How Does it Pay to be Green and Good? The Impact of Environmental and Social Supply Chain Practices on Operational and Competitive Outcomes

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Abstract

Although much has been written about whether it pays to be green, few researchers ask does it pay to be good and fewer still offer insights into which practices pay and which do not. This chapter addresses a key missing link in supply chain management by identifying which environmentally and socially sustainable supply chain management practices impact the operational and competitive outcomes of firms. The research literature has presented a diverse catalogue of measures of supply chain sustainability practices. In this chapter we have consolidated and synthesised existing measures in an effort to test the relationship between established sustainability practices and outcomes which allow firms to create a business case for both environmental and social sustainability practices. In doing so, we arrived at four environmental and four social supply chain sustainability practices with similar themes: monitoring; management systems; new product and process development; and strategy re-definition. A key outcome of this examination is that social sustainability practices pay more than environmental sustainability practices. This finding suggests that it might be advantageous for companies to invest their resources in social new product and process development as well as social supply chain re-definition focusing on social issues and in environmental monitoring and developing new environmental products and processes.

18.1 Introduction

Sustainability is the issue of our generation encompassing the triple bottom line of economic, environmental, and social sustainability (Elkington 1997). Researchers have focused and discussed the relative merits and costs of environmental sustainability and its effect on economic sustainability. This has led to one of the perennial debates in the sustainability literature, which is whether or not it pays to be green: Is there a business case for environmental sustainability? Environmental practices are at the forefront of research for three reasons: First, without conserving our resources, our ecosystem as well as our economy will decline and collapse; Second, many environmental practices are measurable and therefore have a tangibility that most social practices do not; Third, regulatory pressure focuses on environmental regulations. The economic merits of implementing environmentally sustainable practices have been discussed at length (Lankoski 2000, 2006; Reinhardt 2000; Lai and Wong 2012; Preuss 2001; Wu and Pagell 2011; Ambec and Lanoie 2008), and the costs have been assessed (Aupperle et al. 1985; Folger and Nutt 1975; Levy 1995). Economic advantages of sustainable supply chain management include cost savings due to reduced waste, reduced health and safety costs, and design for reuse (Brown 1996; Carter and Stevens 2007; Mollenkopf et al. 2005; Hart 1995); improved quality and shorter lead times (Hanson et al. 2004; Montabon et al. 2000); and reputation advantages (Ellen et al. 2006; Klassen and McLaughlin 1996).

It is likely, therefore, that environmental sustainability practices are more numerous and adopted earlier than social sustainability practices due to imminence, tangibility, and

regulation. As many social practices are seen as voluntary and are not required by law this means they are more easily ignored or neglected. Although there has been some discussion on how some social practices pay or are linked with positive firm performance (Carter and Rogers 2008; Tate et al. 2010) others focus solely on the cost of these practices and ask whether they should even be considered as part of the remit of a business (Walley and Whitehead 1994; Friedman 1970).

Multiple environmental supply chain practices are identified in the supply chain literature, however, the missing link in supply chain management is understanding the outcome of these practices. For example, what is missing in the sustainable supply chain literature is identifying which practices will be a cost to the supply chain and which will lead to enhanced performance? Lankoski (2000, 2006) and Reinhardt (2000) found environmental practices increased revenue or reduced costs. While one study (Hamschmidt and Dyllick 2006) found that when implementing ISO 14000 systems the investment was recovered within just over 2 years.

Nevertheless, few papers have developed a classification for types of environmental supply chain sustainability practice and fewer for social supply chain sustainability. The divide in sustainability research between environmental and social research has been noted (Miemczyk et al. 2012; Seuring and Muller 2008; Srivastava 2007). Although it has been reported that there is a lack of evidence linking social performance of firms to economic performance, it has been noted that socially responsible investment is increasing allowing easier access to capital for socially responsible firms and providing an initial link between social practices of a firm and an economic indicator (Ambec and Lanoie 2008). Also although there are many papers focused at the organisational level fewer take the argument to a supply chain level. Most of the measures relating to green purchasing, in particular, are of a dyadic nature and many focus on internal purchasing functions (Miemczyk et al. 2012). In this chapter we introduce a classification for both environmental and social sustainability practices at the supply chain level and we test whether it pays to be green (environmentally sustainable) and good (socially sustainable) for the operations and the competitiveness of the firm.

18.2 Literature Review

Supply chain sustainability examines the role of sustainability beyond the boundaries of the firm. This includes sustainable practices with suppliers and customers, the actions and behaviours of purchasing departments and logistics systems (Srivastava 2007). Expanding the analysis beyond firm level means including a much wider conceptualisation of sustainability with a bigger impact on operational (through improved quality processes and reduced costs throughout the supply chain) and competitive (financial as well as market benefits) performance of firms and additional environmental and social effects for society. Academics and theorists are calling for managers to look beyond simple compliance to develop proactive sustainability solutions that go beyond the company and apply sustain-

ability practices and principles throughout the supply chain (Koplin et al. 2007; Seuring and Muller 2008; Zhu et al. 2010; Walton et al. 1998). However, there is still uncertainty concerning the practices that will benefit the organisation and the practices that will not.

Supply chain sustainability has been explored in depth especially in the last decade. Most research has focused on environmental sustainability with one recent study finding, during an initial review of 30 core papers, that 69 % of the papers related to environmental issues, with the remaining 31 % referring to social aspects (Miemczyk et al. 2012). The next sections explore both environmental and social supply chain sustainability and their effect on operational and competitive performance.

18.2.1 Does it Pay to be Green?

In previous decades, companies were allowed to use natural resources such as air and water with no thought for the cost to society. Due to the damage done to the environment and to the health and safety of their citizens, governments intervened to address these environment-damaging practices. Initially companies regarded environmental regulation, which they found costly especially in the short term, as profit-reducing government interference. In response to this intervention, researchers and practitioners stated that implementing green initiatives for environmental sustainability was a cost and reduced firm competitiveness (Folger and Nutt 1975; Levy 1995). They based their findings on measures such as emissions data and data collected by the UN in a benchmark survey regarding environmental policies and procedures (Levy 1995).

One seminal article by Walley and Whitehead (1994) argued that implementing better environmental practices is difficult and expensive as the costs generally outweigh the benefits for the company. However, a more prevalent view holds that although picking the "low-hanging fruit," such as implementing waste reduction practices, may reduce costs initially, once more basic practices have been realised, implementing practices to tackle more difficult issues becomes increasingly expensive (Colby et al. 1995). However, both these arguments focus on costs disregarding the benefits (Carter and Rogers 2008), asking how much does it cost to be green, rather than does it pay to be green.

Like all organisational initiatives some practices will fail or be misguided and this overly negative perception of environmental practices was challenged in the 1990s (Porter and van der Linde 1995; Gore 1993; Porter 1991) when researchers began to report the benefits of environmental sustainability practices. Porter (1991), for example, argued that pollution was often the result of wasted resources and that company's response to waste issues and regulation, if innovative, could lead to cost savings as well as protecting the earth's resources.

As the majority of research and conceptual development has focused on environmental supply chain sustainability or green supply chain management (GSCM) there are many available definitions of environmental supply chain sustainability. Together they have one thing in common that environmental supply chain sustainability focuses on the impact of

supply chain practices on the natural environment and biological ecosystems. The definition of GSCM has evolved but there remains little literature addressing which practices pay. To incorporate different levels of practice across the supply chain we take inspiration from three definitions of sustainability at a supply chain level: "Integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumer as well as end-of life management of the product after its useful life" (Srivastava 2007, p. 54); "Internal environmental management, external green SCM, investment recovery, and eco-design or design for environment practices" (Zhu and Sarkis 2004, p. 267); and "A semi-closed loop that includes product and packaging recycling, re-use, and/or remanufacturing operations takes this to a re-definitional level building upon the idea of the traditional supply chain" (Beamon 1999, p. 337).

In the last decade, this idea that GSCM is operationally and competitively beneficial for the firm has gained momentum and the number of research studies exploring if environmental sustainability practices are good for business has increased dramatically. Seminal articles, such as Ambec and Lanoie (2008) highlighted the benefits of improved environmental practices, including cost reduction, profit increase, improved market access, and the ability to differentiate a company's product offerings. This is further supported by event analysis showing that stock markets do react to good or bad environmental news (Ambec and Lanoie 2007). While, Carter and Rogers (2008) noted other benefits that included lower energy costs, increased transparency, and future certainty for your supply chain based on the utilisation of renewable energy.

What is becoming clear is that not all environmental sustainability practices lead to immediate operational or competitive benefits. Low-hanging fruit, such as waste and pollution reduction, can lead to cost-savings in the short term but in the long term there are other practices that increase short-term costs and investments that may not be recouped for many years such as 'green technology implementation' (Preuss 2001; Wu and Pagell 2011). However, it is becoming clear that basic environmental capabilities may lead to improvements in short-term operational and longer-term competitiveness. For example, researchers found that purchasing can become an important change agent for environmental initiatives in the supply chain (Preuss 2001). Here sustainability practices include monitoring suppliers to ensure compliance or carrying out environmental audits. It covers the most basic level of supply chain inter-action and involvement but appears to lead to improved company performance. Therefore we hypothesise:

- **H1a** Instigating environmental supply chain monitoring practices will lead to better operational outcomes.

- **H1b** Instigating environmental supply chain monitoring practices will lead to better competitive outcomes.

Additionally, green certifications can improve the image of an organisation by communicating environmental commitment (Wiengarten et al. 2013) again leading to long-term performance benefits. For example, it was shown that environmental collaboration between customers and suppliers, through activities such as helping suppliers to implement green management systems, leads to the development of knowledge-sharing capabilities (Vachon and Klassen 2006) that are a resource for competitive advantage (Hart 1995). These management systems focus on best practice and the use of industry certification as a method of ensuring implementation within and across the supply chain. They involve more inter-action between the companies in a supply chain. These include environmental practices such as co-designing environmental measurement systems or aiding a supplier to obtain relevant certification such as ISO 14001. Focal firms are not necessarily implementing sustainability systems in their own operations but are making sure that their suppliers are implementing sustainability systems (Vachon and Klassen 2006). Given the conceptual and empirical evidence regarding green management systems and performance we hypothesise:

- **H2a** Implementing environmental supply chain management systems will lead to better operational outcomes.

- **H2b** Implementing of environmental supply chain management systems will lead to better competitive outcomes.

Certain practices, such as environmental product and process development are proposed to be positively related to performance in the short and long-term (Wu and Pagell 2011). Ambec and Lanoie (2008), for example, identified practices that allow firms to exploit win-win situations (both better financial and environmental performance). They identified three channels of new product and process development that will lead to an increase revenue: access to markets, differentiating products, pollution control technologies; and they further found four categories that will enhance operational performance and reduce costs: risk reduction, waste reduction, costs of capital, and attracting better and more loyal employees; many of which are mutually reinforcing.

For example, differentiating products as environmental can lead to competitive advantage through product or service differentiation (green products or services) and better servicing of niche markets (customers demanding ecologically friendly products and services; Nidumolu et al. 2009). This means companies can attract more conscientious customers in spite their increased cost. For example, Patagonia used recycled polyethylene terephthalate and organic cotton to make clothing, albeit at a higher price, for a market willing to pay for environment-friendly clothing (Ambec and Lanoie 2008). Furthermore, firms can create pollution control technologies that they can sell to others gaining first mover advantages as well as product differentiation. Although there is a struggle to find empirical evidence to support some of these propositions, Ambec and Lanoie (2008) propose that by having environmental systems and checks in place firms can show due

diligence which can lead to a lack of scrutiny by external stakeholders, therefore reducing costs. Evidence also shows that the cost of capital to firms can be reduced if they are seen as environmentally responsible as they will have easier access to green investors and banks with environmental screening. Additionally, firms with better CSR practices are seen to attract a better calibre of employees (Ambec and Lanoie 2008), this can improve the image of the company and enhance the loyalty of key stakeholders (Goodman 2000; Rondinelli and Vastag 1996).

New product and process development has emerged as central to environmental supply chain sustainability. The capabilities that are developed both within the firm and between a firm and its supply chain members can lead to many benefits. These include the ability to share knowledge and information that is timely, relevant, and valuable (Mollenkopf et al. 2010; Vachon and Klassen 2006) and that can become a unique or inimitable resource for competitive advantage through environmental actions (Hart 1995). New product and process development practices for sustainability see the focal company develop new products and process across the supply chain. This is a more strategic and proactive approach moving beyond more basic practices. Therefore we hypothesise:

- **H3a** Environmental new product and process development will lead to better operational outcomes.

- **H3b** Environmental new product and process development will lead to better competitive outcomes.

In other supply chain areas such as logistics, even though environmental practices were regarded as key issues, they were not taken into account when buying logistics services (Wolf and Seuring 2010). Lai and Wong (2012) investigated the impact of green logistics management (GLM) on performance in the context of Chinese manufacturer's response to international supply chain pressure. They found that GLM, which includes, sourcing, manufacturing, distribution, and disposal, positively impacts both environmental and operational performance. They also found that economic motivation is not an effective antecedent to GLM adoption but regulatory pressure, as a moderator, enhances supply chain relationship performance.

In some instances the desired outcome or goal is not economical, or operational but environmental where companies' goals and measures of success are tied to environmental sustainability and that success us actually viewed as achieving environmental goals (Wu and Pagell 2011). This redefinition of the supply chain toward environmental performance and outcomes is a higher order level of practice adoption (Sharma and Henriques 2005). It involves fundamental redefinition of the supply chain, involving the collaboration of internal and external stakeholders to the benefit of stakeholders within and without the supply chain. Environmentally this encompasses re-conceptualisations such as the creation of a closed-loop supply chain where waste is eliminated or minimised as much as possible throughout the supply chain and transparent supply chains, which have full visibility

of their supplier's environmental practices and outcomes (Sharma and Henriques 2005; Pagell and Wu 2009). As this is proposed to have significant impact on the operations of the firm and on its competitive advantage we hypothesise:

- **H4a** Redefining supply chains to include environmental outcomes will lead to better operational outcomes.

- **H4b** Redefining supply chains to include environmental outcomes will lead to better competitive outcomes.

The focus of the current literature is mainly on environmental sustainability with research beginning to uncover which environmental supply chain practices pay: monitoring suppliers, with a focus on waste management pollution and green purchasing (Holt and Ghobadian 2009; Zhu and Sarkis 2007; Zhu et al. 2005), the implementation of green management systems (Wiengarten et al. 2013); the potential innovative capability of new product and process development (Ambec and Lanoie 2008; Vachon and Klassen 2006) and redefining the supply chain (Pagell and Wu 2009; Sharma and Henriques 2005). However, researchers are beginning to turn their attention to social supply chain sustainability, and whether it also pays to be good as well as green.

18.2.2 Does it Pay to be Good?

The lack of research on whether it pays to be good, which explores the impact of social sustainability practices, is clear in the supply chain literature (Miemczyk et al. 2012; Besser et al. 2006; Handfield and Baumer 2006; Worthington et al. 2008). Initially in the 1970s, the predominant thinking was that it does not pay and actually costs organisations to be socially responsible. Friedman (1970) for example argued that companies should not be beholden to social responsibilities. He puts forward the view that CSR initiatives like hiring the long-term employed to alleviate poverty are detrimental to profits and should not be considered by managers of companies: The corporate executive is appointed only to serve the interests of the direct stakeholders. Although he does not quantify his argument, he does raise the issue of the cost of socially responsible practices.

There were conflicting results from later studies in the 1970s. A series of studies completed by Moskowitz (1972), Parket and Eilbirt (1975) and Heinz (1976) provided a link between CSR activities and profitability. However, others (Alexander and Buchholz 1978; Abbott and Monsen 1979; Vance 1975) disputed these findings and found no connection between CSR practices and stock market values or return on investment. For example, socially responsible firms identified by Moskowitz (1972) initially registered a higher stock price increase than the general increase in stock prices at the time however further studies showed that over a longer time period they performed below industry averages.

Additionally, a study by Aupperle et al. (1985) found no statistically significant relationships between a strong orientation for CSR and financial performance.

However many of the measures used in this period exemplified by Aupperle et al. (1985) and Carroll (1979), were often vague and difficult to quantify. For example both studies use the measure: Discretionary responsibilities of business, which is defined "as volitional or philanthropic in nature, and, as such, also difficult to ascertain and evaluate" (Aupperle et al. 1985, p. 455).

More recent scholarship has shown that social sustainability practices are linked with positive performance for organisations (Carter and Rogers 2008; Tate et al. 2010). For instance, studies have shown insurance-life benefits to companies (preserving financial performance) if they have implemented social sustainability practices towards secondary stakeholders. For example, if a company has given a donation or financial award to a community or group outside the direct influence of the organisation (Godfrey et al. 2009) this is regarded as moral capital and can mitigate a loss of reputation if undesirable practices are reported. Further research has argued that social sustainability factors are twice as important as environmental factors in determining the relative reputation of a company as social sustainability connects with stakeholders on a personal level. People can imagine health and safety or human rights violations happening to themselves or someone close to them (Brandlogic and CRD Analytics 2012). For these reasons, the importance of social sustainability practices should not be under-estimated especially as advances in technology and globalisation have increased the risk of exposure by non-governmental organisations (NGOs), consumer or activist groups.

In the supply chain literature, social supply chain sustainability is defined with practices ranging from ethical trade, involving codes of conduct for minimum labour standards in supply chains to more radical, developmental projects such as fair trade, which has the goals of producer empowerment and equitable trading (Smith and Barrientos 2005; Hughes et al. 2007). Many supply chain studies take a holistic approach to CSR, combining environmental and social supply chain sustainability practices. For instance, Carter and Rogers (2008) focused on the advantages and perceived disadvantages of adopting environmental and social practices together. While, Pullman et al. (2009) examined both environmental and social supply chain sustainability practices and found that sustainability practices and performance can generate competitive advantage and contribute to a firm's capabilities and variability in performance across firms (Wernerfelt 1984; Barney 1991; Peteraf 1993). Building on these ideas, Pagell and Wu (2009) presented an early adopter argument, stating that if you are the first to implement social or environmental sustainability practices in the supply chain it can lead to competitive advantage and companies can then lobby governments to make practices mandatory for other companies. However, what is unclear from these papers is which social supply chain sustainability practices in particular will lead to enhanced performance when implemented separately from environmental practices?

The first practice is monitoring. This is similar to environmental monitoring where companies monitor their supply chain members to ensure basic environmental compli-

ance. From a social perspective this would focus on basic social practices such as health and safety and human rights requirements enforced across the supply chain. Conceptual studies have suggested a link between monitoring basic technical capabilities but have not tested this link (Parmigiani et al. 2011) and theory-building studies have shown that if suppliers are reducing accidents and have happier, more productive workers this will be good for performance (Pagell and Wu 2009). Empirical studies have also explored how purchasing social responsibility, which involves selecting and monitoring suppliers based on their social sustainability practices, affects a firm's cost structure and leads to organisational learning and improved supplier performance (Carter 2005). While other studies have found that selecting and monitoring suppliers based on social sustainability has a direct impact on performance. This leads to an increase in strategic capabilities, organisational learning, and firm reputation (Ehrgott et al. 2011) and reduces operational risk and increases return on investment (Klassen and Vereeke 2012). Given this evidence we hypothesise that:

- **H5a** Applying social supply chain monitoring practices will lead to better operational outcomes.

- **H5b** Applying social supply chain monitoring practices will lead to better competitive outcomes.

Additionally, helping supply chain members to implement more complex management systems that ensure social sustainability such as OHSAS18000 (for health and safety management) and SA8000 (for workplace practices) have been found to enhance relationship performance with suppliers and also affect the operational outcomes of the firm (Parmigiani et al. 2011). These social management systems focus on best practice and the use of industry certification as a method of ensuring implementation within and across the supply chain. Das et al. (2008) showed that management systems led to positive outcomes for quality performance and Tate et al. (2010) established that social sustainability strategies such as safety training have a positive influence on financial performance. Studies have also found that well-being programmes that go beyond health and safety to work-life balance and exercise and nutrition programmes can lead to a decrease in costs due to sickness and an increase in the healthy lifestyles of supply chain employees (Pfeffer 2010). Unfortunately, researchers stopped short of testing the same practice across both operational and completive performance. From this we hypothesise that:

- **H6a** Implementing social supply chain management systems will lead to better operational outcomes.

- **H6a** Implementing social supply chain management systems will lead to better competitive outcomes.

New product and process development practices are a more strategic and proactive approach moving beyond the more basic practices. Socially, these practices are focused on finding new and innovative ways to reduce any harm on supply chain members such as consumers and employees and finding practices that benefit all workers in the supply chain. Nidulomu et al. (2009) have shown environmental innovation and business redefinition to have positive impacts on performance.

When practices enhance collaborative relationships, such as where buyers and suppliers work together to ensure the creation of products and processes that enhance the well-being of people in the supply chain, this leads to better coordination with supplier's customers and stakeholders can mitigate operational risk and offer good returns although returns were difficult to quantify (Klassen and Vereeke 2012). We hypothesise therefore that:

- **H7a** New product and process development across the supply chain with a social focus will lead to better operational outcomes.

- **H7b** New product and process development across the supply chain with a social focus will lead to better competitive outcomes.

Supply chain redefinition to focus on social outcomes involves non-governmental organisations or community groups in the decision-making and strategy-developing activities of the supply chain (Klassen and Vereeke 2012). This means developing strategies that cause as little harm as possible to communities, society, and groups involved in and affected by the supply chain. An excellent example of this is redefining the supply chain around the strategy of fair trade, where the supply chain is identified with the central ideas of producer empowerment, training and education and fair and equitable trading including fair margins throughout the supply chain (Awaysheh and Klassen 2010; Smith and Barrientos 2005). Again this can affect the performance of the firm by providing new markets to enter and also catering to niche customers willing to pay premium prices for socially focused products (Schaltegger and Wagner 2011). Safe conditions throughout the supply chain, motivated producers and the ability to invest in quality and process improvement programmes would follow from a socially focused supply chain. Therefore we hypothesise:

- **H8a** Implementation of social redefinition practices will lead to better operational outcomes.

- **H8b** Implementation of social redefinition practices will lead to better competitive outcomes.

18.2.3 Summary

The research literature has presented a diverse catalogue of measures of supply chain sustainability practices. To help us categorise these practices we utilised classifications from previous studies that have identified lower order practices to higher order practices as part of a continuum, each with relative impact (Sharma and Henriques 2005). Practices have been categorised in other forms, such as external and internal practices. Externally the focal firm is removed from the implementation but monitors compliance or encourages suppliers to adopt sustainability practices (Vachon and Klassen 2006; Awaysheh and Klassen 2010). Internally the focal firm is part of the process and spearheads change through encouragement, collaboration and/or reward (Nidumolu et al 2009; Vachon and Klassen 2006; Tate et al. 2010). We have consolidated and synthesised existing measures in an effort to test the relationship between established sustainability practices and outcomes for firms to allow firms to create a business case for both environmental and social sustainability practices. We arrived at four environmental and four social supply chain sustainability practices with similar themes: monitoring, management systems, new product and process development, and redefinition. These practices represent varying levels of strategic pro-activeness and also take into account differing adoption drivers (Seuring and Müller 2008; Pagell and Wu 2009; Carter and Easton 2011). They also have different impacts on performance. The next sections will outline how we tested our hypotheses and our findings.

18.3 Methodology

18.3.1 Sample and Data Collection

To test our hypotheses we distributed a survey to supply chain directors in Ireland. Choosing to locate the survey in a single country eliminates any bias of differing regulations (Pagell and Gobeli 2009). Using an established Irish database we drew an initial list of 1000 companies. As a unit of analysis we chose the supply chain relationship, thus allowing us to gain insight into practices adopted across the supply chain (Cao and Zhang 2011). Companies had to satisfy three main criteria to be considered eligible for inclusion: name and relevant job title, companies with over 50 employees and companies from different industrial sectors. Plants had to be larger in size as larger companies have resources and capabilities needed to install innovative technology and policies that small companies may lack (Lee and Klassen 2008; Zhu and Sarkis 2007; Preuss 2009). It was necessary that the results should be broadly applicable and therefore a cross section of industries was chosen. This generalisability is limited if a specific industry is chosen (Walton et al. 1998) and "noise" can be reduced if both manufacturing and services are included (Liu et al. 2010) while also allowing for future studies to be internationally comparable (Carter and Easton 2011). To test our hypotheses our target sample covered ten industries in Ireland based on the North American Industry Classification System (2007).

Table 18.1 Sample descriptives

	% of sample respondents	Mean	Standard deviation	Maximum	Minimum
Employee numbers	99.4	32,908	84,597	500,000	50
Company age	100	9.92	14	41	0.75

Our sample size was reduced twice during the initial stages of examination, once due to companies falling outside our classification specification and then again due to duplications, leaving us with a sample of 883 companies. In an attempt to improve response rates a telephone survey was used, which allowed us to identify the most suitable respondent and ensure clarity. The key informant approach was used where the supply chain expert or equivalent was approached to complete the questionnaire (Cao and Zhang 2011; Singh et al. 2011). It has been noted that surveys sent to pre-screened respondents often have higher response rates (Cycyota and Harrison 2006). We assured the participant that neither they nor the company would be identified, that all data would be treated according to data management best practice and in an effort to avoid a common-rater effect or social desirability, a confidentiality statement was read out at the beginning of each interview (Zhu et al. 2013). As a method of reducing social desirability bias participants were asked to answer questions from a company perspective (Carter 2000).

Our sample size was reduced again by a further 20 companies during the interview process, as companies had ceased trading, phone lines no longer worked and further duplicates deleted. This left a final sample population of 863. The number of complete responses received was 156, giving us an acceptable response rate of 18.08%. In our study, seven companies or 4.5% categorised themselves as "Utilities"; 3.9% (six companies) of the sample were construction companies. The largest proportion, 53.2% or 83 companies, came from the manufacturing sector. Wholesale Trade accounted for 13 companies or 8.3%. Transportation and Warehousing amounted to ten companies or 6.4%; Postal Services, Couriers and Messengers, and Warehousing and Storage accounted for two companies each, which is six in total and 3.9% of the overall sample. Total Telecommunications and Total Waste Management and Remediation Service accounted for one company each or 1.2% in total. Retail Trade companies were the second largest category with 29 companies amounting to 18.6% of our total sample. Our manufacturing respondents were dispersed between 16 sub-types, which accounts for the high concentration of manufacturing companies. Table 18.1 provides an overview of the respondent companies' size and age.

18.3.2 New Construct Development

For environmental monitoring we adapted items from a Global Manufacturing Research Group (GMRG) survey (Sheu 2013). GMRG was established in 1985 and their questionnaire is well known and utilised in management research. They incorporated questions on

monitoring compliance, commitment, and audits of environmental practices. (e.g., "We monitored major suppliers' commitment to environmental improvement goals"). Environmental management systems items are similar to green practices described by Vachon and Klassen (2006) and were created by adapting GMRG's basic environmental management systems items, focusing on the certification of suppliers e.g. ISO 9001, ISO 14001. Items were also adapted from Zhu et al. (2008) on practices describing and eco-design internal environmental management. We used Ehrgott et al. (2011) system design questions provided a basis for new product and process development along with Zhu et al. (2008) who provided items for addressing environmental new product or process design. These included items on increasing the use of recycled materials, the reduction of consuming resources and materials as well as eco-design. We adapted our items for environmental redefinition from Sharma and Henriques (2005). These comprised of practices that sought to look at waste as a potential energy source, the minimisation of waste as well recirculation items, business redefinition items, and eco-efficiency items. Although Sharma and Henriques (2005) items were created to focus on the wood industry, we altered them to be suitable for an industry-wide survey.

We utilised GMRG (Sheu 2013) items again for the final version of the social monitoring construct, these questions concentrated on monitoring commitment, compliance, and audits of health and safety practices, e.g. "We sent occupational health and safety questionnaires to major suppliers in order to monitor their compliance." We also used GMRG items for the social management system construct, asking respondents about the certification of their key suppliers in relation to health and safety practices such as OHSAS 18000. Berman et al. (1999) supplied a source for items dealing with work-family issues. Items on social management systems relating to employee welfare and well-being were adapted from Pullman et al. (2009). We also incorporated items from Awaysheh and Klassen (2010) to cover the area of supplier codes of conduct and labour practices. Ehrgott et al. (2011) provided the basis for the items on designing socially sustainable systems. Items to address fair and safe labour practices were adapted from Awaysheh and Klassen (2010), whereas product design and safety items had their foundation in Zhu et al. (2008) constructs. These together with Berman et al. (1999) items on benefiting employees and stakeholder relations were combined to develop our social new product and process development construct. To create the social redefinition construct we adapted items from Pullman et al. (2009) regarding workers, community, and diversity and also took items from the Impact on Society GRI UNEP/SustainAbility Report as they were focused on increasing transparency, collaboration with external stakeholders and efforts centring on reducing negative impacts on society.

18.3.3 New Construct Refinement

The process of creating and testing our new constructs involved four main steps. Initially we created the items drawing for the literature in the field. We followed this with two

separate rounds of Q-sorting, a pre-test, and a pilot study (Moore and Benbasat 1991). The two rounds of Q-sorts were carried out to ensure domain and content validity.

The first round of Q-sorting involved five pretesters, who, in this case were professors and senior sustainable supply chain management lecturers and would be regarded as reliable sources of information (Miller and Roth 1994; Rosenzweig and Roth 2007). We began with 43 items, divided among our eight potential constructs. The experts had to match an associated indicator variable to each practices. They also advised us on re-wording, refinement and general length and layout issues. 80% was chosen as the acceptable rate for verified constructs, as authors suggested 70% as an acceptable ratio for content validity (Kotcharin et al. 2012; Moore and Benbasat 1991).

Almost all constructs were altered based on the feedback of the experts. Environmental monitoring and social monitoring were completely changed during the first round of Q-sorting, when items were deleted: "Committed to recycling across all categories of waste" (Sharma and Henriques 2005) which only had a 50% agreement rate, and "Did not use child, forced or sweatshop labour" (adapted from Awaysheh and Klassen 2010) with a 25% agreement rate. We replaced them with adapted GMRG items (Sheu 2013).

A second round of Q-sort analysis took place on the refined and shortened scales with new pre-testers comprising of professors and senior sustainable supply chain lecturers. By the end of the second round of Q-sorting all items had reached the 80% agreement rate and we were left with 32 items across eight constructs. Finally a pre-test of the refined scales as part of the whole survey, conducted with three new experts, led to further explanations of some terms and minor clarification recommendations to practice items.

To test the reliability of the new scales we pilot-tested our entire survey ($n=33$). We identified and contacted a sample of respondents in similar industries and positions as would be in our population. Utilising this data we tested the new instruments and the constructs were accepted if the Cronbach's alpha value was greater than 0.7 (Cronbach 1951). All the new scales reached well above a value of 0.7. We also asked for feedback on the questionnaire and specifically on the new sustainable scales. Based on this we revised our definition of social sustainability and incorporating all the feedback ensured item clarity, thus avoiding common method bias (Podsakoff et al. 2003; Zhu et al. 2013). All the measures were based on a seven-point Likert scale with end points of either no implementation or no development and fully implemented or fully developed.

18.4 Measures

18.4.1 Dependent Variable

We had two dependent variables: operational outcomes and competitive outcomes. We assessed both types of outcomes on an environmental and social scale using previously established items and constructs. For both scales respondents were asked to indicate the

level of improvement of their outcomes due to their sustainability practices over the last year on a Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree").

For operational outcomes we adapted the scales from Lawson et al. (2008). We measured the extent to which the focal firm operational outcomes improved as a result of sustainability practices over the past year. The questionnaire included two operational outcome constructs, one environmental and one social. Competitive outcomes scales were adapted from Nahm et al. (2004). We measured the extent to which the focal firm's competitive outcomes improved as a result of sustainability practices over the past year. Items such as "your environmental sustainability practices have resulted in sales growth" and "your social sustainability practices have resulted in better overall competitive position" were included.

The Cronbach's alphas and factor loadings for these established scales all reach required levels. Environmental operational outcomes factor loadings exceeded 0.5 with a Cronbach's alpha of 0.914. Environmental competitive outcomes factor loadings all exceeded 0.5 with an alpha over 0.8. Social operational outcome factor loadings were above 0.7, with an alpha of.934, and social competitive outcome factors loadings were also above 0.7 with an alpha over 0.8. All items exhibited satisfactory levels of inter-item reliability (Nunnally 1978).

18.4.2 Independent Variable

Our dependent variables now consisted of four environmental and four social supply chain sustainability factors. Monitoring covered basic elements such as compliance with environmental requirements or health and safety requirements on the social side. Management systems were a development beyond monitoring and covered practices such as the obtaining of ISO 14001 or OHSAS 18001 certification. New product and process development measured the extent the focal company had worked with suppliers toward initiatives such as the reduced consumption of resources for the environmental construct and benefits for workers on the social construct. While supply chain redefinition constructs focused on closed loop supply chains and the inclusion of stakeholders such as community groups in the supply chain.

We performed a reliability analysis for each of the environmental supply chain sustainability scales. As shown in the two all of the scales exhibited acceptable levels of reliability. We also performed an exploratory factor analysis. A principal axis factor analysis with oblique rotation (Oblimin, delta = 0) was performed on each measure. Evaluation of each of the correlation matrices among items for each measure indicated that it was factorable. All of the environmental items loaded onto their respective four factors ($p < 0.001$), providing evidence of convergent validity. Internal consistency is measured by the coefficient alpha as well as another measure, average variance explained. With the exception of the correlation between monitoring and management systems, the AVE of each scale exceeds the square of its correlation with the other practices, providing evidence of discriminant

Table 18.2 Environmental sustainable supply chain practices

Construct	# Items	Alpha	95% confidence interval		Mean inter-item correlations	Average variance explained
			Lower	Upper		
Environmental monitoring	4	0.93	0.91	0.95	0.77	0.78
Environmental management systems	4	0.93	0.91	0.95	0.77	0.77
Environmental new product and process development	4	0.91	0.88	0.93	0.72	0.63
Environmental strategy redefinition	4	0.87	0.83	0.90	0.63	0.71

Table 18.3 Social sustainable supply chain practices

Construct	# Items	Alpha	95% confidence interval		Mean inter-item correlations	Average variance explained
			Lower	Upper		
Social monitoring	4	0.92	0.90	0.94	0.74	0.74
Social management systems	4	0.90	0.88	0.93	0.69	0.70
Social new product and process development	4	0.90	0.87	0.92	0.69	0.65
Social strategy redefinition	4	0.89	0.85	0.91	0.67	0.70

validity. In all cases, Bartlett's test of sphericity was significant, indicating that correlation matrices were suitable for factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy exceeded 0.80, which is "meritorious" according to Kaiser's criteria (Pett et al. 2003). (Table 18.2)

We performed a similar analysis with respect to the social measures of supply chain sustainability as shown in Table 18.3. The reliability of the social supply chain sustainability items was assessed and all of the scales exhibited acceptable levels of reliability (Cronbach 1951). The alpha of every factor was greater than 0.8 (Nunally 1978). Again, all items loaded on their respective constructs; and as with the environmental measure, the average variance extracted for each factor exceeded 0.50, the Kaiser-Meyer-Olkin measure of sampling adequacy exceeded 0.80 and, Bartlett's test of sphericity was again significant.

18.4.3 Nonresponse Bias

Although telephone surveys have the advantage that the offer an immediate opportunity to assess non-response bias, as you can immediately assess why the respondent would not wish to partake in the survey, out for the 132 refusals, 88 refused outright, mainly citing that they did not have sufficient time to participate, whereas 44 cited company policy as their reason for not participating. We made hundreds of appointments to call back at more convenient times however in the vast majority of these callbacks the key informant was again too busy. We could find no reason to suggest that these respondents would have answered the questions differently from those that did respond (Singh et al. 2011).

18.4.4 Descriptive Statistics

Table 18.4 presents the means, standard deviations, and zero order correlations among all the variables in the study. With the exception of the correlation among some of the adoption practices, the correlations among variables are all below the recommended level of 0.70, which suggests the absence of problems of multi-collinearity. We attributed the higher correlation to the fact that there may be a higher-order construct at play, in short that the four practices we have identified for each category may be re-conceptualised into a second-order two-factor model, however as we wish to identify as many levels of practices that pay as possible, the four factor model is best suited to our needs. Nonetheless, we examined the variance inflation factors of each of the predictors in our models, which ranged from 1.698 to 5.115, with most factors falling between two and three suggesting the absence of multi-collinearity (Neter et al. 1996). Additionally, the condition index, another index of the extent of collinearity, was less than 30, suggesting no significant incidence of collinearity (Cohen et al. 2003).

18.5 Results

We had eight dependent variables: environmental monitoring, environmental management systems, environmental new product and process development environmental supply chain redefinition, social monitoring, social management systems, social new product and process development, and social supply chain redefinition. The models we developed highlighted the differences between the effect of environmental monitoring, management systems, new product and process development, and redefinition practices on operational and competitive outcomes as well as the effect of social monitoring, management systems, new product and process development, and redefinition practices on operational and competitive outcomes. Two four-factor models showed how each level of practice is related to the outcomes.

Table 18.4 Means, standard deviations and zero order (Pearson's) correlation matrix

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Environmental monitoring	4.03	2.02	1													
Environmental management systems	3.32	2.01	0.84**	1												
Environmental new product and process development	4.58	1.74	0.50**	0.50**	1											
Environmental redefinition	4.44	1.49	0.49**	0.46**	0.63**	1										
Social monitoring	3.69	1.95	0.67**	0.64**	0.53**	0.45**	1									
Social management systems	2.91	1.79	0.60**	0.76**	0.60**	0.43**	0.70**	1								
Social new product and process development	4.50	1.71	0.53**	0.53**	0.73**	0.56**	0.60**	0.60**	1							
Social redefinition	3.91	1.67	0.59**	0.58**	0.64**	0.60**	0.61**	0.59**	0.73**	1						
Environmental operational outcomes	4.34	1.55	0.60**	0.58**	0.65**	0.54**	0.56**	0.52**	0.62**	0.63**	1					
Environmental competitive outcomes	3.92	1.52	0.60**	0.55**	0.61**	0.50**	0.50**	0.50**	0.55**	0.55**	0.86**	1				
Social operational outcomes	4.16	1.56	0.52**	0.52**	0.58**	0.50**	0.55**	0.50**	0.62**	0.62**	0.90**	0.78**	1			
Social competitive outcomes	3.81	1.56	0.50**	0.49**	0.57**	0.46**	0.52**	0.48**	0.56**	0.56**	0.79**	0.88**	0.85**	1		
Number of employees	32908.01	84574.99	0.24**	0.19*	0.15	0.18*	0.13	0.19*	0.12	0.08	0.15	0.15	0.11	0.01	1	
Age of company	55.21	50.09	0.06	0.05	0.07	0.07	0.09	0.05	0.17*	0.11	0.06	−0.02	0.04	−0.04	0.14	1

$N = 156$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 18.5 Four-factor environmental model

Environmental outcomes	Operational		Competitive	
	Beta	Sig.	Beta	Sig.
Controls				
Employee numbers (LN)	0.354	0	0.315	0
Age of company (LN)	–	N.S.	–	N.S.
Independent variables				
Monitoring	0.267	0.012	0.351	0.002
Management	–	N.S.	–	N.S.
New product and process development	0.395	0	0.378	0
Redefinition	–	N.S.	–	N.S.

We employed models with two control variables: size and age of the company. Large companies typically face higher sustainability pressures (Godfrey et al. 2009) and are typically required to implement better practices. The control variables are firm size measured by the number of full time-employees (Zhu and Sarkis 2007) and company age. Firm size was significant but age had no significant effect on the model. This holds true for all models.

The models were tested using hierarchical linear regression analysis. Initially the control variables were entered into the regression. Then the first dependent variable, environmental operational outcomes, was run in the model, with each of the four environmental supply chain sustainability practices entered in the second step. Our second model followed the same procedure however this time we tested environmental competitive outcomes. This method was repeated with social operational outcomes as the dependent variable and social supply chain sustainability practices as the independent variables to give us our third model and this was followed by a fourth model with social competitive outcomes as the dependent variable.

The results of the environmental and social hierarchical regression models are presented in Tables 18.5 and 18.6. Evidence of moderation exists when inter-action terms account for significant incremental (step) variances in a dependent variable, either individually, as signified by the value of the β coefficients, which is displayed in the results below. For example for every one standard deviation increased in environmental monitoring, environmental operational outcomes increased by 0.267 standard deviations. For environmental competitive outcomes: for every one standard deviation increase in environmental new product and process development, competitive outcomes increased by 0.378 standard deviations. Regarding the social practices, for every one standard deviation increase in social new product and process development, social operational outcomes increased by 0.314 standard deviations and for every one standard deviation increase in social redefini-

Table 18.6 Four-factor social model

Social outcomes	Operational		Competitive	
	Beta	Sig.	Beta	Sig.
Controls				
Employee numbers (LN)	0.286	0.001	0.251	0.004
Age of company (LN)	–	N.S.	–	N.S.
Independent variables				
Monitoring	–	N.S.	–	N.S.
Management	–	N.S.	–	N.S.
New product and process development	0.314	0.002	0.283	0.007
Redefinition	0.267	0.005	0.227	0.024

Table 18.7 R^2 of models

Model		R^2	Adjusted R^2	R^2 change
Environmental operational outcomes	Step 1	0.117	0.105	0.117
	Step 2	0.541	0.529	0.424
Environmental competitive outcomes	Step 1	0.088	0.076	0.088
	Step 2	0.488	0.474	0.4
Social operational outcomes	Step 1	0.082	0.069	0.082
	Step 2	0.482	0.468	0.4
Social competitive outcomes	Step 1	0.061	0.049	0.061
	Step 2	0.411	0.395	0.35

tion, social competitive outcomes increased by 0.227 standard deviations. The R^2 of the models, which captures the variance explained in the dependent variable, are shown in Table 18.7.

Our results show that environmental sustainability practices and social sustainability practices do not act in the same ways and that differing levels of practices have different effects on each outcome, supporting our categorisation of four factors and showing that it pays to be green and good but for different practices. A summary of results of the hypotheses is given below:

- **H1 (a-b)** Instigating environmental supply chain monitoring practices will lead to better operational and competitive outcomes. The adoption of environmental monitoring practices led to a significant increase in operational outcomes ($\beta = 27, p < 0.05$) and an even larger increase in competitive outcomes was linked to environmental practices ($\beta = 35, p < 0.01$). This supported our hypotheses.

- **H2 (a-b)** Implementing environmental supply chain management systems will lead to better operational and competitive outcomes. The implementation of environmental management systems did not lead to better operational or competitive outcomes as the results were non-significant, therefore these hypotheses were not upheld.

- **H3 (a-b)** Environmental new product and process development practices led to better operational ($\beta = 40$, $p < 0.0001$) and competitive outcomes ($\beta = 38$, $p < 0.0001$). This practice led to the most significant increases. Thus our hypotheses, H3a and H3b, were supported.

- **H4 (a-b)** Redefining supply chains to include environmental outcomes will lead to better operational and competitive outcomes. There was no significant effect of environmental redefinition practices on operational or competitive outcomes. Therefore our hypotheses were not supported.

- **H5 (a-b)** Applying social supply chain monitoring practices will lead to better operational and competitive outcomes. Social monitoring practices had no significant effect on operational or competitive outcomes. Thus our hypotheses were not supported.

- **H6 (a-b)** Implementing social supply chain management systems will lead to better operational and competitive outcomes. The implementation of social management systems in the supply chain were not shown to lead to better operational and competitive outcomes as all results were non-significant, therefore these hypotheses were not upheld.

- **H7 (a-b)** New product and process development across the supply chain with a social focus will lead to better operational and competitive outcomes. The implementation of social new product and process development practices led to better operational ($\beta = 31$, $p < 0.01$) and competitive outcomes ($\beta = 28$, $p < 0.01$). Thus our hypotheses, H7a and H7b, were supported.

- **H8 (a-b)** Implementation of social redefinition practices will lead to better operational and competitive outcomes. Social redefinition had positive significant effects on both operational ($\beta = 27$, $p < 0.01$) and competitive outcomes ($\beta = 23$, $p < 0.05$), upholding our hypotheses.

All the results are shown figuratively in Figs. 18.1 and 18.2.

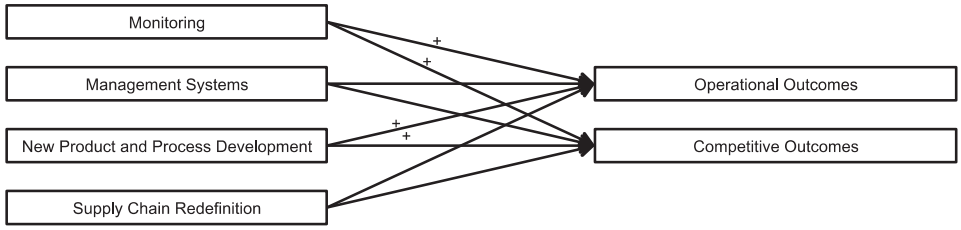

Fig. 18.1 Environmental supply chain sustainability practices and outcomes

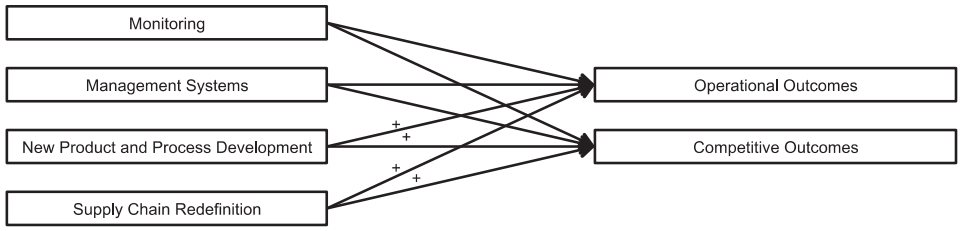

Fig. 18.2 Social supply chain sustainability practices and outcomes

18.6 Discussion

From our study, it is evident that environmental and social practices lead to different outcomes and different levels of performance. In line with the supply chain literature, we found that environmental supply chain sustainability practices are adopted more than social supply chain sustainability practices. But some practices clearly pay more than others. In terms of environmental supply chain sustainability practices, monitoring, and new product and process development led to increased operational and competitive outcomes. With social supply chain sustainability practices new product and process development and supply chain redefinition led to improved operational and competitive outcomes.

It is clear that environmental monitoring is capturing the long-hanging fruit involved in waste, resource and pollution reduction. However, this does not hold true for social monitoring practices. We can assume that this may be due to basic monitoring practices being a pre-requisite or norm especially for first-tier suppliers within the sample supply chains with little cost reduction or market access improvement.

Neither environmental nor social management systems had a significant effect on the outcomes. There could be several reasons for this unexpected result. It may be that there was a fairly low adoption rate of management systems in comparison to other practices, or many of these systems are already in place due to institutional pressures (Wu and Pagell 2011; Zhu and Sarkis 2007) or external stakeholder pressure (Sharma and Henriques 2005). Another reason for this finding could be the existence of the two-factor model, which we discussed earlier, and which should be assessed in further research. Although

the two-factor model can show the difference between lower and higher-order sustainability practices on operational and competitive outcomes, in the study of specific practices and the outcomes of these practices there is no substitute for the four-factor model.

Interestingly, supply chain new product and process development were adopted more than any other set of practices and contributed most to competitive and operational outcomes. Additionally, new product and process development practices led to the best results both environmentally, and socially. This supports Ambec and Lanoie's (2008) focus on innovative environmental strategies as the main way to reduce costs and increase revenues and maintains the argument that new product and process innovation is key to future of sustainable supply chain management (Pagell and Wu 2009).

It also seems that fair trade pays for companies both operationally and competitively. Reorienting the supply chain to focus on bringing in non-traditional partners such as NGOs and community groups into the strategic planning of the supply chain (Pagell and Wu 2009) and ensuring that there is fair and equitable trade and empowerment of producers (Hughes 2007) results in quality improvement throughout the supply chain and access to markets for supply chains.

Further analysis also showed that for firms implementing both environmental and social supply chain sustainability there were rewards: With high implementers reporting both higher operational and competitive benefits. Medium and high adopters of sustainability practices reported relatively higher benefits to their operations and their competitive situation with operational benefits slightly higher than competitive. Those supply chains with low levels of implementation, on the other hand, do not appear to have operational or competitive benefits. Of further interest is the point that social supply chain sustainability practices appear to have a consistently greater impact than environmental equivalents on operational and competitive outcomes. This is despite social supply chain sustainability practices being adopted a lot less. Part of the reason that environmental practices receive more attention might be the fact that companies are better at communicating environmental sustainability than social (Brandlogic and CRD Analytic 2012). A lesson for companies may be that the message that social sustainability pays more than environmental sustainability practices rings true and companies should begin to seriously look at investing in social new product and process development as well as social supply chain redefinition.

For the companies in our sample, the benefits and opportunities are clear: Adopting sustainable practices creates positive operational and competitive outcomes. The adoption of these practices can not only minimise harm and maximise benefit for both the environment and people but can also help companies develop competencies in supply chain sustainability and ultimately long-term operational and competitive sustainability.

18.7 Conclusion

As the shift in focus has broadened from an organisational to supply chain perspective, so too is the current focus on supply chains fast becoming synonymous with the concept of sustainable supply chains. But how do companies implement practices that are economically, environmentally and socially sustainable and which practices should be implemented to support the triple bottom line? Enacting supply chain sustainability is proving to be a challenge, especially as incentives are not aligned with outcomes (Touboulic and Walker 2013). In this study, we have taken a step forward in identifying, developing, categorising and, testing a variety of environmental and social practices that have been shown to lead to better operational and competitive outcomes. The missing link in the sustainable supply chain literature is making a clear and concise business case for sustainability practices. This chapter has contributed to this conversation by outlining both social and environmental sustainability practices and how they benefit operational and competitive outcomes for companies. It is clear that although social sustainability has not been as widely adopted the benefits of adopting social supply chain sustainability practices are clear. This may give stimulus to more adoption of these practices.

There is also scope to reconceptualise these practices as process-based practices and market-based practices creating a higher and lower order of practices to test, however in this instance creating and testing these comparable yet separate four factor constructs allows us to show the different effects of practices on operational and competitive outcomes and also move the discussion on social sustainability forward, concluding that it is as a worthwhile area for attention and investment. Further testing of the items, constructs, and models would allow this phenomenon to be investigated in different contexts and over time. In an effort to mitigate the impact of common method bias and increase validity the survey could be distributed more broadly to suppliers and buyers, incorporating those beyond the first tier.

By their design and through empirical testing these instruments could be used to further research in supply chain sustainability. Creating constructs that were at once comparable and specific to their environmental or social identity was challenging, and choosing which items to include in the scales to provide the most realistic measurement instrument was an arduous process. Due to the abundance of scales available to test environmental sustainability, in particular, choosing the most suitable was a difficult process that required constant testing in different settings and with different populations (Hensley 1999). Although the mix of manufacturing and service companies in our sample increases the generalisability of our study (Walton et al. 1998), the validity and reliability of the measurement constructs could be improved through international testing and these constructs could be refined with further testing. This study has taken steps to improve the theoretical base of supply chain sustainability and has developed measures in order to do this. More importantly, by showing companies that there is a business case to be made for environmental and social sustainability we hope to provide a persuasive argument for companies to implement and invest in supply chain sustainability practices.

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