# Do firms care for the environment or they adopt environmental management in order to benefit economically?

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# Do firms care for the environment or they adopt environmental management in order to benefit economically?

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**Abstract**

Since the dawn of the industrial age, the goals of economic growth and environmental quality have recurrently been at odds (Florida and Davison, 2001). In the last 10 years, a radical change has come about in management's views on pollution, the need for pollution reduction and better environmental management (Melnyk, Sroufe and Calantone, 2003). Firms are becoming "leaner and greener" at the same time (Florida 1995; Atlas and Cline 1999 as cited in Florida and Davison, 2001). These companies are motivated not only by altruistic concerns, but also by a bottom-line quest to increase profits, productivity, and performance by reducing waste and emissions (Florida and Davison, 2001). This paper provides an overview of the determinants of the adoption of environmental management systems and concludes that EMS are effective management tools enabling firms to better anticipate and proactively address potential environmental risks.

**Key words:** firms, environment, management

## 1 .Introduction

Environmental quality has many dimensions. Our lives are affected by the air we breathe, the water we drink, the diversity of species with which we come into contact, and the beauty we observe in nature (Grossman and Krueger, 1995). The productivity of our resources in producing goods and services is influenced by climate, the nutrients in the soil, and rainfall (Grossman and Krueger, 1995).

There has been an increasing interest towards corporate activities aimed at reducing or eliminating the waste created during the production, use and/or disposal of a firm's products (Hahn and Stavins, 1991). Around the world, many companies are moving to adopt advanced environmental practices that amplify both their environmental performance and their competitiveness (Florida and Davison, 2001). Environmental management takes place in a setting of perpetual change (Bonnicksen 1991 as cited in Selin and Chavez, 1995). Managers must adjust to a host of ecological, political, economic, and social forces that affect how a resource will be managed (Selin and Chavez, 1995).

Even though some policy makers would claim that the singular objective of environmental regulation is to protect environmental quality, the decision problem actually faced by policy makers is more complex, involving tradeoffs among multiple objectives and real and frequently binding constraints (Hahn and Stavins, 1991). Economic perspectives play important role in both the selection of goals and the selection of means (Hahn and Stavins, 1991).

## 2. The contribution of the International Standard Organization ( ISO) 14001

The International Standard Organization (ISO) answered back to the calls to address the field of



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environmental law and pollution that were made at the occasion of the Rio Agreement (1993) and the GATT Uruguay Round Ministerial Decision on Trade and the Environment
(1994) (Delmas, 2002). Therefore the ISO established the Strategic Advisory Group on the Environment (SAGE) to determine whether an international environmental management standard could 'promote a common approach to environmental management, enhance an organization's ability to attain and measure improvements in environmental performance, and facilitate trade and remove trade barriers' (Tibor and Feldman, 1996 as mentioned in Delmas, 2002).In September of 1996, the ISO 14001 certification standards for environmental performance were adopted (Melnyk, Sroufe and Calantone, 2003). The ISO 14001 was promoted as the standard that would replace the numerous and often conflicting sets of criteria found in various countries (Melnyk, Sroufe and Calantone, 2003). Instead of focusing on outcomes such as reduced pollution this standard focused on the processes involved in the creation, management, and elimination of pollution (Melnyk, Sroufe and Calantone, 2003).
It was actually a set of guidelines for developing systems and practices in six environmental sectors (Delmas, 2002). The Series was divided into six sections, which included: ISO standards 14001 and 14004 (Environmental Management Systems); ISO standards 14010 to 14012 (Environmental Auditing); ISO standards 14020 to 14025 (Environmental Labeling); ISO standard 14031 (Environmental Performance Evaluation); ISO standards 14040 to 14043 (Life Cycle Assessment); ISO standard 14060 (Environmental Aspects in Product Standards) (Delmas, 2002).

ISO 14001 may be voluntary but not free (Delmas, 2002). It is recommended that firms will invest in ISO 14001, if they perceive that the benefits of certification will outweigh its costs (Delmas, 2002). European companies benefited from a very favorable institutional environment towards ISO 14001(Delmas, 2002). European governments have encouraged the adoption of environmental management standards by setting up a trusted certification system and providing technical assistance to potential adopters (Delmas, 2002). On the contrary, U.S. firms faced an unfavorable institutional environment with a lack of regulatory commitment to environmental management standards. U.S. companies are fearful of the certification process which lays their performance open to public scrutiny (Delmas, 2002).

In fact the ISO 14001 provides the basic framework for the establishment of an Environmental Management System (EMS) that can be audited and certified (Delmas, 2002). The main reason for the creation of ISO 14001 was that its worldwide acceptance should facilitate international trade by harmonizing otherwise diffuse environmental management standards and by providing an internationally accepted blueprint for sustainable development, pollution prevention, and compliance assurance (Delmas, 2002). ISO 14001 is an example of harmonized procedural standards where all nations should eventually adopt similar environmental management systems and procedures (Delmas, 2002). Developing ISO 14001 as an international standard for EMS is a clear consequence of globalization (Delmas, 2002).


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## 3. Environmental Management System (EMS)

### 3.1 Definition

But what exactly is an environmental management system (Melnyk, Sroufe and Calantone, 2003)? EMS is one of the tools an organization can use to implement an environmental policy (Delmas, 2002). EMS illustrate an extension of the core principles of total quality programs to managing the environment (Florida and Davison, 2001).In other words EMS can be described as the systematic application of business management to environmental issues (Florida and Davison, 2001).In particular it involves the formal system and database which integrates procedures and processes for the training of personnel, monitoring, summarizing, and reporting of specialized environmental performance information to internal and external stakeholders of the firm (Melnyk, Sroufe and Calantone, 2003).Notably, it consists of 'a number of interrelated elements that function together to help a company manage, measure, and improve the environmental aspects of its operations' (Welford, 1996 as mentioned in Delmas, 2002). The documentation of this "environmental" information is primarily internally focused on design, pollution control and waste minimization, training, reporting to top management, and the setting of goals (Melnyk, Sroufe and Calantone, 2003). An EMS is aiming to develop, implement, manage, coordinate and monitor corporate environmental activities to achieve two goals: compliance and waste reduction (Sayre, 1996). Compliance, for a firm, simply means reaching and maintaining the minimal legal and regulatory standards for acceptable pollution levels for the purpose of avoiding sanctions. For instance, failure to comply can result in increased costs (fines), in extreme situations, issuance of cease and desist orders, and in increased external intervention in day-to-day operations (Melnyk, Sroufe and Calantone, 2003). Apparently, waste reduction goes beyond compliance and focuses a firm's activities on the dramatic reduction of negative environmental impact (Melnyk, Sroufe and Calantone, 2003). EMSs, actually, represent an organizational change within corporations and a self-motivated effort at internalization of environmental concerns into the objectives of the firm (Khanna and Anton, 2002).

### 3.2 First EMSs in Europe

The first EMSs implemented in the world The British BS 7750 and the European EMAS were (Delmas, 2002). BS 7750 was the world's first environmental standard, published in the U.K. in March 1992 (Delmas, 2002). While British Standard Institute (BSI) began working on BS 7750, the European Commission was setting up its proposal for an eco-audit scheme: the Environmental Management and Audit Scheme (EMAS) (Delmas, 2002). EMAS was adopted by the Council of Ministers on June 29, 1993 (Council Regulation 1836/93). Because of the fact that EMAS is a regulation, rather than a directive, it immediately binds all EU Member States. Although the European Commission originally intended to pursue mandatory participation, business lobbying successfully prevented this. The EMAS regulation requires that the European Commission reviews the progress of the EMAS no more than five years after adoption. The important difference between EMAS and BS 7750 is that the later does not have the formers' commitment to publish audit findings regarding environmental performance, a disclosure with which companies are often



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uncomfortable. It has been suggested that BS 7750 would serve to introduce companies to the EMS techniques, allowing them to cut their teeth on the less publicly scrutinized standards of BS 7750 before moving on to EMAS. The similarity between the two schemes should therefore encourage companies to set up an environmental management system and assess their progress before taking the key step to publication of performance (Gilbert, 1994 as mentioned in Delmas, 2002). Firms with EMSs were granted some regulatory flexibility to EMSs' certified companies (Delmas, 2002).

### 3.3 Overall benefits for firms as a result of adopting environmental management systems

The major question is: are they doing this in response to government regulation, to improve their environmental performance, or to be more efficient and competitive (Florida and Davison, 2001)? The data suggests that firms adopt EMS not only for regulatory or environmental reasons but also for business benefits (Florida and Davison, 2001). The three top ranked factors among respondents in a survey conducted by Florida and Davison in 2001 were business-driven: commitment to environmental improvement, corporate goals and objectives, business performance, followed by community relations, state regulations and federal regulations. Moreover some research has analyzed specific factors external to the firm that go beyond regulatory compliance and drive the adoption of environmental strategies such as competitive forces (Aragón- Correa, 1998; Christmann, 2000; Dean and Brown, 1995; Delmas, 2003; Hart, 1995; Nehrt, 1996, 1998; Russo and Fouts, 1997; Sharma and Vredenburg, 1998 as mentioned in Delmas and Toffel, 2004), and pressure from nongovernmental organizations (Lawrence and Morell, 1995 as cited in Delmas and Toffel, 2004).

In particular, the relationship between business performance and environmental improvement has two dimensions (Florida, Atlas and Cline 1999 as mentioned in Florida and Davison, 2001). On the one hand, organizations may adopt environmental innovations in order to reduce costs through improved or more efficient production processes (Florida and Davison, 2001). On the other hand, environmental improvement may also be a byproduct of changes developed to reduce other costs, to improve productivity, and to improve plant performance (Florida and Davison, 2001).Obviously, the EMS plays a critical role in the firm's efforts not only to improve environmental performance but also overall performance (Melnyk, Sroufe and Calantone, 2003). Operations performance, like the environmental options considered, consists of multiple measures (Melnyk, Sroufe and Calantone, 2003). These measures focus on elements of production competence such as lead time, quality and cost, that generate value for the customer and that can create a strategic advantage for the firm (Vickery et al., 1993 as cited in Melnyk, Sroufe and Calantone, 2003). Other attributes involve areas including corporate reputation (Wood, 1991; Pava and Krausz, 1996 as mentioned in Melnyk, Sroufe and Calantone, 2003), the ability to design and deliver better products and service (Sroufe et al., 2000), the ability to reduce waste and the relative costs/benefits associated with the initiatives. In other words, the presence of an EMS allows a firm to evaluate environmental performance against policy, objectives, and performance targets while seeking performance improvements where appropriate (Melnyk, Sroufe and Calantone, 2003). Performance is lowest when EMS is not present, intermediate when EMS is present but not ISO 14001 certified, and highest when EMS is present and ISO 14001 certified (Melnyk, Sroufe and Calantone, 2003).



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Firms may have lures to voluntarily improve their environmental performance because it can lead to private benefits in the form of direct or indirect payoffs (see Segerson and Li, 1999; Lyon and Maxwell, 1999 as mentioned in Khanna and Anton, 2002). These benefits could emerge from the potential to preempt the threat of mandatory standards (Segerson and Micelli, 1998 as cited in Khanna and Anton, 2002) and to shape future mandatory standards by voluntarily over-complying (Lutz, Lyon and Maxwell, 2000 as mentioned in Khanna and Anton, 2002).Many firms have taken the decision to participate in voluntary programs established by the USEPA such as the 33/50 program (Arora and Cason, 1995,1996; Khanna and Damon, 1999), Green Lights, Waste Wise (Videras and Alberini, 2000) and the Climate Challenge Program in the U.S (Karamanos, 2000) that provide visible benefits to participants through public recognition and technical assistance.

Even though the potentially high costs of compliance with existing and anticipated regulations as well as the threat of liabilities are inducing firms to be more proactive about managing their environmental impacts, these pressures are not as strong as the non-regulatory pressures, from consumers, investors and communities (Khanna and Anton, 2002). Amongst these, it is dependence on capital markets, concerns about public reputation and the adverse effects on it of information about environmental performance and high costs of disposing of waste off-site that provide stronger incentives to adopt a broad-based EMS than consumer pressure and pressure from global competition (Khanna and Anton, 2002). But does stronger environmental performance really lead to better financial performance or is the observed relationship the result of some other underlying firm attribute (King and Lenox, 2008)?In the last 20 years a growing number of researchers have challenged this assumption (King and Lenox, 2008). In the field of industry ecology, scholars argue that there are situations where beyond compliance behavior by firms is a win-win for both the environment and the firm (Nelson 1994; Panayotou and Zinnes 1994; Esty and Porter 1998; Reinhardt 1999 as cited in king and Lenox, 2008). In other words they suggest that firms may be both "green and competitive" (Porter and van der Linde 1995; Reinhardt 1999 as mentioned in King and Lenox, 2008). In fact, many scholars argue that discretionary improvements in environmental performance frequently provide financial benefit (e.g. Hart 1997 as cited in King, Lenox, 2008). There are many ways that improving a company's environmental performance can lead to better economic or financial performance, and not necessarily to an increase in cost (Ambec and Lanoie, 2008). Supporters of a causal link between environmental and financial performance argue that pollution reduction provides future cost savings by reducing compliance costs, increasing efficiency, and minimizing future liabilities (Porter and van der Linde 1995; Reinhardt 1999 as mentioned in King and Lenox, 2008). ). Several studies show that investors react negatively to public disclosures about poor environmental performance reported in the TRI, resulting in significant abnormal stock market returns for firms (Hamilton, 1995; Khanna et al., 1998 as cited in Khanna and Anton, 2002). Bankers are conceding that they might be held legally responsible for environmental mistakes of their corporate borrowers (Khanna and Anton, 2002). As a consequence, they are beginning to include environmental considerations in their lending decisions and viewing poor environmental performers as financially risky (Hoffman, 1997 as mentioned in Khanna and Anton, 2002). Klassen and McLaughlin (1996) noted that strong environmental management, as indicated by


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environmental performance awards resulted in significant positive financial performance, as measured by stock market performance. Furthermore, Deutsch (1998) noticed that eco-efficient companies reward stockholders with good financial performance. Nielsen in 1999 observed that at least one investment firm back then, Innovest Strategic Value Advisors, recommended stocks based on the firm's environmental record. Therefore, better environmental performance can improve the value of the firm and attract new stockholders (Melnyk, Sroufe and Calantone, 2003).

Firms are facing growing pressure to become greener (Ambec and Lanoie, 2008). Various stakeholders press companies to reduce their negative impact on the environment (Ambec and Lanoie, 2008). One important way that companies can reduce outside tension is by involving key stakeholder groups in environmental activities and initiatives (Florida and Davison, 2001). By stakeholders we mean individuals, groups, and formal organizations who have either a perceived interest or impact on a particular resource (Selin and Chavez, 1995).EMS plants were almost three times as likely to involve neighbors and citizen groups in their environmental initiatives and more than twice as likely to involve local government (Florida and Davison, 2001). They can be divided into primary and secondary stakeholders (Kolk, 2000). On the one hand, primary stakeholders play an active role in the company's survival (Kolk, 2000). On the other hand, secondary stakeholders affect and are affected by the company but are not essential for the survival of the company (Kolk, 2000). Nevertheless, secondary stakeholders, as media and NGO's, have a considerable influence on environmental reporting (Kolk, 2000). Collaboration in the environmental management field is increasingly evident as managers supplement centralized decision-making methods by using standing committees, associations, negotiated settlements, and friends groups to assist in setting policy, planning, and managing the resource (Selin and Chavez, 1995). EMS appear to be an effective and useful tool for managing environmental risk outside the plant (Florida and Davison, 2001). The potential for adverse public pressure in response to information about poor environmental performance and the high costs or other barriers to waste treatment and disposal at the end-of-the-pipe are motivating firms to be more innovative about managing their environmental impacts (Khanna and Anton, 2002). Public policy can influence adoption of comprehensive EMSs by firms by providing information about the environmental performance of firms to the public, public recognition to firms with EMSs, and educating the public about the adverse effects of various pollutants, while maintaining stringency of the regulatory framework that imposes high costs of pollution on firms (Khanna and Anton, 2002).

The stakeholders, in specific, that influence the adoption of management practices are the below:

- ✓ *Government pressures*

Legislation authorizes agencies to declare and enforce regulations, a form of coercive power (Delmas, Toffel, 2004). Governments play an important role in firms' decision to adopt ISO 14001 (Delmas, 2002 as mentioned in Delmas, Toffel, 2004). They can act as a coercive force by sending a clear signal of their endorsement of ISO 14001 by enhancing, for instance, the reputation of adopters (Delmas, Toffel, 2004). Governments can also facilitate adoption by reducing information and search costs linked to the adoption of the standard by providing technical assistance to potential adopters (Delmas, Toffel, 2004).



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- ✓ *Customer pressures*

Concerns about the adverse impacts on a firm's reputation, if perceived as environmentally unfriendly, are becoming important for firms (Khanna and Anton, 2002). Public opinion polls indicate growing environmental consciousness among consumers (Cairncross, 1995; Gutfield, 1991 as mentioned in Khanna and Anton, 2002). Therefore, firms respond to customer requirements (Delmas, Toffel, 2004). The customer–supplier relationship is possibly the primary mechanism through which quality management standards have promulgated (Anderson *et al*., 1999 as cited in Delmas and Toffel, 2004). It has been found by several studies that firms that adopted environmental management practices were motivated by customer concerns (Delmas, Toffel, 2004).As an illustration, a survey of the largest Canadian firms showed that customer pressure was the second most cited source of pressure to adopt an environmental management plan, after government pressure (Henriques and Sadorsky, 1996 as mentioned in Delmas and Toffel, 2004).In addition, Khanna and Anton in 2002 found that US companies that sell final goods adopt more comprehensive EMSs than companies that sell intermediate goods (Delmas, Toffel, 2004). This means that retail consumers exert more pressure on companies to adopt environmental management practices than commercial and industrial customers (Delmas and Toffel, 2004).Finally, Christmann and Taylor in 2001 displayed that customers in developed countries have influenced companies in China to improve their environmental compliance and adopt the ISO 14001 EMS standard (Delmas and Toffel, 2004).

- ✓ *Community and environmental interest group pressures*

Do environmental management systems enable plants to better manage their emission and waste streams in ways that pose less environmental risk to the communities in which they are located (Florida and Davison, 2001)? Local communities can impose coercive pressure on companies through their vote in local and national elections, via environmental activism within environmental nongovernment organizations (NGOs) and by filing citizen lawsuits (Delmas and Toffel, 2004). Several studies have found that company decisions to adopt environmental management practices are influenced by the desire to improve or maintain relations with their communities (Delmas and Toffel, 2004 ).For instance, Henriques and Sadorsky surveyed 700 firms in 1992, which indicated that community group pressure influenced them to adopt an environmental plan (Delmas, Toffel, 2004). The adoption of these programs was positively associated with firms' active engagement with community stakeholders (Florida and Davison, 2001 as mentioned in Delmas and Toffel, 2004). Another study based on a survey of ISO 14001 certified companies across 15 countries found that one of the strongest motivating factors to pursue certification was the desire to be a good neighbor (Raines, 2002 as cited in Delmas and Toffel, 2004). Greater declines in toxic emissions have been observed among plants located in communities with higher voting rates (Hamilton, 1999 as cited in Delmas and Toffel, 2004) and in states with higher membership in environmental interest groups (Maxwell *et al*., 2000 as mentioned in Delmas and Toffel, 2004). Higher environmental interest group membership levels indicate a community's pro-environmental stance and greater propensity to use these organizations to lobby for more stringent regulation (Maxwell *et al.,* 2000 as cited in



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Delmas, Toffel, 2004). Hence, higher membership rates provide a credible threat of increased regulation, which in turn drives firms to self-regulate (Delmas, Toffel, 2004). For example, after Mitsubishi Corporation was subject to a protracted consumer boycott led by the Rainforest Action Network (RAN), Mitsubishi announced that it would no longer use old-growth forest products (World Rainforest Movement, 1998 as cited in Delmas and Toffel, 2004).

- ✓ *Industry pressure*

Several studies have indicated that industry associations have motivated firms to adopt environmental management practices (Delmas and Toffel, 2004). Kollman and Prakash in 2002 observed that the decision of whether to pursue certification, and which standard to certify against (ISO 14001 or the European Union's Eco-Audit and Management Scheme), was strongly affected by stakeholder pressures from industry associations additionally to regional chambers of commerce, suppliers and regulators (Delmas and Toffel, 2004).

- ✓ *Interactions*

The pressure from environmental groups may encourage the formulation of more stringent regulations, which can induce industry leaders to encourage laggard firms to adopt environmental practices (Delmas, Toffel, 2004). For instance, following its chemical disaster in Bhopal in 1984, Union Carbide faced mounting public pressure for more stringent safety and environmental regulations. In reply to that, the chemical industry developed and promoted a set of environment, health and safety (EHS) management practices – the Responsible Care program – to chemical industry associations in Canada and the United States (King and Lenox, 2000; Prakash, 2000 as mentioned in Delmas and Toffel, 2004).

- ✓ *The moderating effects of firm characteristics*

EMSs are mainly relative for medium and large companies, as smaller companies might prefer a more informal type of improvement cycle (Kolk, 2000).Multinational corporations are often held to higher standards for social and environmental responsibility than national companies because they are subject to the additional pressure of stakeholders from foreign countries (Zyglidopoulos, 2002 as cited in Delmas and Toffel, 2004).Particularly, social and environmental activists have targeted Nike, McDonald's, Starbucks and Home Depot in part because of their market leadership position (Roberts, 2003; Rowley and Berman, 2000 as mentioned in Delmas and Toffel, 2004). Multinational companies, market leaders and firms with poor environmental records may have more to gain by developing sophisticated mechanisms to anticipate and manage external pressures (Delmas and Toffel, 2004). EMS is associated with factories that are larger, more committed to total quality management, and more innovative in general (Florida and Davison, 2001 as mentioned in Florida and Davison, 2001). Green companies tend to be more innovative in general and adoption of advanced environmental practices stems from a deep commitment to finding innovative solutions to reduce waste and improve efficiency (see Florida 1995; Florida, Atlas and Cline 1999).

To sum up better environmental performance may make the relations between the firm and its external stakeholders easier and reduce the risk correlated with these relations (Ambec and Lanoie, 2008).



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The substantial nature of environmental protection costs indicates that strategies that affect these costs are an important determinant of a firm's competitive position (Christmann, 2000). Firms can improve their competitive position and at the same time reduce the negative effects of their activities on the natural environment by applying certain "best practices" of environmental management (Cairncross, 1992; Hart, 1995; Schmidheiny, 1992; Smart, 1992; Shrivastava, 1995b as mentioned in Christmann, 2000). "Best practices" enable firms to simultaneously protect the environment and reduce costs (Christmann, 2000). Adopting "best practices" that focus on firms' production processes can result to cost advantage (Hart, 1995; Stead & Stead, 1995 as cited in Christmann, 2000). These process-focused "best practices" comprise redesigning production processes to be less polluting, substituting less polluting inputs, recycling byproducts of the process, and innovating less polluting processes (Ashford, 1993; Dechant & Altman; 1994; Florida, 1996; Hart, 1995; Porter & van der Linde, 1995a, 1995b as mentioned in Christmann, 2000). All of the above are intended to reduce the cost of production by increasing the efficiency of production processes and by reducing input and waste-disposal costs (Newman & Breeden, 1992; Smart, 1992; Hart, 1995; Shrivastava, 1995a, 1995b; Stead & Stead, 1995 as cited in Christmann, 2000). The environmental impact of firms' operations throughout the entire life-cycle of its products – from product design through manufacturing, use, and disposal – can also contribute to cost advantage (Christmann, 2000). Nevertheless, the cost advantages from implementing these "best practices" depend on environmental government regulations, which have not yet been instituted in many countries (Christmann, 2000). For example, firms are required to bear the environmental costs associated with the disposal of their products only if government regulations require them to internalize the entire life-cycle costs of their products (Christmann, 2000). Additionally to manufacturing costs, "best practices" can also lower a range of other costs such as potential liability costs, legal fees (Shrivastava, 1995 as cited in Christmann, 2000), and potential product-take back costs.

Producing greener products through a differentiation strategy may enhance workers' commitment toward a company, and this could facilitate recruiting and retaining workers (Ambec and Lanoie, 2008). In the same spirit, reducing the material or energy costs of a product may facilitate the incorporation of environmental features into the product, helping to develop a differentiation strategy (Ambec and Lanoie, 2008). Moreover it may improve the overall image or prestige of a company, and thus increase customers' loyalty or support sales efforts (Ambec and Lanoie, 2008). It is possible that better environmental performance through greener products or services can allow companies to use a differentiation strategy so as to exploit niches in environmentally conscious market segments (Ambec and Lanoie, 2008). Differentiation advantage creates the potential for increasing product prices, which results in higher revenues (Christmann, 2000). Even if green products or services are more expensive to produce, the extra cost can likely be transferred to consumers who are willing to pay more for more environmentally friendly products or services (Ambec and Lanoie, 2008). Consumers' willingness to buy green products in general is important (Ambec and Lanoie, 2008). For instance, 80% of French adults say they favor the purchase of eco-products, while 10% say they actually make such purchases regularly (Guilloux, 2006 as


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mentioned in Ambec and Lanoie, 2008). Among the classic examples is Patagonia, an American sport Garments Company, which in the 1990s launched new lines of clothing made of recycled PET (polyethylene terephthalate) and organic cotton. This was a commercial success in spite of the higher price of these products (Reinhardt, 2000 as cited in Ambec and Lanoie, 2008). Most companies expect that when goods are comparably priced, environmental attributes can break the tie (Khanna and Anton, 2002). As a consequence, companies are increasingly using environmentalism as a marketing tool (Hoffman, 1997 as mentioned in Khanna and Anton, 2002). Generally speaking, a differentiation strategy is more likely to work when: (a) the information about the environmental features of the product is credible, (b) consumers are willing to pay for extra environmental features, and (c) there is a barrier to imitation from competitors (Ambec and Lanoie, 2008). Notably, Hart (1995) suggested that firms will only be able to successfully adopt product-stewardship strategies and achieve differentiation through environmentally responsible products if they have first made significant progress in the implementation of pollution-prevention technologies, which is a process-focused "best practice"(Christmann, 2000).

Firms, in their search for better environmental performance, are led to do research and development in the area of pollution-control/prevention technologies, in order to optimize their manufacturing or waste management processes (Ambec and Lanoie, 2008). This can lead to technological breakthroughs that potentially can be attractive for others (Ambec and Lanoie, 2008).In particular, pollution can be reduced through prevention or through control (Hart 1995 as mentioned in Christmann, 2000). In the one hand, pollution prevention aspires to reduce, change, or prevent emissions and effluent discharges through better material substitution, housekeeping, recycling, or changes in the production process (Willig, 1994; Stead & Stead, 1995 as cited in Christmann, 2000). Pollution-prevention technologies, which are also named as source-reduction technologies or clean technologies, minimize the creation of pollution and wastes in the production process (Christmann, 2000 Hence, the use of pollution-prevention technologies has the potential to increase the efficiency of production (Schmidheiny, 1992; Smart, 1992 as mentioned in Christmann, 2000). Efficiency increases result from reduction of input costs by means of better utilization of inputs or substitution of less costly inputs, savings from recycling or reusing materials, and reduction of waste disposal costs (Christmann, 2000). Pollution prevention in production processes may as well reduce cycle time by simplifying or removing unnecessary steps in the operations or reduce downtime via higher-quality monitoring equipment (Porter & van der Linde, 1995b as cited in Christmann, 2000). Additionally, pollution-prevention technologies may cut emissions well below required levels, resulting in reduced compliance and liability costs (Christmann, 2000). On the other hand, pollution control aims to trap, store, treat, and dispose of emissions and effluents using pollution-control equipment (Christmann, 2000). Pollution control technologies are investments in non-productive assets; added costs with no potential to increase the efficiency of production (Christmann, 2000). In brief, for cost advantage from environmental technologies to be sustainable, these technologies must be difficult to imitate by the firm's competitors (Lippman & Rumelt, 1982; Wernerfelt, 1984; Barney, 1991 as mentioned in Christmann, 2000).



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## Conclusion

"Pollution is a manifestation of economic waste and involves unnecessary or incomplete utilization of resources. Reducing pollution is often coincident with improving productivity with which resources are used" (Porter & van der Linde, 1995, p. 99 as cited in Ambec and Lanoie, 2008).

EMS are effective management tools which enable firms to better anticipate and proactively address potential environmental risks, community concerns, or regulatory issues before they become more substantial programs (Florida and Davison, 2001). Firms in possession of a formal EMS perceive impacts well beyond pollution abatement and see a critical positive impact on many dimensions of operations performance (Melnyk, Sroufe and Calantone, 2003). The results also show that firms having gone through EMS certification experience a greater impact on performance than do firms that have not certified their EMS (Melnyk, Sroufe and Calantone, 2003). In particular, concerns about environmental liabilities and the threat of high costs of compliance with anticipated and existing mandatory regulations have a statistically significant influence on the incentives for corporate environmental management (Khanna and Anton, 2002). The extent and relative importance of external pressures from consumers, investors, competitive markets, and of regulatory pressures from existing and anticipated mandatory regulations faced by firms in inducing them to undertake an environmental management approach (Khanna and Anton, 2002) are also factors that influence corporate environmental decision making.

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