supply chain. To promote participation, public agencies offered to finance training workshops for capacity building in CP methods. Public recognition was awarded to anchor companies collaborating with the MSSP.

Suppliers accepting the invitation to participate in the programme were expected to attend a series of ten workshops, featuring step-by-step application of CP methods. Upon completion of the workshops, each firm made a presentation of a CP project designed to improve ecological performance and operational efficiency. Profit attributed to cleaner production projects was expected to benefit suppliers as well as to contribute to the supply chain's overall performance.

The collective learning method applied in the programme included several complementary characteristics: Representatives of participating firms learned to apply CP tools such as eco-maps, cost inefficiency estimates, eco-balances, and preventive alternatives. Accordingly, each participant acquired knowledge of how to design and implement CP practices in operations.

Workshop meetings were held at anchor company facilities. Throughout the ten workshops, participants were expected to share their experience, work together, and establish social relationships as a means for strengthening ties and generating trust.

Presentations of CP applications among peers emerging from the training programme, together with public recognition of anchor companies for their achievements, were expected to motivate communication among participants. Both financial and ecological indicators were used to facilitate a common language. Table 2 presents the MSSP design features as a collaborative CP learning mechanism.

4. Research methodology and data collection

A quantitative research methodology was used to assess the fit of MSSP empirical data with the theoretical model of collaboration capacity. Construct operationalisation, data collection, and methods of analysis are presented in the following.

4.1. Constructs and their operationalisation

Research questions were operationalised following the framework presented in Table 1. Variables measured in the MSSP were used to gauge organisational routines defining collaboration capacity for sustainable supply chain management. An additional category, *collaboration intention*, identified firms that had yet to demonstrate intentions or actions related to operational, coordinative, or communicative routines:

(i) *Collaboration intention* (*CI*): This dimension denotes that not all suppliers that signed up for the MSSP developed the necessary routines in accordance with programme objectives. These firms showed an initial intention to participate in

Table 2
MSSP design features related to developing collaboration capacity for sustainable supply chain management.

Organisational routine	Related organisational capacities	Design feature of the MSSP
Operational	• Intention to apply sustainability strategies and tools. • Skills to innovate operational processes.	• Capacity building in CP tools (eco-maps, eco-balances, inefficiency cost). • Invitation of at least two representatives of each supplier.
Coordinative	• Intention to create partnerships, to identify common goals, and to negotiate. • Skills to develop collaboration projects.	• Supply chain power to trigger participation. • Exchange of experience with peers in a group process. • Time to foster social relations and trust among participants.
Communicative	• Intention of information exchange with stakeholders based on measurements. • Skills to communicate across the organisation and among stakeholders.	• Supply chain power to trigger participation. • Exchange of experience with peers in a group process. • Recognition of project design and implementation by anchor companies. • Executive presentations noting financial and environmental results.

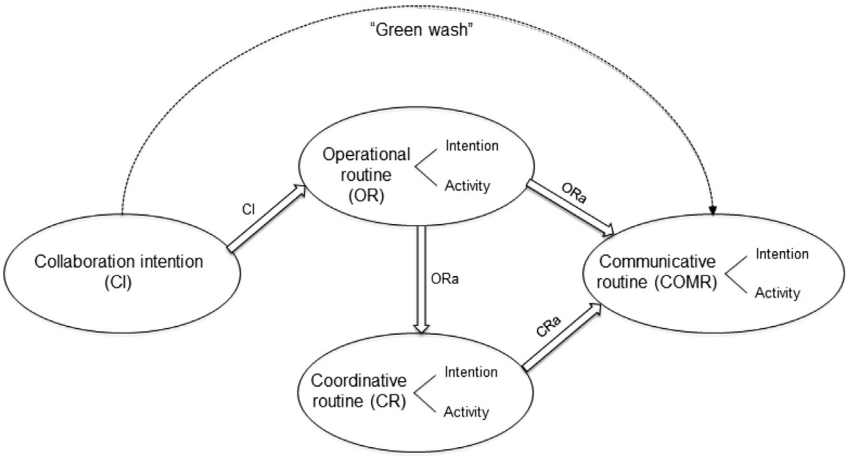

Fig. 1. Conceptual scheme, which supports organisational routines for enhancing collaboration capacity in sustainable supply chain management.
Source: Authors

this multi-actor sustainability initiative, but failed to show progress in operational, coordinative or communicative routines, withdrawing from the programme after participating in some workshops.

(ii) *Operational routine* (*OR*): Suppliers showing evidence of this organisational routine presented a project at the end of the workshop cycle related to CP applications. The presentation of a CP project represents an intention for operational improvement, as project designs relate to activity planning and cost-benefit analysis. The activity dimension is demonstrated by firms that confirmed their skills by implementing CP projects within six months after participating in the MSSP.

(iii) *Coordinative routine* (*CR*): Suppliers showing evidence of this organisational routine presented a CP project at the end of the workshop cycle, involving external stakeholders. These projects, labelled *external projects*, required more complex organisational capacities than internally oriented CP applications as coordinative routines. They also included the organisational capacity to negotiate with external stakeholders and understand their needs; hence firms that presented CP projects classified as "external projects" proved *intention*, while those that also confirmed implementation evidenced *activity*.

(iv) Communicative routine (COMR): Communicative organisational routines relate to the exchange of information concerned with CP project outcomes. Within the research model, indicators that evidenced communication intention measured CP project *outcomes*, while exchanging information with stakeholders on these outcomes was considered as evidence of communication *activity*.

Organisational routines featured in the research model were inter-dependent and complementary, as illustrated in Fig. 1.

Fig. 1 illustrates that the coordinative dimension is considered to also include the operational dimension; i.e., a firm evidencing a coordinative routine by presenting an external project was assumed to have developed operational knowledge and skills for the design of CP projects. Similarly, communicative routines require

Table 3
Operationalisation of collaboration capacity for sustainable supply chain management in the MSSP.

Organisational routines	Dimension of organisational change	Estimator
Collaboration intention	Initial intention (CI)	Withdrawal from the MSSP
Operational routine	Intention (ORi)	CP project design without confirmed implementation
	Activity (ORa)	CP project design with confirmed implementation
Coordinative routine	Intention (CRi)	CP project design (external project) without confirmed implementation
	Activity (CRa)	CP project design (external project) with confirmed implementation
Communicative routine	Intention (COMRi)	Measurement of outcomes of CP project implementation
	Activity (COMRa)	Exchanging information with stakeholders on outcomes of CP project implementation

previously undertaken operational or coordinative routines. The option of evidencing communicative routines without operational or coordinative routines was deemed "green wash". Given these predecessor relationships, coordinative and communicative routines were denoted as higher-level organisational capacities related to collaboration (Huxham, 1993). Table 3 presents the operationalisation of collaboration capacity used in this study. In accordance with Vidal-Salazar et al. (2012) and Aragón-Correa et al. (2007), uni-dimensional estimators were used to study organisational routines as measures of collaboration capacity for sustainable supply chain management.

4.2. Data collection

MSSP data contained information for about 191 companies (14 anchor companies plus 177 suppliers).[2] About 75 per cent of the suppliers were classified as SMEs.[3] Insofar as anchor companies extended invitations only to suppliers located in surrounding locations, 71 per cent of the suppliers were located in Mexico City and 29 per cent in Queretaro. Supply sectors included packaging, printing and promotion, raw materials, services, and indirect supplies – all first tier suppliers.

Data were gathered from several sources. All firms participating in the programme filled out an intake form, reporting their main activity, number of employees, sector, and information on the profiles of managers taking part in the programme. Another source of information was the final presentation of projects delivered by the participants at the end of the ten workshops. These presentations contained detailed information on type of CP applications to be implemented, estimated investments, and expected economic and environmental benefits.

To obtain feedback on CP project design and implementation levels, as well as communication efforts, follow-up questionnaires were mailed to all participating companies. Questionnaires were sent to an initial group of participating firms in March–June 2007, and to the remaining participants in August–September 2008. CEC carried out follow-up calls and data collection free from any intervention from anchor companies. Of 133 cases,[4] 74 valid responses were collected (56 per cent).

4.3. Methods of analysis

Data analyses were undertaken by means of frequency distributions identifying firms fulfilling each organisational routine dimension. Additionally, regression analyses were performed to determine whether the characteristics of suppliers and participating managers influenced collaboration capacity routines.

Any marginal effects of explanatory variables, such as participation characteristics of suppliers, were estimated by means of a logit model (Wooldridge, 2008). This standard statistical method permitted analysis of the individual effects of organisational routines, controlling for firm characteristics, such as firm size and sector. Similar standard methods were used in the relevant literature (Vachon and Klassen, 2006); see Appendix A for the definition of the variables. Equation (1) represents the 'routine model' that analyses how the independent variables of suppliers and participants relate to organisational routines of collaboration capacity for sustainable supply chain management:

Equation 1: Routine model

$$Y_i = \beta_0 + \beta_1\ \text{packaging}_i + \beta_2\ \text{printing}_i + \beta_3\ \text{Raw material}_i + \beta_4\ \text{Indirect supplies}_i\beta_5\ \text{Medium}_i + \beta_6\ \text{Large}_i + \beta_7\ \text{Technical profile}_i + \beta_8\ \text{Administrative}_i \quad (1)$$

$$\text{Where } Y_i = \begin{cases} 1 & \text{if the firm met level } Y \\ 0 & d.l.c. \end{cases}$$

And where $Y = \{\text{ORi, ORa, CRi, CRa, COMRi, COMRa}\}$

An ordered probit model was employed to predict the presence or absence of a particular firm (with specific features and participant characteristics) in a given combination of organisational routines, based on dichotomous values for a set of predictor variables; in this study, the dependent dichotomous variable was equal to 1 if the firm showed a certain organisational routine, and 0 if not (Horowitz and Savin, 2001). Similar analyses were used in studies that concern behaviour of SMEs in network situations, e.g., those presented by Malhotra (2002) and Gulati et al. (2009). Equation (2), a 'routine combination model', studied the impact of independent variables of suppliers and participants on combinations of organisational routines:

Equation 2: Routine combination model

$$Y_i = \beta_0 + \beta_1\ \text{packaging}_i + \beta_2\ \text{printing}_i + \beta_3\ \text{Raw material}_i + \beta_4\ \text{Indirect supplies}_i\beta_5\ \text{Medium}_i + \beta_6\ \text{Large}_i + \beta_7\ \text{Technical profile}_i + \beta_8\ \text{Administrative}_i \quad (2)$$

$$\text{Where } Y_i = \begin{cases} 1 \text{ firm evidenced combination } ORi + COMRi \\ 2 \text{ firm evidenced combination } ORa + COMRi \\ 3 \text{ firm evidenced combination } ORa + COMRa \\ 4 \text{ firm evidenced combination } CRi + COMRi \\ 5 \text{ firm evidenced combination } CRa + COMRi \\ 6 \text{ firm evidenced combination } CRa + COMRa \end{cases}$$

The models evaluate for supply sector and firm size, as in previous research (Delmas and Montiel, 2009; Friedman and Miles, 2002). "Micro sized" and "indirect supplies" were used as dummy variables, STATA 7.0 to run the regressions.

5. Results: collaboration capacity of SMEs within the Mexican Sustainable Supply Programme

Building on the research model presented in the foregoing section, Table 4 shows frequency distributions of organisational routines performed by suppliers to answer the first research question: What level of collaboration capacity did SME participation in the MSSP achieve? A significant proportion, 53 per cent, showed evidence of activities undertaken to implement CP projects, defined in this study as operational routines. A much smaller

[2] Three of the fourteen anchor companies participated twice in the MSSP, completing workshop series with two different supply groups.

[3] Mexican companies are defined by law as follows: micro-sized firms, under ten employees; small firms, ten to 50 employees; medium-sized firms, 51 to 250 employees; large firms, over 250 employees.

[4] Follow-up questionnaires and calls were directed to firms completing the training program and presenting CP projects. The 44 firms that withdrew from the MSSP presumably did not continue CP activities following their short presence, and were not handed follow-up questionnaires. A total of 133 suppliers provided information on CP implementation and communication either at the end of the training programme or as part of feedback questionnaires.

Table 4
Suppliers showing evidence of organisational routines related to collaboration capacity for sustainable supply chain management.

Organisational routines	Dimension of organisational change	Number of suppliers	Percentage of population $n = 177$
Collaboration intention	Initial intention (CI)	44	25%
Operational routine	Intention (ORi)	133	75%
	Activity (ORa)	93	53%
Coordinative routine	Intention (CRi)	18	10%
	Activity (CRa)	14	8%
Communicative routine	Intention (COMRi)	41	23%
	Activity (COMRa)	32	18%

Table 5
The percentage of suppliers showing evidence of combined organisational routines related to collaboration capacity for sustainable supply chain management.

Combined organisational routines				Number of suppliers	Percentage of population $n = 177$
Operational intention	+	Communicative intention	(ORi + COMRi)	41	31%
		Communicative activity	(ORi + COMRa)	0	11%
Operational activity	+	Communicative intention	(ORa + COMRi)	32	24%
		Communicative activity	(ORa + COMRa)	14	11%
Coordinative intention	+	Communicative intention	(CRi + COMRi)	7	5%
		Communicative activity	(CRi + COMRa)	0	5%
Coordinative activity	+	Communicative intention	(CRa + COMRi)	7	5%
		Communicative activity	(CRa + COMRa)	7	5%

proportion of suppliers verified communicative routines. Only 23 per cent reported results of their CP activities. Firms that advanced CP activities but did not measure final outcomes did not demonstrate communicative intention.

Consistent with assumptions of the research model, an even smaller proportion of suppliers demonstrated coordinative routines. Only ten per cent confirmed their intention to do so by developing CP projects that actively involved outside stakeholders, such as customers or new commercial partners; with only about eight per cent reporting actual implementation of this type of project. These results imply that the MSSP, notwithstanding its design as a sustainable supply programme, failed to yield major collaboration efforts in terms of collective CP projects.

Firms that withdrew from the MSSP showed only collaboration intention, despite having accepted a major customer's invitation to participate in the supply chain initiative. Accordingly, these firms showed neither operational, nor cooperative or communicative CP intentions nor activities. A further analysis of programme withdrawals showed that most firms dropped out after attending the first workshop, and hence did not perceive any benefits from the training offered.

Similarly, frequency distributions show how the intention to carry out a certain activity does not necessarily imply that activities emerge. *Intentions* scored higher frequencies than *activities*. In operational routines, 70 per cent of intentions materialised, whereas both communicative and coordinative intentions led to action in 78 per cent of the cases. Table 4 presents the frequency distribution for organisational routines involved in collaboration capacity for sustainable supply chain management.

Table 5 presents the combinations of organisational routines undertaken by MSSP suppliers. The research framework specified that undertaking operational routines was a precondition for firms performing coordinative and/or communicative routines. The research model considered the combination of coordinative action and communicative action, (CRa + COMRa), as the most advanced level of collaboration capacity. This combination identified firms that evidenced knowledge and capacity to develop CP projects, negotiate and coordinate activities required for its implementation, and organisational capacity to measure and communicate outcomes of CP initiatives to external stakeholders. However, only four per cent of MSSP suppliers attained this level of collaboration capacity.

The findings presented in Table 5 show no evidence of two combinations; (ORi + COMRa), and (CRi + COMRa). These levels combine the intention to develop CP projects, together with communication of results to external stakeholders. In other words, none of the firms communicated results without proving implementation; i.e., none of the firms engaged in "green-wash."

The relationship between supplier characteristics, participating managers, and organisational routines, was examined to answer to the second research question: "Did the characteristics of participating companies and managers influence the collaboration capacity of individual suppliers, and if so, how?" Regression analyses were performed to measure relationships between the *dependent* (collaboration capacity categories) and *independent* variables (firm features and participant characteristics).

The results presented in Table 6 show how a supply sector appeared to influence organisational routines. Firms belonging to the printing industry displayed significantly higher propensity to perform operational routines than services suppliers (control group), while evidencing fewer coordinative capabilities as measured by negative *p*-values.

Firms located in Queretaro showed significantly lower implementation of CP projects and communication activities than firms located in Mexico City, as explained by the negative *p*-values shown in Table 6. In comparison to Mexico City, the control group, market forces such as pressure of environmental regulators and peers were less developed in Queretaro. This finding suggested how contextual factors could have influenced supplier performance. The research data also showed that, in a population of 177 suppliers, not a single raw material supplier developed an external CP project, thus failing to evidence coordinative routines.

Certain participant characteristics seem to have influenced the collaboration capacity of suppliers. Technical profiles[5] of participants showed a significant negative relationship with communicative routines, whereas administrative[6] profiles showed significant negative relationships vis-à-vis operational routines. Moreover, firms represented by two or more managers scored higher levels on all routines than firms represented by only one participant. Accordingly, the number of participants per firm appears to be of significance for firms wishing to get the most out of

[5] Technical profile denoted a participant with engineering or technical training, who may be assigned to such areas as quality control, maintenance, and operations.
[6] Administrative profile denoted a participant trained in management, accounting or marketing.

Table 6
Characteristics influencing organisational routines related to collaboration capacity in sustainable supply chain management in the MSSP.

Variables	ORi	ORa	CRi	CRa	COMRi	COMRa
Supply sector: packaging	−0.0813 (0.281)	0.194 (0.266)	0.0404 (0.180)	0.0620 (0.184)	0.0495 (0.323)	0.193 (0.334)
Supply sector: printing	0.143** (0.0724)	0.155 (0.0998)	−0.0889* (0.0464)	−0.0790** (0.0390)	0.0518 (0.153)	−0.0491 (0.110)
Supply sector: raw material	0.0812 (0.0930)	0.205* (0.114)	N.An N.A.	N.A. N.A.	0.110 (0.167)	−0.116 (0.0943)
Supply sector: indirect supply	0.0753 (0.0813)	0.194* (0.104)	−0.0349 (0.0477)	−0.0521 (0.0343)	0.278** (0.134)	0.239 (0.150)
Medium-sized company	0.0799 (0.0763)	0.169* (0.0922)	−0.0457 (0.0559)	−0.0327 (0.0525)	0.0707 (0.128)	0.0124 (0.103)
Large-sized company	0.00966 (0.0932)	0.0183 (0.116)	0.0290 (0.0722)	0.0159 (0.0609)	0.0748 (0.144)	−0.0549 (0.112)
Location Queretaro	0.00256 (0.0743)	−0.191** (0.0869)	0.0513 (0.0573)	−0.0242 (0.0401)	−0.378*** (0.107)	−0.340*** (0.0616)
Technical profile	−0.0993 (0.0844)	−0.119 (0.0968)	0.0539 (0.0586)	0.0308 (0.0552)	−0.301** (0.131)	0.00213 (0.0980)
Administrative profile	−0.313** (0.137)	−0.125 (0.135)	0.0298 (0.0962)	0.0331 (0.0908)	−0.240 (0.169)	−0.109 (0.112)
Number of participants > 1	0.177** (0.0808)	0.183* (0.0935)	0.106** (0.0481)	0.0447 (0.0415)	0.334*** (0.125)	0.255*** (0.0896)
Observations	177	177	149	149	110	111

Robust standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
N.A. Not available.

taking part in programmes such as the MSSP. Table 6 presents the results of processing the data in relation to the regression model.

Table 7 shows participant characteristics influencing combinations of operational routines record opposite *p*-values vis-à-vis combinations of routines representing coordinative and communicative routines. Moreover, the supply sector also appeared to influence the combinations of routines that were implemented. Suppliers with higher propensity to demonstrate combinations of operational and communicative routines (ORa + COMRi) were classified as printing, raw material, and indirect supplies. Nonetheless, companies in these sectors showed a significantly lower propensity to communicate results of collaboration in CP projects (CRa + COMRa).

Company location also appeared to be significant in terms of impacting routine combinations. Location in Queretaro, as opposed to Mexico City, was negatively related to combinations of coordinative and communicative routines. This outcome confirmed findings similar to those presented in Table 6, i.e., that suppliers in Queretaro contributed less to fulfilling programme objectives than those located in Mexico City. Firm size, characteristics of managers and number of participating representatives did not appear to have significantly influenced the combinations of organisational routines implemented. Table 7 presents the relationships between firm and participant characteristics and combined organizational routines.

6. Discussion: collaboration capacity for environmentally focused sustainable supply chain management

The research findings reveal that MSSP suppliers achieved differing levels of collaboration capacity. The majority of participants did not evidence complex capacities (Winter, 2006), such as coordinative and communicative routines. This might suggest that the MSSP focused chiefly on technical knowledge and operational skills – thus coinciding with Baas (2006) and Stone (2006), who claimed that most CP implementation programmes based on technical assistance and workshop training, were largely aimed at overcoming technical pitfalls and measuring CP cost-benefits. Attention to more complex organisational capabilities in these types of programmes was often overlooked, thus limiting outcomes of the implementation programmes (Baas, 2006; Stone, 2006).

Contrary to results reported in the literature (Dieleman, 2007; Van Berkel, 2007; Stone, 2006), the MSSP project implementation results were relatively high. Firms participating in the MSSP implemented innovations by modifying existing operational processes, thus evidencing intra-organisational changes. Some companies undertook coordinative routines by designing projects involving external stakeholders. Following collaboration theory reasoning (Lozano, 2007; Wood and Gray, 1991), this MSSP research outcome supports the notion that collaboration may contribute to inter-organisational dynamics by strengthening knowledge absorption capacity, structuring solutions, and motivating activity around a commonly defined problem or goal (Blomqvist and Levy, 2006; Gray, 1985).

The positive relationship shown between firms evidencing high-level collaboration capacity, and managers combining administrative and technical profiles, supports the findings of Stone (2006), who underscored the importance of management skills for implementing CP-related activities. Accordingly, this and earlier findings, provided guidelines for MSSP coordinators and those of similar programmes with regard to which firms and managers to invite in order to obtain effective CP implementation.

Indirect suppliers' lack of strategic character may account for the low collaboration capacity level shown for participating firms

Table 7
Characteristics influencing combined organisational routines related to collaboration capacity for sustainable supply chain management in the MSSP.

Variables	Marginal effects			
	ORa + COMRi	ORa + COMRa	CRa + COMRi	CRa + COMRa
Supply sector: packaging	−0.151 (0.249)	0.069 (0.063)	0.012 (0.025)	0,07 (0.172)
Supply sector: printing	0.498*** (0.176)	−0.370** (0.161)	−0.023 (0.025)	−0.105** (0.042)
Supply sector: raw material	0.541*** (0,14)	−0.404*** (0.124)	−0.025 (0.026)	−0.113** (0.051)
Supply sector: indirect supplies	0.383** (0.164)	−0.291** (0.139)	−0.017 (0,02)	−0.074** (0.038)
Medium-sized company	0.088 (0.166)	−0.055 (0.103)	−0.006 (0.012)	−0.027 (0.054)
Large-sized company	0.052 (0.186)	−0.034 (0.125)	−0.003 (0,01)	−0.015 (0.051)
Technical profile	−0.155 (0,14)	0.092 (0.088)	0,01 (0.014)	0.053 (0.049)
Administrative profile	0.092 (0,29)	−0.063 (0.208)	−0.005 (0.016)	−0.024 (0.068)
Number of participants (>1)	0.006 (0.221)	−0.004 (0.137)	0 (0.014)	−0.002 (0,07)
Location at Queretaro	0.602*** (0.127)	−0.497*** (0.129)	−0.021 (0.021)	−0.084** (0,04)

Standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

belonging to this sector (Haake and Seuring, 2009; Mol, 2003). Strategic purchases from different types of suppliers distinguish their strategic importance for operational activities. Indirect suppliers of office equipment, for example, are easily replaceable. Accordingly, loose interactions with these latter types of suppliers are prevalent and recommended (Nollet et al., 2005).

Shifting its CP innovation project locus towards inter-organisational domains, away from individual firms, [and] could strengthen the design of the MSSP. Instead of expecting each supplier to design their own CP project, CP application would directly link supplier and customer interests. Powell et al. (1996) highlighted this common locus of innovation as an important condition for learning through networks (Hult et al., 2003). Also, Boons and Baas (1997) identified the lack of coordination capabilities as a key problem of industrial ecology-related approaches, such as sustainable supply chain management. They proposed a symbiotic interdependency, such as waste re-use among suppliers and buyers, as an alternative strategy (Boons and Baas, 1997).

An additional suggestion for improving programme design of initiatives such as the MSSP was to strengthen their impact on the collaboration capacity of suppliers by formally communicating CP implementation benefits. Even when the MSSP training programme showed evidence of stimulating inter-organisational communication by generating a common language and trust among participants, little emphasis was given to the measurement of CP project outcomes. Clarke and Roome (1999) suggested that formal communication of sustainability initiatives trigger management involvement, together with intra- and inter-organisational communication. Soosay et al. (2008) underscored the importance of top management involvement as a requirement for supply collaboration. The formal communication of benefits obtained from implementing CP projects could be included in initiatives like the MSSP by designing such complementary tools as certification and public recognition.

It should be noted that the MSSP design included several conditions that favoured collaboration: First, the voluntary nature of participation ensured supplier autonomy (Wood and Gray, 1991). Second, a clear collaboration strategy was defined by linking the individual interests of anchor companies and suppliers to common interests of supply chains (Blomqvist and Levy, 2006; Maloni and Benton, 2000; Huxham, 1993). Third, both trust (Blomqvist and Levy, 2006) and open communication among managers (Wondolleck and Yaffee, 2000), were generated in workshop training. Fourth, a commitment to undertake collaboration (Blomqvist and Levy, 2006) was fostered by selecting participants from established buyer-supplier relationships. Fifth, learning-by-doing was applied both as a means for learning to collaborate (Lambe et al., 2002), and as a tacit organisational asset (Powell et al., 1996; Huxham, 1993). Accordingly, the MSSP can be viewed as a voluntary environmental initiative that employed collaboration concepts as a key mechanism for CP implementation as part of sustainable supply chain management.

7. Conclusions and recommendations for future research

This paper highlights collaboration capacity as a multidimensional organisational construct in CP implementation initiatives. The study identified different levels of collaboration capacity of SME suppliers explained by organizational characteristics and their managers' profiles. Additionally, this study proposed a framework for the operationalisation of collaboration capacity in sustainable supply chain management.

The collaboration capacity of 177 suppliers was assessed to determine how that capacity contributed to the CP implementation goals of a major multi-stakeholder effort, undertaken in Mexico's emerging economy. The comparison of research findings with the theoretical model of collaboration capacity provided an understanding of the effects of collaboration on the implementation of CP among SME suppliers. Empirical evidence for this study was obtained by statistical analyses of consistently collected data.

Collaboration capacity for sustainable supply chain management represented a new organisational construct, introduced to identify a firm's capability to connect to a supply chain's sustainability initiatives, as well as design and implement environmental projects. The construct combined concepts drawn from literature on collaboration theory and sustainable supply chain management, and emphasises the operational, cooperative, and communicative routines required for the successful implementation of initiatives involving buyer-supplier relationships.

Collaboration capacity may be viewed as a complex, structured and multi-dimensional organisational construct that generates competitive advantage based on sustainability. Therefore, collaboration capacity is a significant concept for CP implementation within supply chains and networks.

This paper contributes to theory by integrating sustainability-related organisational routines with collaboration theory and specifying network capabilities of sustainable supply chain management. Furthermore, it provides and justifies supplier selection criteria for managers of anchor companies pursuing sustainable supply chain initiatives. SMEs are offered recommendations for the assignment of managers to multi-stakeholder initiatives. Also, agencies involved in the implementation of sustainable practices among firms, supply chains and other networks should address collaboration capacity as a component to ensure the efficiency of their initiatives.

Although the study provided numerous insights into the collaboration capacity of suppliers, one limitation is that only a small part of the inter-organisational dynamics was assessed. The collaboration domain is multi-dimensional and involves the collaboration capacity of anchor companies and agents, such as service providers. Within this research, these actors were not taken into account. Future research should focus on the "collaboration capacity" of anchor firms as well as on the capacity of convener organisations, such as service providers that offer training workshops. Understanding their dynamics would uncover the information required to upscale multi-stakeholder CP efforts, such as the MSSP, and assist in replicating the MSSP's holistic approach in other emerging economies.

Additional recommendations for research include widening the size and scope of the sample by addressing the impact of geographic characteristics on collaboration capacity. Broadening the scope of future studies by including social aspects into the operationalisation of collaboration capacity would contribute to theory building in sustainable supply chain management. To generalize the recommendations of empirical research, the use of a control-group in the context of supplier selection is recommended.

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Appendix A. Variables influencing collaboration capacity of suppliers

Variable	Categories	Descriptive statistics		Reference category
		n	%	
Type of supplier	• Printing	44	25%	• Services
	• Packaging	28	16%	
	• Raw materials (chemicals, minerals, agricultural products)	50	28%	
	• Indirect supplies (office equipment, filters)	40	23%	
	• Services (cleaning services, maintenance, catering)	15	8%	
Firm location	• Mexico City	9	64%	• Mexico City
	• Queretaro	5	36%	
Firm size	• Large (>250 employees)	35	20%	• Small
	• Medium (51–250 employees)	83	47%	
	• Small (11–50 employees)	59	33%	
Participant profile	• Technical	95	54%	• Combined technical and administrative
	• Administrative	30	17%	
	• Combined technical and administrative	47	26%	
	• Other	5	3%	
Number of participants per firm	• 1	67	38%	• 1 participant per firm
	• >1	110	62%	

References

Ahi, P., Searcy, C., 2013. A comparative literature analysis of definitions for green and sustainable supply chain management. J. Clean. Prod. 52, 329–341. http://dx.doi.org/10.1016/j.jclepro.2013.02.018.

Aragón-Correa, J.A., García, V.J., Cordón-Pozo, E., 2007. Leadership and organizational learning's role on innovation and performance: lessons from Spain. Ind. Market. Manag. 36 (3), 349–359. http://dx.doi.org/10.1016/j.indmarman.2005.09.006.

Baas, L., 2006. To make zero emissions technologies and strategies become a reality, the lessons learned of cleaner production dissemination have to be known. J. Clean. Prod. 15, 1205–1216. http://dx.doi.org/10.1016/j.jclepro.2006.07.017.

Blackman, A., 2006. Small Firms and the Environment in Development Countries: Collective Impacts, Collective Action. Resources for the Future, Washington DC.

Blomqvist, K., Levy, J., 2006. Collaboration capability: a focal concept in knowledge creation and collaborative innovation in networks. Int. J. Manag. Concepts Phil. 2 (1), 31–47. http://dx.doi.org/10.1504/IJMCP.2006.009645.

Boons, F., 2009. Creating Ecological Value: An Evolutionary Approach to Business Strategies and the Natural Environment. Edward Elgar Publishing Limited, Cheltenham.

Boons, F., Baas, L., 1997. Types of industrial ecology: the problem of coordination. J. Clean. Prod. 5, 79–86. http://dx.doi.org/10.1016/S0959-6526(97)00007-3.

Bowen, F.E., Cousins, P.D., Lamming, R.C., Farukt, A.C., 2001. The role of supply management capabilities in green supply. Prod. Oper. Manag. 10 (2), 174–189. http://dx.doi.org/10.1111/j.1937-5956.2001.tb00077.x.

Cai, S., Jun, M., Yang, Z., 2010. Implementing supply chain information integration in China: the role of institutional forces and trust. J. Oper. Manag. 28 (3), 257–268. http://dx.doi.org/10.1016/j.jom.2009.11.005.

Cao, M., Zhang, Q., 2011. Supply chain collaboration: impact on collaborative advantage and firm performance. J. Oper. Manag. 29 (3), 163–180. http://dx.doi.org/10.1016/j.jom.2010.12.008.

Carter, C.R., Easton, P.L., 2011. Sustainable supply chain management: evolution and future directions. Int. J. Phys. Distrib. Log. Manag. 41 (1), 46–62. http://dx.doi.org/10.1108/09600031111101420.

Carter, C.R., Rogers, D.S., 2008. A framework of sustainable supply chain management: moving toward new theory. Int. J. Phys. Distrib. Logist. Manag. 38 (5), 360–387. http://dx.doi.org/10.1108/09600030810882816.

Chertow, M.R., Ashton, W.S., 2009. The social embeddedness of industrial symbiosis linkages in Puerto Rican industrial regions. In: Boons, F., Howard-Grenville, J. (Eds.), Social Embeddedness of Industrial Ecology. Edward Elgar Publishing Limited, Cheltenham, pp. 128–151.

Clarke, S., Roome, N., 1999. Sustainable business: learning – action networks as organizational assets. Bus. Strat. Environ. 8 (5), 296–310. http://dx.doi.org/10.1002/(SICI)1099-0836(199909/10)8:5<296::AID-BSE212>3.0.CO;2-N.

Delmas, M., Montiel, I., 2009. Greening the supply chain: when is customer pressure effective? J. Econ. Manag. Strat. 18 (1), 171–201 http://dx.doi.org/10.1111/j.1530-9134.2009.00211.x.

Dieleman, H., 2007. Cleaner production and innovation theory: social experiments as a new model to engage in cleaner production. Rev. Int. Contamin. Amb. 23 (2), 79–94.

Fayet, L., Vermeulen, W.J.V., 2012. Supporting smallholders to access sustainable supply chains: lessons from the Indian cotton supply chain. Sustain. Develop.. http://dx.doi.org/10.1002/sd.1540.

Friedman, A.L., Miles, S., 2002. SMEs and the environment: evaluating dissemination routes and handholding levels. Bus. Strat. Environ. 11 (5), 324–341. http://dx.doi.org/10.1002/bse.335.

Gold, S., Seuring, S., Beske, P., 2010. Sustainable supply chain management and inter-organizational resources: a literature review. Cor. Soc. Respons. Environ. Manag. 17 (4), 230–245. http://dx.doi.org/10.1002/csr.207.

Gray, B., 1985. Conditions facilitating inter-organizational collaboration. Human Rel. 38 (10), 911–936. http://dx.doi.org/10.1177/001872678503801001.

Gulati, R., Lavie, D., Singh, H., 2009. The nature of partnering experience and the gains from alliances. Strat. Manag. J. 30 (11), 1213–1233. http://dx.doi.org/10.1002/smj.786.

Haake, H., Seuring, S., 2009. Sustainable procurement of minor items: exploring limits to sustainability. Sustain. Develop. 17 (5), 284–294. http://dx.doi.org/10.1002/sd.424.

Heimeriks, K.H., Duysters, G., 2007. Alliance capability as a mediator between experience and alliance performance: an empirical investigation into the alliance capability development process. J. Manag. Stud. 44, 25–49. http://dx.doi.org/10.1111/j.1467-6486.2006.00639.x.

Hirschhorn, J.S., 1997. Why the pollution prevention revolution failed – and why it ultimately will succeed. Pollut. Prevent. Rev. 7 (1), 11–31.

Horowitz, J.L., Savin, N.E., 2001. Binary response models: logits, probits and semiparametrics. J. Econ. Persp. 15 (4), 43–56. http://dx.doi.org/10.1257/jep.15.4.43.

Hult, G.T.M., Ketchen Jr., D.J., Nichols Jr., E.L., 2003. Organizational learning as a strategic resource in supply management. J. Oper. Manag. 21 (5), 541–556. http://dx.doi.org/10.1016/j.jom.2003.02.001.

Huxham, C., 1993. Collaborative capability: an intra-organizational perspective on collaborative advantage. Public Money Manag. 13 (3), 21–28. http://dx.doi.org/10.1080/09540969309387771.

Inkpin, A., 1998. Learning, knowledge acquisition, and strategic alliances. Eur. Manag. J. 16 (2), 223–229. http://dx.doi.org/10.1016/S0263-2373(97)00090-X.

Lambe, C.J., Spekman, R.E., Hunt, S.D., 2002. Alliance competence, resources, and alliance success: conceptualization, measurement, and initial test. J. Acad. Market. Sci. 30 (2), 141–158. http://dx.doi.org/10.1177/03079459994399.

Lee, S.-Y., 2008. Drivers for the participation of small and medium-sized suppliers in green supply chain initiatives. Supp. Chain Manag. Int. J. 13 (3), 185–198. http://dx.doi.org/10.1108/13598540810871235.

Lozano, R., 2007. Collaboration as a pathway for sustainability. Sustain. Develop. 15 (6), 370–381. http://dx.doi.org/10.1002/sd.322.
Lozano, R., 2008. Developing collaborative and sustainable organizations. J. Clean. Prod. 16 (4), 499–509. http://dx.doi.org/10.1016/j.jclepro.2007.01.002.
Malhotra, Y., 2002. Information Ecology and Knowledge Management: Toward *Knowledge Ecology for Hyperturbulent Organizational Environments*. Encyclopaedia of Life Support Systems (EOLSS), UNESCO/Eolss Publishers, Oxford.
Maloni, M., Benton, W.C., 2000. Power influences in the supply chain. J. Bus. Logist. 21 (1), 49–73, 30AJ271.
Mitchell, C.L., 2006. Beyond barriers: examining root causes behind commonly cited cleaner production barriers in Vietnam. J. Clean. Prod. 14 (18), 1576–1585. http://dx.doi.org/10.1016/j.jclepro.2005.04.010.
Mol, M.J., 2003. Purchasing's strategic relevance. J. Purch. Suppl. Manag. 9 (1), 43–50. http://dx.doi.org/10.1016/S0969-7012(02)00033-3.
Nollet, J., Ponce, S., Campbell, M., 2005. About "strategy" and "strategies" in supply management. J. Purch. Suppl. Manag. 11, 129–140. http://dx.doi.org/10.1016/j.pursup.2005.10.007.
Paquin, R., Howard-Grenville, J., 2009. Facilitating regional industrial symbiosis: network growth in the UK's national industrial symbiosis programme. In: Boons, F., Howard-Grenville, J. (Eds.), Social Embeddedness of Industrial Ecology. Edward Elgar Publishing Limited, Cheltenham, pp. 103–127.
Porter, M.E., Kramer, M.R., 2011. Creating shared value. Harv. Bus. Rev. 89 (1–2), 62–77.
Powell, W.W., 1990. Neither market nor hierarchy: network forms of organization. Res. Organ. Behav. 12, 295–336.
Powell, W.W., Koput, K.W., Smith-Doerr, L., 1996. Inter-organizational collaboration and the locus of innovation: networks of learning in biotechnology. Adm. Sci. Q. 41, 116–145.
Puppim de Oliveira, J.A., 2008. Upgrading Clusters and Small Enterprises in Developing Countries: Environmental, Labour, Innovation and Social Issues. Ashgate Publishing Limited, Farnham.
Sage, J., 2000. Continuous learning and improvement in a regional cleaner production network. J. Clean. Prod. 8 (5), 381–389. http://dx.doi.org/10.1016/S0959-6526(00)00041-X.
Sarkis, J., 2002. A strategic decision framework for green supply chain management. J. Clean. Prod. 11 (4), 397–409. http://dx.doi.org/10.1016/S0959-6526(02)00062-8.
Seuring, S., Müller, M., 2008. From a literature review to a conceptual framework for sustainable supply chain management. J. Clean. Prod. 16 (15), 1699–1710. http://dx.doi.org/10.1016/j.jclepro.2008.04.020.
Sharma, S., Vredenburg, H., Westley, F., 1994. Strategic bridging: a role for the multinational corporation in third world development. J. Appl. Behav. Sci. 30 (4), 458–476. http://dx.doi.org/10.1177/0021886394304007.
Soosay, C., Hyland, P.W., Ferrer, M., 2008. Supply collaboration: capabilities for continuous innovation. Supp. Chain Manag. Int. J. 13 (2), 160–169. http://dx.doi.org/10.1108/13598540810860994.
Stone, L.J., 2006. Limitations of cleaner production programmes as organizational change agents. I. Achieving commitment and on-going improvement. J. Clean. Prod. 14, 1–14. http://dx.doi.org/10.1016/j.jclepro.2004.12.008.
Storer, M., Hyland, P., 2009. Dynamic capabilities and innovation in supply chains. In: Enhancing the Innovation Environment: Proceedings of the 10th International CINet Conference, 6–8 September 2009, Australia, Queensland, Brisbane, pp. 912–923.
Vachon, S., Klassen, R.D., 2006. Extending green practices across the supply chain: the impact of upstream and downstream integration. Int. J. Oper. Prod. Manag. 26 (7), 795–821. http://dx.doi.org/10.1108/01443570610672248.
Vachon, S., Klassen, R.D., 2007. Supply chain management and environmental technologies: the role of integration. Int. J. Prod. Res. 45 (2), 401–423. http://dx.doi.org/10.1080/00207540600597781.
Vachon, S., Klassen, R.D., 2008. Environmental management and manufacturing performance: the role of collaboration in the supply chain. Int. J. Prod. Econ. 111 (2), 299–315. http://dx.doi.org/10.1016/j.ijpe.2006.11.030.
Van Berkel, R., 2007. Cleaner production and eco-efficiency initiatives in Western Australia 1996-2004. J. Clean. Prod. 15, 741–755. http://dx.doi.org/10.1016/j.jclepro.2006.06.012.
Vidal-Salazar, M.D., Cordon-Pozo, E., Ferron-Vilchez, V., 2012. Human resource management and developing proactive environmental strategies: the influence of environmental training and organizational learning. Hum. Res. Manag. 51 (6), 905–934. http://dx.doi.org/10.1002/hrm.21507.
Winter, S.G., 2006. Understanding dynamic capabilities. Strat. Manag. J. 24 (10), 991–995. http://dx.doi.org/10.1002/smj.318.
Wondolleck, J.M., Yaffee, S.L., 2000. Making Collaboration Work: Lessons from Innovation in Natural Resource Management. Island Press, Washington DC.
Wood, D.J., Gray, B., 1991. Toward a comprehensive theory of collaboration. J. Appl. Behav. Sci. 27 (2), 139–162. http://dx.doi.org/10.1177/0021886391272001.
Wooldridge, J.M., 2008. Introductory Econometrics: A Modern Approach, fourth ed. South Western College Publishing, Cincinnati.
Zhu, Q., Geng, Y., Fujita, T., Hahimoto, S., 2010. Green supply chain management in leading manufactures: case studies in Japanese large companies. Manag. Res. Rev. 33 (4), 380–392. http://dx.doi.org/10.1108/01409171011030471.