THE SPREAD OF GREEN PRACTICES IN BUSINESS NETWORKS

COMPETITIVE PAPER

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ABSTRACT

The paper proposes a theoretical framework governing the spread of green (environmental) practices in business networks. This addresses gaps identified in extant green supply chain management and network theory literature. The network approach, as developed by the Industrial Marketing and Purchasing (IMP) Group, affords a comprehensive analysis of the interactions between the numerous organisations influencing an entity's environmental policies and practices, such as governments, industry organisations, environmental advocacy groups, consumers, customers, suppliers, supplier's suppliers and so forth. The framework will assist stakeholders, such as governments and brand owners, who may be interested in green practices spreading throughout industries and supply chains.

Key words: environmental practices; industrial networks; spread of practices; sustainability

INTRODUCTION

Organisations face increasing demands from stakeholders to be "sustainable" (Seuring & Muller 2008a; Linton, Klassen & Jayaraman 2007; Seuring & Muller 2008b), which requires management of not only the economic aspects of business, but also their social and environmental facets (Seuring & Muller 2008b; Othman & Ameer 2009; European Commission 2011). The environmental or "green" issues that need to be addressed include (1) adherence to environmental laws and regulations and (2) meeting increased demands from consumers for environmentally friendly products and processes (Zhu, Sarkis & Geng 2005; Srivastava 2007). To manage these green issues, many organisations have implemented additional intra- and inter-organisation green practices (Handfield, Sroufe & Walton 2005; Vachon & Klassen 2006; Simpson & Samson 2010) that are aimed at improving environmental performance. Examples of intra-organisation green practices include the design of "greener" products (Rao 2002) and the implementation of environmental management systems (Gonzalez, Sarkis & Adenso-Diaz 2008). Inter-organisation green practices include collaboration with suppliers and/or customers to develop greener products (Sharfman, Shaft & Anex Jr. 2009), as well as green purchasing practices, where environmental indicators are included in supplier selection criteria (Min & Galle 2001).

Environmental performance management is increasingly being monitored across the supply chain (Linton, Klassen & Jayaraman 2007; Zhu, Sarkis & Lai 2008; Vachon & Klassen 2006). Consequently, the traditional notion of "supply chain" has been extended to include environmental aspects, such as end-of-life processes, recycling and re-use (Pagell & Wu 2009). Some companies are trying to understand their product's comprehensive carbon and water footprints over its life-cycle, which may involve cooperation between a number of companies (Kovacs 2008). For example, PUMA recently published an "Environmental Profit & Loss Account", which presents environmental indicators across PUMA's supply chain (PUMA 2011). They found raw material production at the fourth-tier supplier level had the highest greenhouse gas emissions and water consumption impacts. Another example requiring collaboration across the supply chain is Wal-Mart, which expects to provide information on product labels detailing the overall environmental impact of those items, which necessitates the compilation of environmental data over the product's life-cycle (Christopher 2011). These examples highlight the importance of environmental practices at all tiers in supply chains and the significance of spread of green practices to these tiers.

Some researchers have incorporated the entire supply chain in their analysis of green issues (Pagell & Wu 2009), with some even considering the forward and reverse supply chain simultaneously (Hulthen & Gadde 2009; Zhu, Sarkis & Lai 2008). However, a criticism of prior research is that most studies concentrate on the focal company and its customers or first-tier suppliers and do not extend the analysis to longer sections of the supply chain (Srivastava 2007). Further, many of these studies consider the dyadic relationships from only the customers' viewpoint, to the exclusion of suppliers' and other stakeholders' perspectives (Srivastava 2007; Wagner 2006). Srivastava (2007) called for research dealing with the spread of green supply chain management best practices. Seuring and Muller (2008b) echo this sentiment, suggesting the development of a sustainable supply chain requires many more tiers of suppliers to be included in the analysis as environmental standards need to be traced back to the first materials used and the processes used to extract them.

Many propose that business issues are best understood when considered not only at a company level, a buyer-supplier dyad level or a supply chain level, but also at a business network level (Gulati, Nohria & Zaheer 2000; Håkansson et al. 2009). Gulati et al. (2000) argued a company's conduct and performance can be better understood by examining the network of relationships in which it is embedded. Oberg, Huge-Brodin & Bjorklund (2009) warned contemplation of environmental effects (e.g. pollution or noise) at a company level, rather than at a network level, may lead to decisions that are detrimental to the environment. Halinen, Salmi & Havila (1999) contend that the network approach offers conceptual tools for the study of dynamics in business markets, as it incorporates direct and indirect links, as well as close and distant relationships. They found that network analysis shows relationships have important roles in the generation and transmission of change. The network approach, as developed by the Industrial Marketing and Purchasing (IMP) Group, would suggest that to comprehend an organisation's adoption and spread of environmental practices it is necessary to understand its dyadic relationships, as well as the network of relationships in which it is directly and indirectly involved. However, to date there is limited network literature addressing green issues and the spread of practices and behaviour in networks (Harilainen 2009; Oberg, Huge-Brodin & Bjorklund 2009; Halinen, Salmi & Havila 1999; Welch 2000).

To address these gaps identified in extant green supply chain management and network theory literature, this paper proposes a theoretical framework governing the spread of green practices in business networks. The framework builds on Harilainen's (2009) work and utilises insights from prior theories relating to the spread of practices in supply chains (Vachon & Klassen 2006; Hall 2000; Kovacs 2008; McFarland, Bloodgood & Payan 2008; Pagell & Wu 2009) and networks (Harilainen 2009), as well as theories relating to network change (Halinen, Salmi & Havila 1999; Harilainen 2009; Havila & Salmi 2000; Johnston, Peters & Gassenheimer 2006; Madhavan, Koka & Prescott 1998). This answers calls for a broadening of green supply chain analysis to include the entire supply chain (Srivastava 2007). It offers a contribution to the network literature by addressing green issues from a business network perspective (Harilainen 2009; Oberg, Huge-Brodin & Bjorklund 2009; Halinen, Salmi & Havila 1999; Welch 2000) and developing theories concerning the spread of practices in networks (Srivastava 2007; Vachon & Klassen 2006). While the paper concentrates on the green aspect of the Corporate Social Responsibility (CSR) and "sustainability" triad, the potential trade-offs and interactions with social and economic aspects are considered concurrently to gain a holistic perspective.

Thus, the objectives of the paper are as follows:

To develop a **theoretical framework** governing the spread of green practices in business networks including contemplation of:

a. **how** green practices are spread in business networks;
b. the **factors** which **trigger and inhibit** the spread of green practices in business networks; and
c. the **necessary conditions** influencing the spread of green practices in business networks.

The remainder of the paper consists of a review of the extant literature leading to the presentation of the proposed theoretical framework. Thereafter the framework is discussed, followed by concluding remarks and suggested areas for further research.

LITERATURE REVIEW

To understand the spread of green practices in business networks, prior research relating to green practices was consulted, as well as theories concerning change, adaptions and spread of practices emanating from the extant supply chain management and network theory literature. Although many of the theories relating to change and spread of practices can be applied to sundry management practices, it is submitted that green practices are sufficiently distinct in relation to the drivers of their spread and conditions required for their spread to warrant specific attention on this group of practices. For example, green practices differ from other management practices aimed at improving cost, quality and delivery in that often the economic benefit of the green practice is not tangible in the short- (or even long-) term. In this regard green practices share similarities with social practices. However, since the drivers and conditions under which spread occurs often differ between green and other CSR practices, this paper focuses specifically on green practices to gain an in-depth understanding of their spread. The next three sub-sections provide a review of literature relating to (1) the green practices themselves, (2) the motivations, hindrances and necessary conditions for the spread of green practices and (3) theories of spread emerging from the supply chain management and network theory literature.

GREEN PRACTICES

A number of types of green practices have been considered in the literature. The objective of all these practices is the improvement of an organisation's own and/or its supply chain's environmental performance, such as their carbon emissions, waste management and water usage. These practices may be considered along intra- and inter-organisation lines. The literature concerning intra- organisation green practices has focused on the practices themselves (Theyel 2000; Sarkis 2001), the motivations for employing green practices (Cousins, Lamming & Bowen 2004; Hall 2000; Handfield, Sroufe & Walton 2005), the usage of environmental management systems and certification of these systems (Gonzalez, Sarkis & Adenso-Diaz 2008; Fryxell & Szeto 2002) and the link between green practices and environmental and economic performance (Zhu, Sarkis & Geng 2005; Zhu & Sarkis 2007; Theyel 2000). Inter-organisation green practices are contemplated in the green supply chain management literature (Kovacs 2008; Handfield, Sroufe & Walton 2005; Rao 2002; Rao & Holt 2005; Seuring & Muller 2008b; Srivastava 2007; Vachon & Klassen 2006; Zhu, Sarkis & Geng 2005), green supplier development literature (Bai & Sarkis 2010) and green purchasing literature (Min & Galle 2001), as discussed below.

Srivastava (2007, pp. 54-55) defined green supply chain management as: "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life". This definition highlights the strategic and practical aspects of incorporating green considerations into management of the supply chain and the product's full life-cycle.

There is an extensive list of green supply chain management practices contemplated in the literature ranging from arm's-length to collaborative interactions (Zhu, Sarkis & Geng 2005; Vachon & Klassen 2006). Vachon and Klassen (2006) have broadly grouped the green supply chain management practices into "environmental monitoring" and "environmental collaboration" categories. Environmental monitoring practices are activities by a buying company that use markets or arm's-length transactions to evaluate and control its suppliers. On the other hand, environmental collaboration describes activities where the buying

company gets directly involved with its suppliers to jointly develop environmental solutions (Vachon & Klassen 2006). This classification highlights the range of green supply chain management practices available to management, as well as the management choice between a hands-off versus collaborative approach to addressing green issues with supply chain members. Within this array of green supply chain management practices, there is an emergent interest in green supplier development (Bai & Sarkis 2010).

Supplier development may be defined as: "any effort of a buying firm with its supplier(s) to increase the performance and/or capabilities of the supplier and meet the buying firm's short- and/or long-term supply needs" (Krause & Ellram 1997a, p. 21). Green supplier development may thus be considered as efforts of a buying firm with its supplier(s) to improve the *environmental* performance and/or capability of the supplier(s). Traditionally the focus of supplier development programmes have been to improve cost, quality and delivery of suppliers (Wagner 2006). Just as the focus on quality in the 1990s spurred a number of supplier development initiatives (Wagner 2006), such as training suppliers in total quality management, continuous improvement, ISO 19001 and statistical process control, the heightened importance of environmental performance is leading to initiatives targeting improved green performance (Bai & Sarkis 2010). While considerable research has examined general supplier development (Krause 1997; Wagner 2006), *green* supplier development literature is still embryonic (Srivastava 2007). Green purchasing practices, a further group of inter-organisation green practices, have been investigated within the green supplier development and green supply chain management literature (Min & Galle 2001; Srivastava 2007), as well as from a purchasing literature perspective (Srivastava 2007).

The theoretical framework developed in this paper contemplates the spread of all the above-mentioned intra- and inter-organisation "green" practices *between organisations*. The framework does not focus on the spread of green practices within the internal operations of an organisation. The proposed framework makes allowance for consideration of whether green practices with different *attributes* or characteristics spread differently i.e. whether the rate, extent and processes of spread differ among *groups* of green practices exhibiting common attributes. For example, the framework allows for consideration of whether green practices with the attribute of being required by law spread differently (in terms of rate, extent and processes of spread) to voluntary green practices, all else being equal. Another example is whether green practices with the attribute of resulting in short-term net economic benefits spread differently to those with long-term benefits. This conjecture emerges from extant literature which categorises management practices with common attributes into groups so as to explain characteristics and behaviour of such groups of practices. An example arising from the supplier development literature is the distinction between direct and indirect supplier development practices (where direct practices require the use of substantial human and capital resources, whereas indirect practices make use of the market and arm's-length transactions to bring about improvements in suppliers' performance, thus requiring less human and capital resources) (Wagner 2006). Wagner (2006) found that these two categories of practices are conducted consecutively in corporate practice, with direct supplier development following the basis laid by indirect supplier development practices. Thus, he ascribed different behaviours and use of these distinguishable groups of practices. Along these lines, the framework proposes *attributes* of green practices which may lead to differences in the rate, extent and processes of their spread (please refer to table 2), which is discussed further in the "proposed theoretical framework" section.

MOTIVATIONS, HINDRANCES AND NECESSARY CONDITIONS FOR SPREAD

The literature highlights numerous motivations for the adoption and/or spread of green practices. These motivations can be understood in terms of internal organisation motivations and motivations arising from external pressures. Internal motivations include competitive advantage, the avoidance of fines for non-compliance with regulations, cost savings due to efficiencies, as well as mitigating the risk of financial and reputational damage in the event of environmental disasters (Cousins, Lamming & Bowen 2004; Hall 2000; Handfield, Sroufe & Walton 2005). Hall (2000) contends that regulators should recognise that legislation is not the only mechanism that can generate change in practices and that understanding other pressures and mechanisms can help increase the leverage of limited government resources. External pressures motivating the use and spread of green practices may arise from consumer advocacy groups, consumers, buying companies, culture or legislation (Hall 2000; Vachon 2010). Kovacs (2008) uses the term "environmental demand" to describe the pressures on companies to incorporate green practices into their business, while Hall (2000) refers to them as "environmental pressures".

Not all companies are exposed to the same environmental pressures and motivations, due to differences in company size and prominence, industry type, country and network position (Hall 2000). Differences in environmental pressures provide part of the explanation for varying use of green practices between companies, industries and countries (Hall 2000; Zhu & Sarkis 2006). For example, the use of green practices is higher in North America and Europe compared to China (Hall 2000). Within China, Zhu and Sarkis (2006) found industry differences in the drivers and practices of green supply chain management. Lead companies and brand owners often face significant environmental pressure, being held accountable not only for their own environmental performance, but also for the environmental performance of other companies in their supply chains (Kovacs 2008; Seuring & Muller 2008b; Rao & Holt 2005). The environmental pressure on lead companies may serve as a motivation to spread green practices within their supply chains. Suppliers, on the other hand, are often not under direct environmental pressure from consumers (Hall 2000) but are subject rather to environmental pressures passed on from lead companies (Hall 2000). Suppliers may thus have less motivation to spread green practices further along their supply chains (Hall 2000).

In addition to motivations, extant literature discusses the *hindrances* to incorporating green practices into an organisation (Vachon & Klassen 2006; Kovacs 2008). Hindrances include prohibitive costs of green practices, lack of market demand for green products and processes, lack of technical ability to adopt and/or spread green practices, as well as the perception of green matters as secondary business issues (England & White 2009; Hall 2000; Vachon & Klassen 2006). This lack of emphasis on green business issues is captured in Vachon and Klassen's (2006, p. 801) finding that, "while there is growing pressure for environmental criteria to be a major factor in the design and management of supply chains, environmental issues tend to still be viewed as peripheral decisions and ancillary investments".

The *hindrances* appear to be resulting in limited adoption and spread of green practices in certain companies, industries, countries and networks. For example, Kovacs (2008, p. 1572) reported that environmental purchasing measures are scarce in practice and rarely extend beyond first-tier suppliers and "little is done to extend these measures to several echelons, to say nothing of enforcing them in the ultimate supply chain". Frequently the propagation of green practices seems to halt at the first-tier supplier level of lead companies. For example, the Toyota Australia 2010 Sustainability Report indicates that while corporate social responsibility activities (which includes safety, the *environment* and human rights) are being

spread to first-tier suppliers, first-tier suppliers are not actively deploying these activities to second- and third-tier suppliers (Toyota 2010). These examples of lack of spread of green practices highlight the relevance of understanding how and why green practices are (or are not) spread.

On a practical level, the literature points to a number of *necessary conditions* which need to be present for green practices to be adopted and/or spread. The first requirement is top management support. Sometimes this support only emerges after a major environmental crisis (Handfield, Sroufe & Walton 2005). For example, at Dow Chemical, their strategy for re-designing their supply chain logistics channels came about only after a major chemical spill on the rail line that resulted in huge clean-up costs (Handfield, Sroufe & Walton 2005).

The second necessary condition for adoption and spread of green practices is the ability to operationalize a green strategy at lower management levels within an organisation, which requires the relevant technical and management skills. The first steps in implementing an environmental supply chain strategy, such as implementing practices to reduce the likelihood of environmental disasters and capturing the "low-hanging fruit such as recycling cardboard, paper and glass" (Handfield, Sroufe & Walton 2005, p. 5) may be easy to implement at the operational level. However, the next stages of implementation can be more difficult because managers perceive *trade-offs* between improved environmental performance on the one hand, and improvements in traditional performance measures such as cost and quality, on the other (Handfield, Sroufe & Walton 2005). Similar to the trade-off often cited between quality and costs, "improved environmental performance and costs are often seen only as in dichotomous, and not symbiotic relationship" (Handfield, Sroufe & Walton 2005, p. 5). To overcome the chasm between environmental strategy and its implementation at the operational level, Simpson and Sampson (2010) suggest that certain environmental practices, such as the use of environmental experts, can play a bridging role.

The third necessary condition for the spread of green practices is the presence of current or perceived future demand for "green" products and processes by the market (England & White 2009). The effect of a lack of this condition was highlighted in a government project in the Western Australian dairy industry. The project's aim was to spread the implementation of an environmental self-assessment tool and green practices (England & White 2009). The project was implemented at pilot farms with the assistance of government funding and technical support. However, these practices failed to spread outside the pilot groups since the market or community drivers for demonstrating sustainability were not strong enough at that time (England & White 2009).

These differences in motivations, hindrances and conditions relating to organisations, industries and countries points to the importance of *context* in determining the spread of green practices. That is, the spread of green practices is highly dependent on the circumstances and characteristics of the organisations, dyadic relationships, supply chains and networks under consideration. This insight from the literature regarding the significance of *context* in the spread of green practices is incorporated in the proposed theoretical framework, where the term "*sea of context*" is used to denote the set of circumstances and conditions immersing organisations, relationships and networks.

THEORIES OF SPREAD

"Spread" in this paper implies bringing about changes in practices and behaviour in another organisation. This section discusses the theories of spread of (green) practices emerging from the supply chain management and network theory literature.

THEORIES FROM SUPPLY CHAIN MANAGEMENT

There have been theories proposed for the spread of management practices along supply chains, such as the notions of *supply chain contagion* (McFarland, Bloodgood & Payan 2008), *environmental supply chain dynamics* (Hall 2000) and *supplier development* (Wagner 2006; Krause 1997). Supply chain contagion refers to "the propagation of inter-firm behaviours from one dyadic relationship to an adjacent dyadic relationship within the supply chain" (McFarland, Bloodgood & Payan 2008, p. 63). This theory can be viewed in combination with the large body of work on *social contagion*, which offers insights into the spread of practices and behaviour of *individuals*, see for example Burt (1987) and Valente (1996). The main mechanism of spread in supply chain contagion is *imitation*. McFarland et al. (2008) found that the way intermediaries treat end customers is significantly explained by an imitation of the way suppliers treated the intermediary. Their empirical investigation only included the supplier-intermediary and intermediary-customer relationships, and did not capture the full length of the supply chain. Thus, they have not investigated empirically whether the same process of spread (contagion) occurs in other relationships within the supply chain.

Environmental supply chain dynamics (ESCDs) is defined as a "phenomenon where environmental innovations diffuse from a customer to a supplier firm" (Hall 2000, p. 455). Hall (2000) found that ESCDs emerge when there is a channel leader with adequate power over their suppliers, suitable technical competencies, and under specific environmental pressure. The contribution of this theory is that *both* environmental pressures *and* supply chain pressures are needed to spread environmental practices in a supply chain. Thus, companies not only need the reasons to initiate an environmental supply chain, but also the capabilities to make them work (Hall 2000). The empirical work on ESCD did not extend beyond the buyer-supplier dyad and considered supply chains individually and not from a network perspective.

Bringing about desired changes in suppliers has long been contemplated in the supplier development literature. The term "supplier development" covers a wide range of activities and strategies. At the one extreme, a firm may adopt a strategy involving no, or very limited, supplier development efforts, such as informal supplier evaluation or a request for improved performance (Krause 1997). At the other extreme, a firm's strategy may involve extensive efforts, such as the training of the supplier's personnel and investment in the supplier's operation (Krause 1997). Thus, the mechanisms of spread of supplier development range from coercion to cooperation. Most of the general supplier development practices discussed in the literature can be adapted to target green performance improvement. Some of the network theory literature is critical of certain premises of supplier development, such as the premise that it is a one-sided activity (Ford et al. 2003). However, supplier development is commonly found in practice and need not be interpreted as a one-sided activity. It takes the response and at times cooperation and investment of both sides (buyers and suppliers) to bring about change (Krause & Ellram 1997b; Krause & Ellram 1997a).

The above theories of spread of practices in supply chains (supply chain contagion, ESCD and supplier development) are similar in that they deal with dyadic relationships, while they differ in the mechanisms of achieving spread. The main criticism of these theories is that only dyadic relationships were investigated, thus the theories have not been contemplated for longer lengths of the supply chain, nor from a network perspective. These theories of spread are incorporated in the proposed theoretical framework where they are termed *"processes"* of spread.

THEORIES FROM THE NETWORK APPROACH

The network models developed by the IMP Group visualise changes occurring in networks as the result of *interactions* between organisations, where organisations may choose to make *adaptations* towards each other (Håkansson & Snehota 1995). Interactions are a multi-dimensional process between companies that change and transform aspects of the resources and activities of those companies, as well as the companies themselves (Håkansson et al. 2009). These changes can be spread further through the impact of interactions within a dyad affecting each company's interactions with other connected companies in the network (Håkansson et al. 2009). The IMP network models suggest that incremental evolution is the main mode of network change (Halinen, Salmi & Havila 1999). Radical changes or revolutions have been viewed as possible but unusual (Halinen, Salmi & Havila 1999).

The IMP network theorists have discussed the sites of interaction and adaptions in terms of the concept on "interfaces" between various parties, both within organisations (Berry 1977; Biemans, Makovec Brenčič & Malshe 2010; Anderson & Taylor 1977; Saghafi, Gupta & Sheth 1990) and between organisations (Araujo, Dubois & Gadde 1999; Dubois & Wynstra 2005). For example, Araujo et al. (1999) considered the customer-supplier resource interface. A resource interface is described as being "primarily concerned with the technical interdependencies that arise when the resource bases of buyer and supplier are connected through exchange activities" (Araujo, Dubois & Gadde 1999, p. 499). Araujo et al. (1999) contend that a variety of buyer-supplier interfaces are required to suit the idiosyncratic relationships of a buyer with various suppliers. They regard the type of interface developed to be the result of decisions made by both sides of a dyad and also the interrelationship with other interfaces that each of the parties develops with third parties. The notion of interfaces is incorporated in the proposed theoretical model as part of the concept termed "locus" or site of spread. The notion of "interface" suggests the points of contact and interaction between two organisations/divisions, which could be visualised as a two-dimensional plane. In contrast, the idea of a *locus* of spread (as contemplated in the proposed theoretical model) is broader and refers to the *area* or space within which two organisations are placed and have the potential to interact, based on the surrounding conditions. The concept of locus thus includes the interface between the organisations as well as the conditions or *context* surrounding the two organisations.

The literature exploring change and dynamics in business networks (Halinen, Salmi & Havila 1999; Havila & Salmi 2000; Hertz 1999; Araujo & Brito 1998) has often focused on the spread of *structural* change in networks (Hertz 1999; Madhavan, Koka & Prescott 1998; Halinen, Salmi & Havila 1999), rather than changes in behaviour, practices and processes. There have been only limited attempts to describe how management practices spread in the network context (Harilainen 2009). While this paper is concerned with changes in *practices* rather than *structural* change in networks, the concepts relating to structural change may offer insights into changes in practices and are therefore included in the discussion below.

Focusing on *structural* change, Madhavan et al. (1998) developed a theory of structural change in networks explaining how and why networks change over time. They suggested that inter-firm networks evolve in response to key industry events that may be either structure-reinforcing or structure-loosening. They described "occasions" or events that trigger structural change in networks. They described network-reinforcing events as ones that strengthen the current balance of power of companies in the network, whereas network-loosening events shift power from the dominant to peripheral players in the network. Halinen et al. (1999) also proposed an analytical framework for understanding and investigating

structural network change, distinguishing between confined dyadic change, in which the change remains within the dyad, and network change, in which a change in one relationship is received and acted on by other actors in the network. They showed how change can be incremental or radical and examined the mechanisms of change, emphasising the central role of business relationships, i.e. dyads, and their role as generators, recipients and transmitters of change in networks. They proposed an analytical framework where the ideas of mechanism, nature and forces of change are integrated. Utilising this framework, Havila and Salmi (2000) investigated the spread of change in business networks, focusing on the critical events that trigger radical change. They cited examples of critical events such as economic recession (which affects multiple companies in a network) and mergers and acquisitions. They concluded that while overall conditions seem to have a general impact on networks, they are always transmitted within the network through individual relationships. These analytical frameworks concerning *structural* change provide insights into changes in practices by highlighting the central role of dyads in network change as well as the role of "trigger" events as initiators of change.

In addition to the importance of *dyads* and *triggers* in structural change, Hertz (1999) and Dahlin, Fors, Havila and Thilenius (2005) emphasised the influence of *interconnectedness* on the extent of change. In her exploration of *structural* network change, Hertz (1999) used the term "domino effects" to describe the situation where a change which is spread to another business relationship may cause a "domino effect" among several connected business relationships in the network. This "domino effect" could thus bring about changes in relationships and network positions of organisations (Hertz 1999). Hertz (1999) considered critical events as incidents that trigger radical change in a business dyad and/or network, criticality being determined by the way the parties of the focal and other dyads react to the event (Halinen, Salmi & Havila 1999). Related to this concept is the notion of a "netquake" (Dahlin et al. 2005) which is used to describe the spread of change in business networks. The "netquake" conception suggests that a high level of connectivity in a network means that changes spread more easily in the network and vice versa (Harilainen 2009).

A more recent paper (Harilainen 2009) has focused on the spread of *practices* rather than on *structural* change in networks. Harilainen (2009) presented a conceptual framework for the spread of CSR-related practices towards suppliers in a supplier network (Harilainen 2009). The spread of practices was described as follows. A trigger initially affects a single buyer-supplier dyad which triggers the creation of new practices within one dyad, most likely initiated by the buyer side or brand owner. A trigger for a new CSR-related practice could be a CSR misconduct event that has received significant media attention (Harilainen 2009). Next, the practices may be adopted in directly connected dyads, such as the supplier's supplier and the buyer's other suppliers. Finally, the new practices may be adopted by indirectly connected buyer-supplier dyads in the network if the trigger is strong enough and if the propagating company has the necessary skills and resources to propagate the practice. Harilainen's (2009) conceptual framework has been used as a starting point for the proposed theoretical framework presented in the next section.

In summary, the literature review has highlighted the significant role played by *dyadic relationships* as generators and transmitters of change in networks (Halinen, Salmi & Havila 1999; Havila & Salmi 2000; Hertz 1999). This is captured in the proposed theoretical framework in the contemplation of *"loci"* or sites of spread in which two organisations have the potential to interact and spread green practices. The literature review also emphasised the influence of "occasions" (Madhavan, Koka & Prescott 1998), "critical events" (Hertz 1999; Halinen, Salmi & Havila 1999) or "triggers" (Harilainen 2009) in initiating change, which are

denoted as *"triggers"* in the proposed theoretical framework. Finally, the literature review points to the importance of "*context*" (Hall 2000) in determining the spread of green practices. This is incorporated in the proposed theoretical framework in the contemplation of the "*sea of context*" in which the network is immersed. These insights from the literature review are incorporated in the proposed theoretical framework presented in the following section.

PROPOSED THEORETICAL FRAMEWORK

Extending Harilainen's (2009) conceptual framework, the proposed framework includes contemplation of the role and interactions of less commonly discussed network organisations, such as government organisations, industry organisations and not-for-profit organisations, in addition to the traditional for-profit companies. The proposed framework incorporates key insights from the literature review namely the central role of *dyadic relationships* in generating and transmitting change, the role of *triggers* of change and the influence of *context* in determining the rate, extent and processes of spread, as discussed previously. The following sub-section provides a brief summary of the proposed theoretical framework together with a graphical representation, after which components of the framework are discussed in more detail.

SUMMARY AND GRAPHICAL REPRESENTATION

The proposed theoretical framework governing the spread of green practices in business networks envisions *loci* or sites of potential spread which play the central role in the spread of green practices. Within a locus, which involves two organisations, various *processes of spread* may occur which may result in *green practices*. The processes and practices in loci can be analysed from an activity, resource, and actor perspective as conceived by the Activity-Resource-Actor (ARA) network model (Håkansson & Snehota 1995). The *attributes* of the green practices may affect the rate, extent, processes and loci of spread. A single organisation in the network may be involved in *multiple* loci of spread at a time or over time. The loci of spread may occur in *sequence*, giving rise to a wider spread of practices within the network. A *sea of context* immerses all components of the network and consists of the set of circumstances surrounding individual organisations, relationships, processes, loci and the entire network. The sea of context gives rise at times to the necessary conditions for spread, the triggers of spread and hindrances to spread.

Figure 1 shows a broad graphical representation of the proposed framework. The figure depicts a network of relationships (shown by connecting lines) between organisations (represented by circles). The loci are represented by the shaded ellipses, capturing the two organisations together with the context surrounding them and their relationship. The figure shows that a single organisation, such as "A", may be involved in multiple loci or sites of spread (represented by the A-B, A-D and A-E loci). Note that the loci can involve two organisations in direct relationships (for example the A-B locus) or indirectly linked organisations (A-E). The figure shows that the loci may develop in sequence (A-B locus followed by the B-C locus).

Figure 2 shows that within a locus or site of spread, processes and green activities/practices may emerge between the two organisations ("A" and "B"). The figure illustrates the feedback effects between the processes and green activities/practices, where the processes of spread influence the spread of green practices and the attributes of the practices influence their spread. These concepts are discussed further in the sub-sections that follow.

Figure 1: Theoretical framework governing the spread of green practices

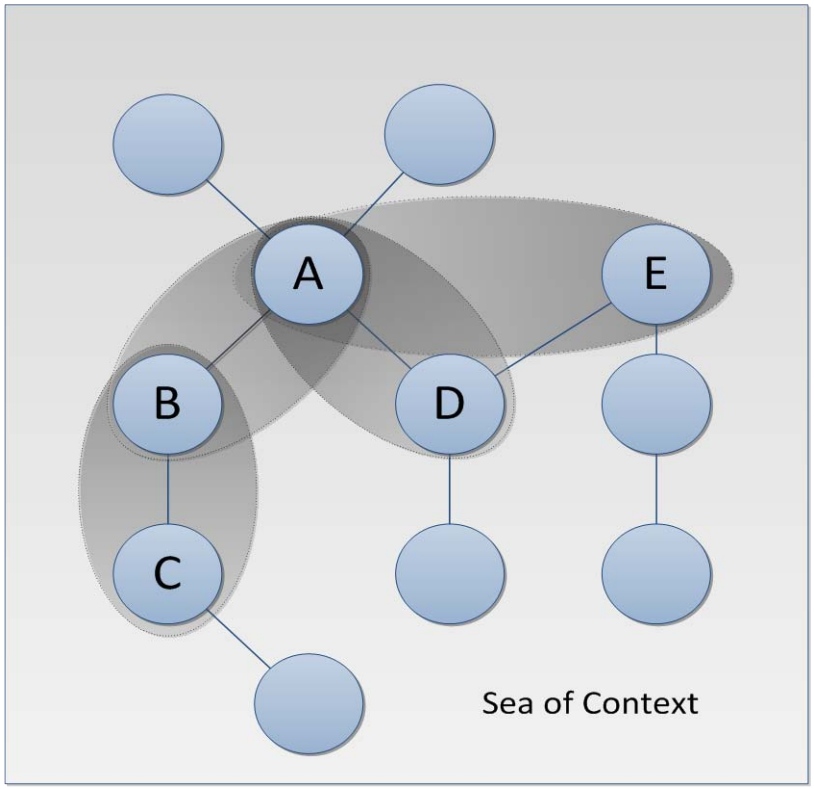
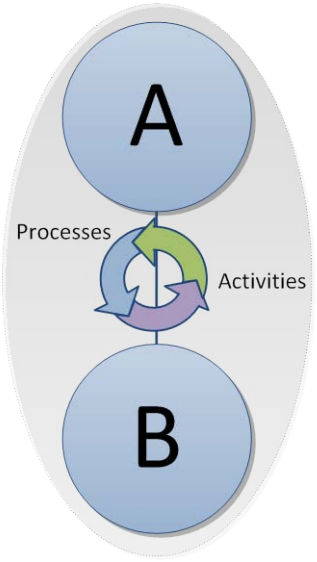


Figure 2: Locus of spread of green practices



LOCI OF SPREAD

It is submitted that there are a number of *loci* or sites of potential spread of green practices which may develop in a business network. It is conceived that a locus of spread is a site where two organisations are interacting. The concept of a "locus" of spread is broader than the idea of "interfaces" between organisations. The locus includes the interface between the organisations as well as the circumstances or *context* surrounding the two organisations and the relationship. The set of conditions particular to a locus may result in the site being more or less fertile for the spread of green practices. The locus may involve interactions between

two directly linked organisations (direct locus) or two indirectly connected organisations (indirect locus). Examples of direct loci include the site of potential spread surrounding (1) a government organisation and company and (2) a buyer-supplier dyad. An example of an indirect locus is a site involving two competitors who do not interact directly but rather indirectly through imitation regarding green practices. Note that two competitors may also be in a direct locus; for example where competitors work cooperatively to improve the industry level of green practices so as to jointly enter certain markets.

An individual organisation may be involved in single or multiple loci of spread at one time or over time. For example, an organisation may respond to a customer's request to implement green practices (buyer-supplier locus) in addition to being involved in a project with government to improve green performance (government-company locus). When multiple organisations are jointly involved in common green projects, the framework considers the site surrounding each dyadic relationship in turn as a locus. It is envisaged that the multiple loci representing multiple organisations involved in a common green project may be analysed as individual loci as well as a "*super-locus*", which encompasses all the other overlapping loci.

Loci of spread may take place in *sequential order*, one locus following on from another. The occurrence of sequences of loci should result in more extensive spreading of green practices in a network, in contrast to the spread remaining within an initial locus. An example of sequential loci of spread is where changes brought about from interactions within a government-company locus, bring about changes in this company's relationship with its supplier (buyer-supplier locus). Conceivably, this supplier could then further spread the green practices through interactions with its supplier(s) (direct locus) or through an effect on the behaviour of its competitors (indirect locus). Table 1 provides examples of loci of potential spread of green practices in business networks.

Table 1: Examples of loci of spread of green practices in business networks

	Loci of spread involving:
a	Government interacting directly with a company.
b	Government interacting indirectly with a company.
c	A company interacting directly with its suppliers.
d	A company interacting indirectly with its suppliers' suppliers.
e	A company interacting directly with its competitors.
f	A company interacting indirectly with its competitors.
g	An industry organization interacting directly with a company.
h	An environmental specialist company interacting with a company.
i	A not-for-profit organisation interacting with a company.

The proposed framework suggests that insights may be gained by analysing: each locus in depth; the loci relevant to an individual organisation at any one time and over time; the sequences of loci that occur over time; as well as the loci within the entire network at one time and over time. The sequences of interest extend beyond the more obvious ones which may be likened to supply chain dynamics (where one locus of spread follows on from another along a supply chain), to the sequences arising from indirect loci. This allows contemplation of spread from one locus to directly interacting organisations, as well as to more distant indirectly related organisations in the network. For example, government interacting with a company may result in change in the company's green practices. These practices may spread

through direct interactions to the company's supplier(s) and from some of these suppliers to their suppliers (along the supply chain). At the same time, any one of these direct loci could lead to an indirect locus developing between one of these organisations and an indirectly related organisation, such as a competitor; signifying more extensive spread of green practices in a network.

It is submitted that multiple loci and certain combinations of loci in a network may have synergistic influences which may increase the speed and extent of spread throughout a network. The literature mentions that certain industries set higher self-imposed regulations on themselves, beyond that stipulated in the laws (Hall 2000). In such networks, it is conceived that the combinations of loci may synergistically be enabling wider spread. The processes of spread within a locus are discussed in the following sub-section.

PROCESSES OF SPREAD

Within a locus or site of spread it is submitted that there are a variety of possible *processes* of spread which may emerge. For example, within a government-company locus, the spread may occur through the use of laws accompanied by fines (a coercive process) and/or collaboration between government and the company (which may include government providing expertise, training and funding) to improve green performance (a collaborative process). In a buyer-supplier locus, the spread of green practices may occur though the buyer threatening not to buy from the supplier if they do not meet certain green criteria (a coercive process) and/or a collaborative process where the buyer and supplier work together to improve green performance. The processes of spread in an indirect locus, such as the locus involving two indirectly linked competitors, are limited to the processes that involve indirect interactions (such as imitation).

It is envisaged that prior literature concerning the spread of practices, such as supply chain contagion (McFarland, Bloodgood & Payan 2008), environmental supply chain dynamics (Hall 2000) and supplier development (Krause 1997; Wagner 2006), fits into the proposed theoretical framework as *processes* of spread. A broad distinction may be drawn between coercive and cooperative processes used to bring about desired changes in practices. Many processes may have both coercive and cooperative varieties, such as supplier development, which may be based on a coercive approach, cooperative approach or a combined approach (Bayne 2010).

Multiple or single processes of spread may occur within a locus. For example, government may put laws in place with accompanying fines to try to bring about improved green performance in a company through coercion. At the same time, government may collaborate with the company to improve green performance. Thus, both coercive and collaborative processes are occurring concurrently in the government-company locus. The processes within a locus can be further analysed along the activity-resource-actor layers of interaction contemplated in the ARA-model (Håkansson & Snehota 1995). Within each process, the context of each organisation, as well as the context of the relationship and loci, will influence the way the green activities and resource requirements are shared between the two interacting organisations and indeed whether spread takes place. The processes potentially result in green practices or activities, as discussed in the next section.

GREEN PRACTICES

The outcome of the processes may be the spread of green *practices or activities*. It is submitted that the *attributes* of a green practice may indeed *affect its spread*, in terms of the

locus in which spread takes place, the rate of spread, the extent of spread (breadth of spread) and the level of adoption (depth of spread). Examples of attributes of a green practice include whether the practice is expensive or inexpensive to implement and whether the practice results in short-term or long-term economic benefits. All else being equal, an inexpensive practice may spread more readily than an expensive one. Similarly, all else being equal, a practice leading to short-term benefits is likely to spread more readily than a practice giving rise to long-term economic benefits. However, a green practice is likely to have multiple attributes, some of which reinforce each other with regards to spread, while others may mitigate each other with respect to spread. Some attributes may have a more significant influence on spread than others. For example, although short-term benefits may be preferred to long-term benefits (all else being equal), the size and probability of the benefits of the green practice are other significant attributes which may affect its spread. Extant literature has not explicitly discussed the relationship between the *attributes* of practices and their spread; the contemplation of this aspect is a contribution of the proposed framework.

Table 2 provides examples of attributes of green practices which may potentially influence their spread. It is proposed that groups of green practices which have common combinations of attributes may *spread differently* to practices with other combinations of attributes. Many of these attributes are borrowed from classifications found in the supplier development (Krause, Handfield & Scannell 1998), supply chain management (Hall 2000), quality control (Drury 2008) and management accounting literature (Drury 2008), which have been adapted to the green practice context.

Table 2: Attributes of green practices potentially affecting their spread

	Attributes:
a	Legally required vs. voluntary (Hall 2000).
b	Short-term vs. long-term economic benefits (Drury 2008).
c	Preventative, appraisal, internal failure and external failure practices (Drury 2008).
d	Strategic vs. reactive (Krause, Handfield & Scannell 1998).
e	Independent vs. cooperative (Håkansson et al. 2009).
f	Low cost vs. high cost (Drury 2008).
g	Easy vs. complex to implement (Hall 2000).
h	Practices which attract public attention vs. practices not necessarily seen by the public (*Greenwashing Index* 2012).

Attribute “a” distinguishes between green practices required by law (e.g. reporting requirements to statutory bodies or correct disposal of dangerous chemical waste) and voluntary practices (such as voluntary sustainability reporting and adherence to packaging covenants). All else being equal, it is expected that the former may spread differently (e.g. more readily or through different processes) than the latter. Attribute “b” relates to whether the economic benefits of implementation of the green practice occur in the short- or long-term. All else being equal, it is proposed that green practices resulting in short-term economic gain are likely to spread more readily than those resulting in long-term gains.

The next attribute of green practices relating to preventative, appraisal, internal failure and external failure practices (“c”) borrows from classifications in the quality control cost literature (Drury 2008). In the green context, preventative practices include risk assessment and management practices, curbing pollution at the design stage, avoiding the use of problematic materials and ensuring compliance with laws. Appraisal or monitoring practices

are concerned with the administration of operationalization of green practices, such as practices to decide what environmental data to record, when, where, how often and where the data is to be stored. Internal failure practices refer to remedial green practices implemented after a green problem has occurred but before the issue has extended beyond the organisation's borders, such as buying carbon credits for excess pollution and sorting out the effects of a green disaster within the organisation. External failure practices refer to the cleaning-up practices required to remedy a green problem which has impacted outside the organisation's boundary, such as the damage to the company's reputation following a green disaster. The spread of these groups of practices may differ and depend on the organisation's risk appetite concerning green issues. A more risk averse organisation may implement more preventative practices (hopefully resulting in less need for internal and external failure practices). In contrast, an organisation with a greater green risk appetite may implement less preventative practices, which may result in more failure practices being required, all else being equal.

Attribute "c" is one instance of the more general strategic/reactive attribute ("d") which borrows from a classification used in the supplier development literature (Krause, Handfield & Scannell 1998). Green practices implemented strategically include those put in place to prevent green disasters, mitigate risks or in anticipation of pending environmental legislation. Reactive green practices refer to practices implemented in response to green issues which have already occurred, such as an environmental disaster. It is submitted that strategic practices may spread less readily than reactive processes, all else being equal. Also, the triggers of strategic practices are likely to differ from those of reactive practices.

Attribute "e" arises since some green practices can be successfully implemented within the confines of a single organisation, for example monitoring and improving water consumption, while others require cooperation with other network members for implementation. For example, if a company wishes to document the full water footprint over the life-cycle of a product, data will need to be collected along many tiers in the supply chain. Another example is where an organisation wishes to ensure that their product is made of material that is fully recyclable. This would require that the components bought from suppliers comply with the specifications as well. It is suggested that independent practices are easier to implement and may spread more readily than cooperative practices.

The low cost vs. high cost attribute ("f") highlights that some green practices require low economic and human resources to implement, whereas others require considerable resources. Thus, it may be that the lower cost practices spread more readily than expensive practices, all else being equal. This attribute bears similarity to the supplier development classification into direct and indirect practices (Wagner 2006). Note the potential interactions between attributes "b" and "f". It then becomes difficult to predict whether lower cost practices with long-term benefits are more or less likely to spread than expensive practices with short-term benefits.

The easy vs. complex to implement attribute ("g") refers to the distinction between green practices that are relatively simple to implement, requiring limited changes to the ordinary course of business, such as the use of more environmentally-friendly packaging materials, versus complex implementations, such as the use of an innovative green technology in the product, as in hybrid cars. The easy to implement practices are likely to spread more readily than complex practices involving much knowledge and training and potentially the participation of multiple network members, all else being equal.

The last attribute ("h") relates to public awareness of an organisation's green practices. Certain organisations may desire to appear to be "green" and "environmentally friendly", but may not be prepared to implement and spread deeply entrenched green practices. Thus, such organisations may choose to implement the practices that target the most positive public image for a given amount of resources. An extreme case of the implementation of "green" practices to gain a positive public image is the concept of "greenwashing". Greenwashing occurs when an organization "spends more time and money claiming to be "green" through advertising and marketing than actually implementing business practices that minimize environmental impact. It's whitewashing, but with a green brush" (*Greenwashing Index* 2012).

In addition to the attributes of green practices which may affect spread discussed above, it is submitted that green practices may be classified into various *levels of adoption* of practices. This classification bears similarities to the classifications in the supplier development literature into basic, moderate and advanced practices (Sanchez-Rodriguez, Hemsworth & Martinez-Lorente 2005). In the green context, some practices, which have been referred to as "low lying fruit" (Handfield, Sroufe & Walton 2005, p. 5), occur where companies implement easy and relatively inexpensive green practices, such as the use of more environmentally-friendly packaging. Then there is a middle range of green practices, involving more onerous economic and human resources, such as educating suppliers. At the highest level of implementation, more complex and costly practices are adopted, such as switching to clean energy suppliers and changing the design to meet environmental criteria. It is submitted that spreading a lower level of adoption of green practices is likely to be easier than spreading a high level of adoption. A network with organisations exhibiting a high level of adoption may be considered to have achieved a greater "depth" of spread. Thus, the spread of green practices needs to be considered in terms of both the extent (across the network) and depth (the efficacy and levels of adoption of the green practices) of spread. All components of the framework are influenced, as well as influence, the *sea of context* immersing a network, as discussed further in the following sub-section.

SEA OF CONTEXT

It is submitted that the spread of green practices is affected by the *sea of context* relating to the organisations, the relationship between the organisations, the loci, the processes, practices and the network. This concept emerged from extant literature that highlighted the influence of *context* on an organisation's uptake and spread of green practices (Hall 2000). The *context* in relation to an *organisation* includes factors such as the organisation's exposure to environmental pressure, its capabilities, the nature of its product and its financial position. The *relationship* between organisations is affected by *contextual* factors such as the frequency of interactions, power differentials between the parties, the sharing of the green activities and resources between the parties and the roles played by actors in the relationship. The *context* affecting a *locus* includes the laws relating to the industry in which locus is found, the other loci in which an organisation is involved and the history of loci in which the organisations have participated. Whether a locus is included in a super-locus has implications for the locus since multiple loci may have synergistic effects on the spread of green practices. The *context* in relation to the *processes* of spread includes factors relating to the individual organisations as well as to their relationship. *Contextual* factors affecting *practices* include what other practices are being practiced simultaneously and the attributes of the practices. The sea of context also affects the *network* as a whole in terms of the industry norms, the number of existing loci, the type of products and country factors (some countries have more green demands arising from laws, enforcement of the laws, government intervention in green

matters and community attitudes, than others). In turn, it is submitted that the loci, relationships, processes and practices which emerge in a network have *feedback effects* on the sea of context. For example, if the spread of green practices gains momentum within a network, this may then create a higher expected norm of greenness required by end consumers which will fuel a further spread of green practices in this network.

When considering the sea of context in which an organisation is embedded, it is possible to specify *conditions* necessary for the development of a locus and the successful spread of green practices. These conditions may differ depending on the particular organisations involved in a locus, such as government organisations, not-for profit companies or for-profit companies. For example, the necessary conditions for government to enter a government-company locus may differ from the necessary conditions for a lead company to enter into a buyer-supplier locus. For a government organisation to engage in a locus with a company, it may need to have appropriate policy regarding government involvement in green issues, necessary funding and expertise. When a lead company in a supply chain forms a locus with a supplier, there may need to be a net financial benefit for both organisations in addition to the necessary expertise and supply chain power of the lead company. While prior literature has discussed the necessary conditions for the spread of green practices in relation to companies (Hall 2000), the conditions necessary for organisations such as government and industry organisations have not been dealt with explicitly. The proposed framework brings these unique necessary conditions into focus in the analysis of spread through the concept of "sea of context".

Within the sea of context there is interplay between the three sustainability concepts of environmental, economic and social aspects. The conditions necessary for the spread of green practices is highly interrelated to the current social and economic context relating to the organisations, locus and network. Further, the economic and social attributes of the green practices will influence their spread, as discussed in the section concerning the attributes of green practices.

In addition to the presence of necessary conditions, the proposed theoretical framework envisions that *triggers or events* are required to initiate the processes of spread of green practices (as seen in prior supply chain management and network theory literature). Examples of potential triggers include a global movement towards greater demand for greener products, pending legislation or an environmental disaster in some part of an industry. Once the adoption or spread is triggered there are further considerations around the *momentum* of spread and how far along supply chains and within networks spread occurs. There is mention in the literature of some industries setting voluntary environmental standards which are above the level fixed by law (Hall 2000). This suggests that some industries have gathered momentum for implementation of green practices. However, prior literature highlights that green practices are often not spread beyond lead companies and key tier-one suppliers (Hall 2000). This suggests the presence of factors in the sea of context which are preventing the spread of green practices. The proposed framework provides for an analysis of these hindering factors in addition to the triggers and necessary conditions for spread within the sea of context.

CONCLUSION

The proposed theoretical framework governing the spread of green practices in business networks builds on insights from extant literature, in particular on Harilainen's (2009) conceptualisation of the spread of CSR practices to suppliers. The key insights incorporated

in the framework from prior literature are the central role of *dyadic relationships* in the spread of green practices, the influence of *triggers* and the importance of *context* in determining the spread of green practices. Harilainen's work is extended by giving attention to the role and interactions of organisations such as government, industry organisations and environmental specialist companies, in addition to the more commonly contemplated for-profit companies, providing a holistic perspective regarding *how* and *why* green practices are (or are not) spread in business networks.

The proposed framework fills gaps in extant green supply chain management literature by addressing green issues across longer lengths of the supply chain (Srivastava 2007; Vachon & Klassen 2006), through the contemplation of the circumstances and processes involved in *sequences* of loci, which may be likened to the spread of practices along a supply chain. However, the proposed framework does not merely contemplate *linear* spread of green practices along supply chains, but also the spread of green practices to indirectly related organisations in the network, through the consideration of *indirect loci* of spread, which provides a more comprehensive, *network approach* to the spread of green practices. The proposed framework thus contributes to network literature by explicitly examining green issues from a network perspective, as well as considering the spread of changes in *practices and behaviour* (as opposed to the more frequently investigated structural change) within networks. The proposed framework makes a further contribution through the contemplation of the potential influence of the *attributes* of the green practices on their spread, which has not been explicitly addressed in extant literature. Various attributes which may affect the spread of green practices have been proposed (please refer to table 2), borrowing from classifications used in prior supplier development, quality control and management accounting literature.

The managerial implications of the proposed framework are to highlight the need to consider green practices and strategies at a network level, in addition to the company level. The framework brings attention to the multiple loci in which management may engage, as well as the multitude of processes managers may employ to achieve the spread of green practices. A consideration of the attributes of green practices and their influence on spread may be of assistance to management when implementing and spreading green practices. Management may also benefit from understanding the sea of context relevant to their organisation, relationships and network.

The implication of the framework for government is the need to focus attention and initiatives on the *sea of context* in which organisations operate in addition to the organisations themselves. Thus, it may be more efficient to spend resources influencing certain necessary conditions and triggers for implementation and spread of green practices, rather than assisting individual organisations in implementing green practices. For example, government may wish to target initiatives to stimulate consumer demand for green products and processes through social marketing campaigns, or address a lack of net economic benefits of implementing green practices through tax incentives, rather than assisting individual companies with the implementation of green practices.

The proposed theoretical framework begs for empirical data for further development into a theoretical model which represents an area for further research. Also, the influence of the attributes and combinations of attributes of green practices on spread could be investigated empirically, together with an analysis of the interactions between attributes. Another possibility is the use of an Agent-Based model to simulate the spread of green practices in a network, where the conditions surrounding individual organisations, loci and networks could

be specified and decision criteria for organisations set. This could allow for simulations of various depths and breadth of spread, depending on the specified context.

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