Do Environmental Management Systems Improve Business Performance in an International Setting?[1]

Nicole Darnall
Department of Environmental Science & Policy
George Mason University
4400 University Drive, MSN 5F2
3020 David King Hall
Fairfax, VA 22030
USA

Irene Henriques
Schulich School of Business
York University
4700 Keele Street
Toronto, Ontario M3J 1P3
Canada

Perry Sadorsky
Schulich School of Business
York University
4700 Keele Street
Toronto, Ontario M3J 1P3
Canada

Paper accepted for publication in
Journal of International Management

[1] The authors thank the Organisation for Economic Co-operation and Development (OECD) Environment Directorate for partial funding of this research. We thank three anonymous reviewers for their helpful comments.

ABSTRACT

With the worldwide increase in the adoption of environmental management systems (EMS), some research has emerged that evaluates the reasons why facilities adopt them. However, there is little information about how these motivations extend to different international settings, and the link between the comprehensiveness of an EMS and business performance has yet to be demonstrated. While both institutional pressures and resources and capabilities may encourage EMS adoption and improved business performance, questions remain about whether organizations that are motivated mainly by their resources and capabilities benefit to the same extent as organizations that are driven to adopt an EMS mainly because of institutional pressures. We analyze these relationships using OECD survey data from manufacturing facilities operating in Canada, Germany, Hungary, and the United States. Our results show that facilities that are motivated to adopt more comprehensive EMSs because of their complementary resources and capabilities, such as export orientation, employee commitment and environmental R&D, (as opposed to institutional pressures) observe greater overall facility-level business performance.

Key Words: Institutional theory, resource-based view of the firm, environmental strategy, environmental management system, competitive advantage, business performance

1.0 INTRODUCTION

An environmental management system (EMS) consists of a collection of internal policies, assessments, plans and implementation actions (Coglianese & Nash, 2001), affecting the entire organizational unit and its relationships with the natural environment. Since 1996, more than 88,800 facilities worldwide have adopted EMSs that are certified to ISO 14001 (Peglau, 2005), the international EMS standard, and thousands more have adopted other types of EMSs. With the increased number of global EMS adoptions, scholarly interest in EMSs also has burgeoned. Researchers have evaluated the motivations for EMS adoption (e.g., Potoski & Prakash, 2005b; King, et al., 2005; Darnall, 2003; Melnyk, et al., 2003; Coglianese & Nash, 2001; Anton, et al., 2004) and the relationship between EMS adoption and improved environmental performance (Khanna & Anton, 2002; Potoski & Prakash, 2005a; King, et al., 2005). However, as yet, we know little about whether EMSs improve the business value for organizations that adopt them.

Previous studies that evaluate the broader link between an organization's environmental strategies and its business performance offer mixed results, with some studies demonstrating that an organization's proactive environmental activities lead to improved business performance (e.g., Russo & Fouts, 1997; Hart & Ahuja, 1996; Rivera 2002; Stanwick & Stanwick, 2001), and others illustrating either insignificant (e.g., Levy, 1995; Fogler & Nutt, 1975; Rockness, et al., 1986) or varied findings (e.g., Khanna & Damon, 1999). As such, the argument of whether or not proactive environmental activities lead to improved business performance is far from resolved. Even less is known about how EMSs, in particular, fit into this debate.

In understanding the link between EMSs and business performance, it is important to consider the motivations for adopting these management systems. Previous research utilizes

differing theoretical perspectives. On one hand, a group of scholars has relied on aspects of institutional theory to explain why organizations adopt EMSs and other proactive environmental strategies (e.g., Bansal & Roth, 2000; Hoffman, 1999; Davidson & Worrell 2001; Bansal & Clelland, 2004; Khanna & Anton 2002; Bansal & Hunter, 2003). These authors suggest that organizations are motivated to increase their internal efficiency and external legitimacy, which also can lead to competitive advantage. On the other hand, scholars have relied on the resource-based view of the firm to explain that complementary resources and capabilities lead to the adoption of proactive environmental strategies (e.g., Sharma & Vredenburg 1998; Darnall & Edwards, 2006; Aragón-Correa & Sharma, 2003) and improved business performance (e.g., Russo & Fouts, 1997). By implementing these strategies, these authors suggest that organizations are more likely to gain competitive advantage. In a fewer number of instances, researchers have combined both theoretical views, (e.g., Bansal, 2005; Darnall, 2003) and reached similar conclusions to previous studies that consider both theories individually.

However, little scholarship has examined the *relative contributions* of institutional theory and the resource-based view of the firm to determine the motivations for EMS adoption, and the extent to which these two theories are associated more (or less) with improved business performance. While both institutional pressures and resources and capabilities may encourage EMS adoption and improved business performance, questions remain about whether organizations that are motivated mainly by their resources and capabilities benefit to the same extent as organizations that are driven to adopt an EMS mainly because of institutional pressures. Studying the relative contribution of both theoretical perspectives would enhance our understanding of these theories to a much greater degree.

Finally, previous research examining the motivations to adopt an EMS (Bansal & Hunter, 2003; Potoski & Prakash, 2005b; King, et al., 2005; Darnall, 2003; Melnyk, et al., 2003; Coglianese & Nash, 2001; Anton, et al., 2004) and the relationship between proactive environmental activities and business performance (Russo & Fouts, 1997; Hart & Ahuja, 1996; Stanwick & Stanwick, 2001) generally has focused on organizations operating in the United States (U.S.). As yet, we know little about whether these relationships can be generalized to the broader international setting and whether international capabilities such as export orientation are a significant motivator for facilities to adopt more comprehensive EMSs.

In this paper, we make three contributions to the existing literature. First, we consider both institutional theory and resource-based view of the firm to determine the motivations for EMS adoption at the facility level. These motivations include an important international capability, namely, export orientation, as well as the institutional pressures each facility faces. Second, we examine and empirically test the relative contribution of each of these theoretical perspectives to a facility's overall business performance across four countries (Canada, Hungary, Germany and the United States) and find that our results do generalize to a broader international setting in that facilities that are more motivated to adopt more comprehensive EMSs because of their complementary resources and capabilities observe greater overall facility-level performance. Third, this study takes a significant step forward in advancing our understanding of environmental management in the global context in that our findings suggest that export orientation is an important complementary capability to a facility's decision to adopt more comprehensive environmental management practices.

2.0 THE COMPREHENSIVENESS OF AN EMS

Organizations that implement EMSs identify how their activities interact with the environment, the types of environmental impacts that emanate from different operations, and alternative means of preventing environmental pollution and natural-resource degradation (Rondinelli & Berry, 2000). Based on Deming's (1986) continuous improvement model, EMSs are premised on a commitment to continuous environmental improvement (Kitazawa & Sarkis, 2000) and environmental action plans to improve environmental performance over time (Tilley, 1999). These activities create a basis upon which organizations can assess all of the aspects of their operations jointly, thus minimizing the shift of environmental harms from one subsystem to another (Shrivastava, 1995). Since EMSs are intended to design or alter operations, processes, and products to prevent (rather than merely ameliorate) negative environmental impacts, many scholars characterize approaches of this sort as proactive environmental strategies or practices (Hart, 1995; Aragón-Correa & Sharma, 2003; Hart & Ahuja, 1996; Russo & Fouts, 1997; Sharma & Vredenburg, 1998). Such practices, and EMSs in particular, have been shown to lead to improved environmental performance (Khanna & Anton, 2002; Potoski & Prakash, 2005a; King, et al., 2005).

When adopting an EMS, organizations implement different types of environmental activities, in large part, because EMSs arise in different organizational settings and organizations adhere to different types of EMS standards (Coglianese & Nash, 2001). For instance, the Canadian Chemical Producers Association's Responsible Care program, the American Forest and Paper Association's Sustainable Forestry Initiative, the International Chamber of Commerce's Business Charter for Sustainable Development, and the International Organization for Standardization's ISO 14001, all have different requirements for adoption (Coglianese & Nash, 2001). While most EMSs involve implementing a written environmental policy, training

employees regarding environmental concerns, employing internal environmental audits, and developing environmental performance indicators and goals (Netherwood, 1998), because of their voluntary nature, there often is variation in how these procedures are utilized (Coglianese & Nash, 2001). Some EMSs, like ISO 14001 and the Sustainable Forestry Initiative, require that facilities carry out external audits. Others EMSs, like the Canadian Responsible Care standard, require facilities to publicly report their environmental performance (Coglianese & Nash, 2001). While still other EMSs ask facilities to implement environmental benchmarking and accounting procedures that measure performance (Nash & Ehrenfeld, 1997), and link employee compensation to environmental performance (Netherwood, 1998). While these variations suggest that it is difficult to definitively characterize the core practices which comprise every EMS, they also suggest that a more nuanced treatment is needed when evaluating these management systems. That is, a typical approach of asking facilities whether they have adopted an EMS fails to account for the comprehensiveness of the EMS in that facilities that implement more of these environmental practices as part of their EMS may be regarded as having a more comprehensive EMS than facilities with fewer of these environmental practices.

There are numerous institutional and resource-based motivations that explain why an organization would implement an EMS. These motivations are discussed in the following sections.

3.0 INSTITUTIONAL SETTING

Institutional theory explains that organizations operating within similar social frameworks of norms, values and assumptions often behave similarly to gain social approval (Meyer & Rowan, 1977; Scott, 2001). This theory challenges the notion that firms exclusively are profit-seeking in that organizations also recognize the importance of achieving social legitimacy for

their long term survival and competitiveness (Suchman, 1995). Legitimate businesses are those whose actions are seen or presumed to be desirable or appropriate within some socially constructed system of norms, values, beliefs and definitions (Suchman, 1995). Legitimacy is determined beyond the firm's or facility's boundaries, but within the broader community of which the firm/facility is a part (Hoffman, 1997). Within this research area, scholars have stressed the importance of external legitimization (DiMaggio & Powell, 1983; Oliver, 1991) and its relationship with creating opportunities for organizations to access resources that contribute to their long term viability (Meyer & Rowan, 1977). At the inter-organizational level, institutional pressures arise from external sources such as government, markets and society (e.g. constituency groups and industry associations) (Hoffman, 2000). At the organizational level, institutional pressures also arise from the culture, shared belief systems and political processes (DiMaggio & Powell, 1983) and shareholders (Henriques & Sadorsky, 1996; 1999). Hence institutional actors can impose coercive, mimetic and normative pressures on managers. Coercive pressures are authoritative forces imposed primarily (but not exclusively) by government mandate or threat of mandate (Oliver, 1991). Mimetic pressures occur through organizational imitation or modeling of norms or practices in the organization's institutional field while normative pressures have their origins in the professionalization of industry or sector members who attempt to define the conditions and methods of their work to legitimate their professional autonomy (Oliver, 1997a). Following Delmas and Toffel (2004), we focus on a subset of institutional actors identified by Hoffman (2001) who are most likely to directly influence environmental practices at the facility level, namely, regulatory, market and social actors.

3.1 Regulatory Pressures

Regulatory pressures involve coercive legal mandates for organizations to use pollution

control technology, attend to pollution thresholds, and report their pollution emissions to reduce their impact to the natural environment. Organizations that fail to comply with regulatory requirements risk legal sanction, including losing their operating permits and incurring fines and penalties, which constrains the strategic actions of business. The fear of legal sanction is considered the primary reason why organizations implement proactive environmental activities (Hoffman, 1997). However, in other instances, regulatory pressures may create opportunities for competitive advantage. Organizations that anticipate stricter regulatory requirements may preempt these regulations, by reducing their emissions below the reporting thresholds. Doing so can make the new regulations less relevant, reduce mandated reporting requirements and eliminate the need to purchase and install costly pollution control technologies. By taking a proactive position in managing their environmental impacts, organizations also can accrue political capital with regulators. For example, facilities can form collaborative relationships with government more easily and explore more nonregulatory ways in which government can encourage greater environmental improvements. These collaborations also can promote environmental learning, capacity-building (Darnall & Edwards, 2006), and trust between facilities and regulators (Hoffman, 2000). Increased trust and access to regulators have additional benefits in that they can create greater opportunities to influence the environmental policy agenda.

3.2 Market Pressures

Market pressures that encourage facilities to adopt EMSs have increased as facilities and customers have become increasingly aware of the natural environment. Greater awareness mainly has been due to improved availability of environmental information about industrial environmental practices. This information affects an organization's reputation (Konar & Cohen,

1997; Marshall & Mayer, 1991) and its ability to market its products (Klassen & McLaughlin, 1996). For example, previous studies have shown that consumers are less willing to purchase products from organizations with greater chemical spills (Klassen & McLaughlin, 1996). In other instances, the market may reward facilities with EMSs by appealing to buyers who have policies to purchase goods and services from facilities that utilize EMSs (Darnall, et al., 2001). General Motors, Toyota, and Ford Motor Company, for example, have required their suppliers to adopt EMSs that are certified by external auditors. By yielding to market pressures such as these, and adopting EMSs, facilities may be able to confer greater moral legitimacy for their environmental practices. These market pressures, therefore, exert both coercive and mimetic institutional pressures on managers to adopt more comprehensive EMSs.

3.3 Social Pressures

Achieving social legitimacy for their long term survival and competitiveness (Suchman, 1995) also relate to an organization's community constituents. Community constituents include environmental organizations, community groups, labor unions and trade associations (Hoffman, 2000). Constituents in the social system mobilize public sentiment, alter accepted norms, and change people's perceptions about the environment and pressure organizations to reduce their impact to the natural environment (Hoffman, 2000). Like market actors, social constituents have increased their awareness of environmental issues due to more widespread availability of environmental information. Media stories of catastrophic environmental disasters such as the Union Carbide toxic gas leak in Bhopal and the Exxon Valdez oil spill have heightened public awareness and personalized the importance of facilities' environmental performance. These disasters also have increased external scrutiny by giving rise to social demands that organizations improve their environmental performance (Greening & Gray, 1994). Demands for improved

environmental management often originate from environmental and community groups, who draw attention to organizations' environmental wrongdoings by leading protests and boycotts. Labor unions also exert pressure for environmental consideration, in that they are concerned about the safety of union members, and environmental accidents often lead to worker injuries. Similarly, trade associations have begun to take a more active role in managing their members' environmental actions. Institutional researchers have argued, in a more general setting, that organizations are more likely to mimic behavior of other organizations that are tied to them through networks (Guler et al, 2002; Delmas & Toffel, 2004). For example, the U.S. chemical industry's primary trade association requires its international members to adopt an EMS as a condition of membership. Social pressures from environmental organizations, community groups, labor unions and trade associations alike therefore comprise important institutional pressures which are expected to influence facilities' decision to adopt an EMS.

3.4 Ownership Pressures

Some companies face yet another level of institutional pressure imposed by the organization's shareholders (Henriques & Sadorsky, 1996; 1999). Adopting a more comprehensive EMS may be consistent with shareholders' growing interest in investing in environmentally responsible organizations. Shareholder expectations that firms and their facilities be environmentally responsible are increasing as they come to understand the financial liabilities associated with a poor environmental reputation. For example, previous studies have shown that firms with higher toxic chemical emissions (Konar & Cohen, 1997) and chemical spills (Klassen & McLaughlin, 1996) are penalized by lower stock prices. By contrast, firms with facilities that adopt EMSs may be able to attract resources from socially concerned investors since they may be more likely to proactively address environmental impacts.

Consequently, we hypothesize:

Hypothesis 1: Facilities that endure greater institutional pressures adopt more comprehensive EMSs.

4.0 RESOURCE-BASED VIEW

Institutional theory largely assumes that external factors will result in *similar* responses from all facilities. However, facilities are dynamic and evolving (Perrow, 1986); they respond to external pressures in numerous ways based on their access to resources and the complementary capabilities that have developed over time (Perrow, 1986; Oliver, 1997b). For example, organizations with fewer internal resources and capabilities may not be able to respond as quickly or as effectively to different types of institutional pressures, whereas facilities with stronger resources and capabilities may be able to do so. Related to the natural environment, several studies have indicated that an organization's complementary resources and capabilities may facilitate the adoption of EMSs. A resource or capability is considered complementary to an EMS if it assists the adoption process (Darnall & Edwards, 2006).

4.1 Quality Management Systems

Previous studies have indicated that quality management systems offer complementary knowledge-based capabilities that assist with EMS adoption (Hart, 1995; Kitazawa & Sarkis, 2000). These management systems facilitate organization-wide changes and encourage the persistent improvement to internal operations (Falk, 2002). In requiring a commitment to continually improve process and product quality, facilities that rely on quality management system procedures ensure that quality is measured constantly and appropriate corrective action is taken whenever defects occur (Corbett, et al., 2005). By implementing quality management systems, facilities develop extensive knowledge and monitoring of their resources, constraints,

production capabilities and processes that complement their strategic actions to improve the environment (Darnall & Edwards, 2006). Like facilities that adopt EMSs, those that utilize quality-based management systems plan strategically for the long-term and develop a capacity to assess their progress toward achieving desired outcomes (Kitazawa & Sarkis, 2000).

4.2 Health and Safety Management Systems

Similarly, facilities that have expertise with health and safety management systems have developed their knowledge-based competencies. Rather than focusing on product and process quality, health and safety management systems require organizations to critically review injury rates, hazard programs, safety health programs and emergency response. A facility's ability to assess and manage these issues may be affected by the harmful side effects of its toxic chemicals and other pollution in its production cycle. As such, the resources and capabilities required to meet health and safety management system goals also may complement proactive environmental management (Zutshi & Sohal, 2004).

4.3 Employee Commitment

Other capabilities that facilitate the utilization of EMSs are related to management and non-management employees. Top management leadership and support is vital to ensuring an organization-wide understanding of and commitment to environmental issues (Tilley, 1999; Zutshi & Sohal, 2004). Such commitment also is critical to maintaining and improving an organization's environmental strategy over time. In particular, managerial attitudes and views (Cordano & Frieze, 2000), managerial interpretations (Sharma, 2000), and environmental values and leaders (Egri & Herman, 2000) all influence management decisions and partially explain why facilities undertake particular environmental activities. However, managerial commitments should be partnered with support from non-management employees. Like mangers, line

employees must be committed to the organization's environmental goals to facilitate the adoption of EMSs that are maintained over time, and to reduce environmental impacts (Zutshi & Sohal, 2004).

4.4 Environmental Research and Development

Investments in environmental research and development also can complement EMS adoption. Facilities that invest in environmental research and development are more likely to implement internal practices and routines that benefit the natural environment. By allocating a portion of their budget to addressing environmental concerns, these organizations demonstrate a managerial commitment towards environmental innovation. They also are more likely to establish an organizational culture for proactively managing their impacts to the natural environment since they have a capacity to follow through in addressing their environmental concerns (Nakamura et al. 2001; Porter & van der Linde, 1995). By investing in innovation and exploring solutions to its environmental concerns, these facilities can further benefit by generating knowledge-based capital and tacit skills that are difficult for competitors to replicate (Ghemawat, 1986).

4.5 Export Orientation

Finally, a facility's export orientation may assist EMS adoption. A facility's export orientation is developed when it operates within, and depends upon, foreign markets (Bansal, 2005). Through this experience, organizations acquire knowledge of multiple jurisdictions and develop the capabilities essential to coordinating across these jurisdictions (Roth, 1995). Facilities with an export orientation also have capabilities necessary to meet the needs of diverse customers. They are more skilled at educating multiple types of customers about their operations, and gaining trust from a variety of buyers (Tallman & Li, 1996). These proficiencies may

complement a facility's decision to adopt a more comprehensive EMS since the export oriented facility is better able to educate its customers about the societal benefits of its strategic approach (Bansal & Hunter, 2003).

In summary, complementary resources and capabilities such as total quality management systems, health and safety management systems, employee and managerial support, environmental research and development investments, as well as export orientation are important assets that may facilitate the adoption of a more comprehensive EMS. Consequently, we hypothesize:

Hypothesis 2: Facilities with greater resources and capabilities adopt more comprehensive EMSs.

5.0 EMS AND BUSINESS PERFORMANCE

Economic arguments suggest that organizations should invest in environmental activities only to the extent that their marginal benefit of doing so equals their marginal cost. Many scholars have interpreted this suggestion to mean that investment beyond the requirements of the environmental regulatory system is detrimental to an organization's economic performance and constrains its financial opportunities (Christiansen & Haveman, 1981; Conrad & Morrison, 1989). If so, there is little incentive for an organization to implement an EMS, and therefore little reason to study business performance that result from such practices.

Despite these conventional economic arguments, recent evidence indicates that organizations that adopt EMSs may benefit financially. By responding to institutional pressures and creating greater external legitimization (DiMaggio & Powell, 1983; Oliver, 1991), facilities may obtain greater access to resources that contribute to their long term viability (Meyer & Rowan, 1977). For instance, during the 1990s, some companies saved hundreds of millions of

dollars by responding to market pressures for greater production efficiency and gathering the "low hanging fruit" associated with reducing excessive wastes, material, and energy use (Hart & Ahuja, 1996). Similarly, facilities that adopt proactive environmental strategies and benefit from premium pricing and increased sales (Rivera, 2002) because of enhanced market legitimacy (Suchman, 1995) and greater social approval (Meyer & Rowan, 1977; Scott, 2001). Such approval may allow environmentally conscious facilities to market their management procedures as selling points for their products, and create a means to differentiate their products from their competitors (Rivera, 2002; Bansal & Hunter, 2003).

In other instances, EMS adoption may help facilities respond to institutional pressures related to the regulatory system. By implementing an EMS, some facilities can qualify to participate in government-sponsored EMS programs that establish greater access to regulators (Darnall, 2003). Access of this sort is desirable since most environmental regulations are characterized by their command-and-control nature, and often are perceived to be inflexible and economically inefficient. As such, better access to and influence over the regulatory process could benefit facilities (Kollman & Prakash, 2001; Coglianese & Nash, 2001) by creating competitive advantage opportunities, and EMS adoption may be a means to do so. Each of these examples illustrates how facilities can utilize EMSs to respond to institutional pressures, enhance external legitimacy, and create opportunities for improved business performance.

Similarly, the resource-based view of the firm suggests that an organization's ability to leverage its complementary resources and capabilities is critical to developing environmental practices that lead to competitive advantage (Hart, 1995; Russo & Fouts, 1997). EMSs often require facilities to develop knowledge-based skills since employees are encouraged to share information and work in teams to address environmental problems. Knowledge development of

this sort and employee engagement leads to environmental practices based on decentralized communications and operations, which are difficult for competitors to replicate (Hart, 1995). If these environmental practices are continually improved (Sharma & Vredenburg, 1998; Russo & Fouts, 1997; Hart, 1995), they can generate a stream of innovations that are necessary for sustained competitive advantage (Sharma & Vredenburg, 1998). Moreover, facilities that rely on their complementary resources and capabilities to reduce their environmental impacts, and develop their knowledge-based capital, have greater success at reducing or eliminating environmental protection costs (Christmann, 2000; Hart & Ahuja, 1996; Henderson & Mitchell, 1997; Klassen & McLaughlin, 1996), preempting competitors and gaining future position (Hart, 1995). Consequently, we hypothesize:

Hypothesis 3: Facilities that adopt more comprehensive EMSs obtain positive business performance.

However, some facilities may struggle to adopt legitimate but difficult-to-implement environmental practices, especially if they lack the complementary resources and capabilities to do so (Darnall & Edwards, 2006). One resolution is for these facilities to signal that they are environmentally proactive when in fact they are not or only moderately so. In such situations, facilities may produce one-shot symbolic changes that create the public perception that proactive environmental strategies are being implemented (Sastry, et al., 2002). However, these strategies lead to less meaningful improvements in the facility's internal operations (Meyer & Rowan, 1977) and environmental performance. For instance, the American Chemistry Council's Responsible Care Program requires member facilities to adopt an EMS. The program has succeeded in improving the industry's environmental image and in thwarting more stringent regulatory actions and greater societal scrutiny but failed to improve facilities' environmental

performance (King & Lenox, 2000). This example suggests a decoupling whereby facilities may adopt new strategies ceremonially in order to stave off institutional pressures at a more fundamental level (Meyer & Rowan, 1977). Related to a facility's decision to adopt an EMS, this area of institutional theory suggests that EMSs may represent a symbolic action that does little to improve a facility's internal efficiencies. Reacting to institutional pressures in this way may lead to some financial gain by increasing external legitimacy, at least in the short run. However, facilities that lack the complementary capabilities and resources to maintain their EMS over time (Darnall & Edwards, 2006) may forego competitive advantage opportunities (Barney, 1991). For this reason, we hypothesize that:

Hypothesis 4: Facilities whose EMSs are driven mainly by their resources and capabilities (rather than institutional pressures) are more likely to obtain positive business performance.

6.0 RESEARCH METHODS

6.1 Description of Data

To evaluate our hypotheses, we rely on data from a twelve-page survey developed by the Organisation for Economic Co-Operation and Development (OECD) Environment Directorate and university researchers from Canada, France, Germany, Hungary, Japan, Norway and the U.S. The OECD survey was pre-tested in France, Canada and Japan before it was finalized. Prior to its dissemination, the survey was translated into each country's official language and validated for accuracy. In 2003, surveys were sent to individuals who worked in manufacturing facilities having at least 50 employees and who were responsible for the facility's environmental activities. The manufacturing sector was selected because it is commonly accepted that these industries produce more air, land, and water pollution than service facilities (Stead & Stead,

1992). The OECD sent two follow-up mailings to prompt additional responses. A total of 4,188 facility managers completed the survey. The response rate was 24.7 percent, which is consistent with previous studies of firms' environmental practices (e.g., Christmann, 2000; Melnyk, et al., 2003)[2]. Almost half of the sample consisted of either small- or medium-sized enterprises (<250 employees), the majority of our respondents consisted of single location production facilities (nearly 67.2%) and included publicly traded and privately owned facilities.

Facilities in North America (Canada, n=256 and U.S., n=489) and two European countries (Germany, n=898; Hungary, n=466) were the subject of this study. Previous research evaluating the motivations to adopt EMS (Potoski & Prakash, 2005b; King, et al., 2005; Darnall, 2003; Melnyk, et al., 2003; Coglianese & Nash, 2001; Anton, et al., 2004) and the relationship between proactive environmental activities and business performance (Russo & Fouts, 1997; Hart & Ahuja, 1996; Stanwick & Stanwick, 2001) generally has focused on studying organizations within a single country, and predominantly U.S. organizations. Our research design, therefore, offers an important extension to existing scholarship.

In selecting the four countries included in this study, we determined that Canada's single-most important trading partner is the U.S. with over 85% of its exports going to the U.S. (CIA, 2005). Likewise, Hungary's single-most important trading partner is Germany, and foreign companies account for over 70% of Hungary's exports, 33% of its gross domestic product and about one quarter of its new jobs (CIA, 2005). By concentrating our analysis on the manufacturing sector in these four countries, we are able to explain the observed variability in environmental practices undertaken by facilities in OECD countries with relatively similar trading dependencies.

[2] Response rates were 20.1 percent and 10.4 percent respectively.

Since the OECD data were collected using survey techniques, it is important to address the limitations of survey data. The four standard criticisms of survey data are common method variance (bias), social desirability bias, non-response bias, and lack of generalizability (Tan & Peng, 2003). Common method variance refers to variance that is attributable to the measurement method rather than to the modeling. To check for common method variance, a factor analysis was performed to see if all of the OECD data loaded on one un-rotated factor. This diagnostic is commonly referred to as Harman's single factor test (Podsakoff & Organ, 1986). The results of the factor analysis revealed four distinct factors indicating little evidence of common method bias. The second criticism of survey data, social desirability bias, refers to the situation where individuals attempt to answer survey questions in ways that they deem socially desirable. To address the potential issue associated with social desirability bias, all respondents were guaranteed anonymity, and survey questions addressing institutional influences were separated from questions pertaining to EMS practices. No indication of social desirability bias was found in our pre-test analysis of the survey. We also found no evidence that respondents always over or under reported data in a consistent manner since there were wide variations in facility responses. For instance, in considering the proportion of facilities that had an EMS, 54% of respondents stated that their facility had no EMS, 14% stated that they were in the process of implementing an EMS while 32% of respondents stated that their facility had implemented an EMS. Similarly, respondents reported significant variation in their responses regarding the value of their firm-level shipments. Nine percent of respondents stated that their firm's value of shipments had decreased significantly, 28% stated that value of shipments had decreased, 29% stated that the value had stayed about the same, 28% stated that the value increased and 6% stated that the value significantly increased over the last three years. These examples illustrate that respondents were

forthcoming about their lack of EMS-related activities and poor growth performance, and lend additional confidence about the quality of the OECD data.

The third concern, non-response bias, refers to the possibility that subjects who answer the survey differ from non-respondents. In the presence of non-response bias, subjects who return the survey last are more like non-respondents (Armstrong & Overton, 1977). Non-response bias was checked by qualitatively comparing the responses of late respondents with those of early respondents. In countries for which secondary data were obtained, we were unable to find instances in which respondents differed from non-respondents. These findings are consistent with the OECD's examination of the general distribution of its survey respondents. In its evaluation, the OECD assessed the industry representation and facility size of its sample relative to the distribution of facilities in the broader population. It found no statistically significant differences (Johnstone, et al., in press). The fourth issue, generalizability, was less of a concern because the OECD survey had broad applicability in that it targeted multiple industrial sectors in multiple countries. This approach differs from typical survey research examining facilities' environmental practices, which focuses on a single industry within a single country. However, care must be taken in generalizing the results of this study to other industries and non-OECD countries.

Detailed information on environmental practices at the facility level is seldom available from public sources in the United States, let alone any other country (Delmas & Toffel, 2004). Consequently, the OECD database provides us with a unique opportunity to examine the reasons why facilities adopt these environmental management practices and the extent to which these practices have enhanced facility level performance.

6.2 Measures

6.2.1 Environmental Management System Adoption

The comprehensiveness of a facility's EMS is an unobserved quality. However, it can be measured by examining a facility's diverse environmental practices (Khanna & Anton, 2002). An EMS is considered more comprehensive if it incorporates a greater number of environmental practices (Khanna & Anton, 2002) that have been recognized as important components of different types of EMSs (Coglianese & Nash, 2001). To develop this measure, we relied on OECD survey data that asked facility managers whether they had implemented nine different proactive environmental practices: written environmental policy; environmental criteria used in the evaluation and/or compensation of employees; environmental training program in place for employees; carry out external audits; carry out internal audits (Netherwood, 1998); benchmarking of environmental performance; environmental accounting (Nash & Ehrenfeld, 1997); public environmental report (Coglianese & Nash, 2001); and environmental performance indicators/goals (Coglianese & Nash, 2001; Netherwood, 1998). By accounting for the different types of practices that form an EMS, this approach is more comprehensive than utilizing a typical dichotomous measure that accounts for whether or not a facility adopts an EMS (Coglianese & Nash, 2001). A factor analysis of these nine environmental practices (Cronbach's alpha[3] = 0.83) confirmed the existence of a single factor scale (EMS comprehensiveness).

6.2.2 Business Performance

EMS adoption occurs at the facility-level, and while parent companies may have a role in the decision to adopt an EMS (Darnall, in press), implementation is affected primarily by facility-level practices (Ray, et al., 2004). Although the effectiveness of such practices can be measured by a firm's overall performance, Ray et al. (2004) suggest that a highly aggregate

measure such as firm performance may not be the best way to test resource-based theory. Consequently, we use *facility* level performance as our measure of business performance.

As suggested by Cho and Pucik (2005), two measures for an organization's performance are employed: profitability and growth performance. Facility profitability is measured by using OECD data that asked environmental managers whether their facility profits had changed over the past three years. Respondents replied using a five-point scale indicating whether during the last three years revenue was "so low as to produce large losses," "insufficient to cover our costs," "at break even," "sufficient to make a small profit," or "well in excess of costs." We measure growth performance by relying on OECD data that asked managers how the facility's value of shipments changed in the last three years. Respondents replied using a five-point scale indicating whether they have "significantly decreased", "decreased", "stayed about the same", "increased" or "significantly increased". A factor analysis confirms the existence of a single scale, "business performance" (Cronbach's alpha = 0.61).

6.2.3 Institutional Pressures

Institutional actors (Hoffman, 2001) – including regulators, customers, community, labour unions, environmental interest groups and trade associations – impose coercive, normative and mimetic pressures on firms (Delmas and Toffel, 2004). Managerial perceptions of these institutional actors are extremely important in influencing environmental practices (Henriques & Sadorsky, 1999). For example, even if institutional pressures are exerted at the same level on two facilities, these facilities may perceive and respond differently (Delmas & Toffel, 2004). Our survey questionnaire provides information about the managerial perceptions of these institutional pressures and the actions taken in response. We do not assume that facilities are

[3] Cronbach's alpha ranges from 0 to 1. When alpha is .8 or over, the set of indicators is often deemed sufficiently reliable. Alpha scores of between .6 and .8 are sufficient for measures that have not yet been tested in the literature

independent of the firm. On the contrary, like Delmas and Toffel (2004), we understand that institutional pressures are exerted at various levels of the firm whereby community pressures, for example, are usually directed at a specific facility whereas shareholder pressures tend to target the entire firm. Our database, therefore, allows us to test our hypotheses across a host of facilities in four different countries.

We assess regulatory pressures by relying on OECD data that asked environmental managers how important the influence of public authorities was on the environmental practices of their facility (regulator influences). Respondents indicated whether public authorities were "not important," "moderately important," or "very important". Facility managers were also asked the number of regulatory inspections they received over the last three years (inspection frequency). Market pressures are measured using OECD data that asked facilities how important household consumers, commercial buyers, and suppliers were on the environmental practices of their facility (Cronbach's alpha = 0.63 – See Table 1). Respondents indicated whether each pressure group was "not important," "moderately important," or "very important". Additionally, four societal pressures are measured using the same scale to determine the importance of labor unions, trade associations, environmental groups, and community groups on the facility's environmental practice (Cronbach's alpha = 0.75 – See Table 1). Ownership pressures (Henriques & Sadorsky, 1996; 1999) are proxied by whether the parent company was listed on the stock exchange.

6.2.4 Resources & Capabilities

To measure facilities' experience with quality management systems (quality management system) and health and safety management systems (health & safety management system), we rely on OECD data that asked facilities whether or not they had implemented either management

(Nunnally, 1978).

system. Managerial and non-managerial commitment to the environment is determined by asking facility managers to what extent they considered the influence of (1) management and (2) non-management employees on the facility's environmental practices. Respondents answered by indicating either "not important," "moderately important," or "very important". These items are combined and using factor analysis, form a factor called "employee commitment" (Cronbach's alpha = 0.83 – See Table 1).

— Insert Table 1 about here —

Environmental research and development is measured by whether or not a facility had a development budget allocated towards environmental matters (environmental R&D budget) (Porter & van der Linde, 1995; Nakamura et al. 2001). Finally, to evaluate export orientation, the OECD asked whether the facility's market was at a local, national, regional (i.e., neighboring countries) or global level (Nakamura et al. 2001). Given the categorical nature of this variable and to avoid possible bias in the regression coefficients from using data coded on a categorical scale, a dummy variable (export orientation) is created with local and national equal to zero and regional or global equal to one.

6.2.5 Controls

The natural logarithm of the number of employees in a facility is used as a measure of facility size. Dummy variables are included to control for industry effects (the chemical industry was the omitted category) and country effects (the U.S. was the omitted category). A pooled data set with no missing observations for all of the countries resulted in a sample size of 1355 observations. Summary statistics for the variables are presented in Table 2.

— Insert Table 2 about here —

6.3 Empirics

EMS comprehensiveness is the dependent variable in models 1 through 4. Facility business performance is the dependent variable in model 5. We use multiple ordinary least squares (OLS) regression techniques to evaluate the reasons why facilities adopt comprehensive EMSs (models 1-4). Model 1, which includes only control variables (facility size, dummy variables for industry, and dummy variables for country), is our baseline model. Model 2 incorporates control variables and variables for institutional pressure. Model 3 contains control variables and variables for resources and capabilities. Model 4 includes control variables and variables for both institutional pressures and resources and capabilities.

To control for the potentially endogenous relationship between EMS and business performance, we utilize a two-stage least squares estimate of the EMS variable to estimate model 5 (Kennedy, 1994; Wooldridge, 2002). This model includes control variables and the two-stage least squares estimate of EMS comprehensiveness. The values of the EMS variable are first computed on the basis of a regression model (model 4) and the predicted values from this regression are then included as a driver in the business performance equation.

Model significance is determined by R-squared values, adjusted R-squared values and likelihood ratio tests. Heteroskedasticity-robust standard errors are computed for each coefficient estimate. A likelihood ratio test of a particular model against the baseline model is used to illustrate the improved fits of models 2 through 5 over the baseline model.

7.0 RESULTS

Model 1 (the baseline model) is reported in Table 3 for comparison purposes only. With one exception, all of the estimated coefficients in the baseline model are statistically significant at the 1% level. Model 2 adds institutional pressures to the list of explanatory variables, the effect of which improves the fit of the model significantly. Each of the estimated coefficients on

the institutional pressures variables is positive and statistically significant. These findings support Hypothesis 1, which states that facilities that endure greater institutional pressures adopt more comprehensive EMSs. Model 3 includes control variables and variables measuring facility resources and capabilities. Each of the estimated coefficients is positive and four of the five estimated coefficients are statistically significant at the 1% level. These results provide support for Hypothesis 2, which states that facilities with greater resources and capabilities adopt more comprehensive EMSs.

— Insert Table 3 about here —

Notice that the increase in R-squared value between model 3 and model 1 is 0.074, whereas the increase in R-squared between model 2 and model 1 is 0.039, suggesting that resources and capabilities add more explanatory power in the determination of a more comprehensive EMS than do institutional pressures. To further explore this relationship, we use a non-nested one-tailed t-test for the change in R-squared value. The result of this test, $t = 2.63$ ($p < 0.01$), offers statistical evidence for the notion that EMS comprehensiveness is better predicted by resources and capabilities than institutional pressures.

Model 4 includes control variables and variables for both institutional pressures and resources and capabilities. The model fit is significantly improved over both models that include variables for institutional pressure (model 2) and resources and capabilities (model 3). Each of the estimated coefficients associated with the institutional pressure variables is positive and four of the estimated coefficients are statistically significant, lending additional support for Hypothesis 1 and the stability of our empirical approach. Each of the estimated coefficients associated with the resources and capabilities variables is positive and four of the estimated coefficients are statistically significant, lending additional support for Hypothesis 2.

The fitted values from model 4 are used as an explanatory variable in model 5 to test the relationship between EMS comprehensiveness and business performance (Hypothesis 3). The estimated coefficient on the EMS variable is positive and statistically significant providing evidence for Hypothesis 3—that facilities adopting more comprehensive EMSs obtain positive business performance. These findings, combined with the fact that resources and capabilities add more explanatory power in the determination of EMS adoption, suggest that facilities whose EMSs are driven mainly by their resources and capabilities (rather than institutional pressures) are more likely to obtain positive business performance (Hypothesis 4).

8.0 DISCUSSION AND CONCLUSION

The results of this research build on prior studies evaluating the motivations for EMS adoption (e.g., Potoski & Prakash, 2005b; King, et al., 2005; Darnall, 2003; Melnyk, et al., 2003; Coglianese & Nash, 2001; Anton, et al., 2004) and the relationship between EMS adoption and improved environmental performance (Potoski & Prakash, 2005a; King, et al., 2005). It offers three contributions to theory and practice. First, this study provides empirical evidence of the potential business value created by adopting a comprehensive EMS. After controlling for the endogenous relationship between EMS adoption and business performance, it appears that facilities which adopt more comprehensive EMSs can benefit financially. These findings fuel the ongoing discussion regarding whether or not it pays to be "green," and offers evidence about how EMSs, in particular, fit into this debate.

Second, the results of this study broaden our understanding of institutional theory and the resource-based view of the firm by exploring their relative contributions to the decision to adopt a more comprehensive EMS and to subsequent facility business performance. While this study confirms that institutional pressures and resources and capabilities both encourage more

comprehensive EMS adoption, facilities that are driven mainly by their resources and capabilities (rather than institutional pressures) are more likely to obtain positive business performance. One reason for these findings may be that facilities that are guided to adopt EMSs due to institutional pressures may be using these management systems more as symbolic actions to increase external legitimacy (Bansal & Hunter, 2003) without necessarily improving internal efficiencies. In such instances, facilities may be devoting more resources to meeting, challenging or even defying the institutional forces they are currently facing (Oliver, 1997b) rather than finding or developing the complementary resources and capabilities necessary to meet their environmental challenges. Reacting to institutional pressures in this way may lead to some financial gain by increasing external legitimacy, at least in the short run. However, these facilities lack the internal capabilities and resources to maintain their EMS over time (Darnall & Edwards, 2006). Such capabilities include the tacit capacities developed from quality management systems, employee commitment, export orientation, and resource commitments in the form of an environmental research and development budget. Capabilities and resources such as these help develop cross-functional and cross-stakeholder management practices that are socially complex, and shared visions that are difficult for competitors to replicate (Hart, 1995; Sharma & Vredenburg, 1998). They also help to improve organizational reputation and strategically align the facility with future changes in the general business environment (Hart, 1995; Sharma & Vredenburg, 1998; Aragón-Correa & Sharma, 2003). Facilities that fail to develop their complex capabilities, therefore, appear to forego these competitive advantage opportunities.

Third, this study takes a significant step forward in advancing our understanding of environmental management in the global context in that our findings suggest that a facility's export orientation is an important complementary capability to it's decision to adopt more

comprehensive environmental management practices. While previous research has examined the motivations to adopt EMS (Potoski & Prakash, 2005b; King, et al., 2005; Darnall, 2003; Melnyk, et al., 2003; Coglianese & Nash, 2001; Anton, et al., 2004) and the relationship between proactive environmental activities and business performance (Russo & Fouts, 1997; Hart & Ahuja, 1996; Stanwick & Stanwick, 2001), most of this scholarship has focused on organizations in a single country, and more specifically U.S. organizations. By examining these relationships for facilities in four OECD countries, results of this research can be generalized to a much broader international setting and makes an important contribution to existing scholarship.

Two limitations of our research should be noted. First, self-reported data may be biased in that environmental managers may have exaggerated their facility's environmental activities and business performance. From the onset of this study, we believed that respondents might consist of facilities with more ambitious environmental strategies. We further believed that respondents might want to describe their environmental strategies as being more rigorous than they actually were. While our results suggest that the facility managers were not reluctant to identify the shortcomings of their environmental strategies and profitability, the potential bias would tend to reduce the variance in our sample. As such, we would be less likely to find statistically significant relationships. However, by finding statistically significant relationships, additional evidence is offered about the strength of the relationship between the variables in our models (Hardin & Hilbe, 2001).

Second, publicly available databases on information on "objective pressures" (Delmas & Toffel, 2004) such as the number of compliance violations and enforcement actions taken against the facility (regulatory pressures), interest group ratings of politicians to measure political pressures and the proportion of population proximate to the facility who are members of

environmental or conservation groups to measure community environmental activism would have made wonderful additions to this study. Unfortunately, such databases are not available across the four countries we study. Therefore, the OECD survey measures of the perceptions of institutional actors, as well as, the number of facility inspections provide the only data available at this unit of analysis across the four countries.

These findings have important implications for future research. Regulatory, market and social pressures for environmental consideration may prompt many facilities to adopt EMSs when they lack the complementary resources and capabilities that foster continual environmental improvement over time. These facilities also may develop EMSs that have less ambitious environmental goals and, therefore, may not improve their environmental performance or reap only a marginal financial gain. In still other instances, a facility's weak resources and capabilities may explain why it later endures stronger institutional pressures to address its environmental harms, which then give rise to environmental action. These examples illustrate that a facilities' institutional pressures and resource and capabilities may be interrelated to a much greater degree than previously conceived. Future scholarship would benefit by evaluating these temporal relationships further.

Related to international management, additional scholarship is needed to help in our understanding of how EMS practices are influenced by national cultures. For example, our empirical analysis shows that the estimated coefficients on the country specific dummy variables in our EMS equations (models 1 through 4) are each negative and significant indicating that facilities located in the U.S. are more likely to implement a more comprehensive EMS than those located in Canada, Germany or Hungary. The estimated country specific dummy variables in the business performance equation (model 5) are each positive and statistically significant indicating

facilities located in Canada, Germany and Hungary, *ceteris paribus*, have greater business performance than those located in the U.S.. While we control for country differences in our analysis, we are not modeling the sources of these differences per se. While the nature of our data limits us from assessing temporal and culture-based issues, they are important issues that future research should examine.

In summary, this study evaluates whether EMSs can create business value across multiple international settings. It shows that facilities are driven to adopt more comprehensive EMSs in response to institutional pressures for greater external legitimacy, and desires to build upon existing complementary resources and capabilities. However, facilities that rely on their resources and capabilities such as export orientation, quality management, R&D and employee commitment in developing their EMS are more likely to improve their overall business performance.

9.0 REFERENCES

Anton W.R.Q., Deltas, G., Khanna, M. 2004. Incentives for environmental self regulation and implications for environmental performance. Journal of Environmental Economics and Management, 48, 632-654.

Aragón-Correa, J.A., Sharma, S., 2003. A contingent resource-based view of proactive corporate environmental strategy. Academy of Management Review, 28, 71-88.

Armstrong, J., Overton, T. 1977. Estimating nonresponse bias in mail surveys. Journal of Marketing Research, 14, 396-402.

Bansal, P. 2005. Evolving sustainability: A longitudinal study of corporate sustainable development. Strategic Management Journal, 26, 197-218.

Bansal P., Clelland I. 2004. Talking trash: Legitimacy, impression management and unsystematic risk in the context of the natural environment. Academy of Management Journal, 47, 93-103.

Bansal, P., Hunter, T. 2003. Strategic explanations for the early adoption of ISO 14001. Journal of Business Ethics, 46, 289-299.

Bansal, P., Roth, K., 2000. Why companies go green: A model of ecological responsiveness. Academy of Management Journal, 43, 717-736.

Barney, J. 1991. Firm resources, sustained competitive advantage. Journal of Management, 17, 99-120.

Central Intelligence Agency (CIA). 2005. The World Factbook 2005. Washington, DC, Central Intelligence Agency.

Cho, H.J., Pucik, V. 2005. Relationship between innovativeness, quality, growth, profitability, and market value. Strategic Management Journal, 26, 555-575.

Christiansen, G.B., Haveman, R.H. 1981. The contribution of environmental regulations to the slowdown in productivity growth. Journal of Environmental Economics and Management, 8, 381-390.

Christmann, P. 2000. Effects of 'best practices' of environmental management on cost competitiveness: The role of complementary assets. Academy of Management Journal, 43, 663-880.

Coglianese, C., Nash J. (eds.) 2001. Regulating from the Inside: Can Environmental Management Systems Achieve Policy Goals? Washington, DC, Resources for the Future.

Conrad, K., Morrison, C.J. 1989. The impact of pollution abatement investment on productivity change: An empirical comparison of the U.S., Germany and Canada. Southern Economic Journal, 55, 684-698.

Corbett, C., Montes-Sancho, M., Kirsch, D. 2005. The financial impact of ISO 9000 certification in the United States: An empirical analysis, Management Science, 51, 1046-1059.

Cordano, M., Frieze, I.H. 2000. Pollution reduction preferences of U.S. environmental managers: Applying Ajzen's theory of planned behavior. Academy of Management Journal, 43, 627-641.

Darnall, N. In press. Why firms mandate ISO 14001 certification. Business & Society.

Darnall, N. 2003. Motivations for participating in a voluntary environmental initiative: the multi-state working group and EPA's EMS pilot program, in: Sharma, S., Starik, M. (Eds.), Research in corporate sustainability. Edward Elgar Publishing, Boston, pp.123-154.

Darnall, N., Edwards, Jr., D. 2006. Predicting the cost of environmental management system adoption: the role of capabilities, resources and ownership structure. Strategic Management Journal, 27, 301-320.

Darnall, N., Gallagher, D.R., Andrews, R.N.L. 2001. ISO 14001: Greening management systems, in: J. Sarkis (Ed.), Greener Manufacturing and Operations: From Design to Delivery and Back. Greenleaf Publishing, Sheffield, pp. 178-190.

Davidson W.N., Worrell D.L. 2001. Regulatory pressure and environmental management infrastructure and practices. Business and Society, 40, 315-342.

Delmas, M., Toffel, M.W. 2004. Stakeholders and environmental management practices: An institutional framework. Business Strategy and the Environment, 13, 209-222.

Deming W.E. 1986. Out of the Crisis. Cambridge, MA: MIT Press.

DiMaggio, P.W., Powell, W.W. 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American Sociological Review 48, 147-160.

Egri, C.R., Herman, S. 2000. Leadership in the North American environmental sector: Values, leadership styles, and contexts of environmental leaders and their organizations. Academy of Management Journal, 43, 561-604.

Falk, M. 2002. Endogenous organizational change and the expected demand for different skill groups. Applied Economic Letters 9, 419-423.

Fogler, H.R., Nutt, F. 1975. A note on social responsibility and stock evaluation. Academy of Management Journal, 18, 155-160.

Ghemawat, P. 1986. Sustainable advantage. Harvard Business Review, 64, 53-58.

Greening, D.W., Gray, B. 1994. Testing a model of organizational response to social and political issues. Academy of Management Journal, 37, 467-498.

Guler, I., Guillen, M.F., MacPherson, J.M. 2002. Global competition, institutions and the diffusion of organizational practices: The international spread of ISO 9000 quality certificates. Administrative Science Quarterly, 47, 507-531.

Hardin, J., Hilbe J. 2001. Generalized Linear Models and Extensions. Stata Press, College Station.

Hart, S.L. 1995. A natural-resource-based view of the firm. Academy of Management Review, 20, 874-907.

Hart, S.L., Ahuja, G. 1996. Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. Business Strategy & the Environment, 5, 30-37.

Henderson, R., Mitchell, W. 1997. The interactions of organizational and competitive influences on strategy and performance. Strategic Management Journal, 18, 5-14.

Henriques, I., Sadorsky, P. 1999. The relationship between environmental commitment and managerial perceptions of stakeholder importance. Academy of Management Journal, 42, 89-99.

Henriques, I., Sadorsky, P. 1996. The determinants of an environmentally responsive firm: An empirical approach. Journal of Environmental Economics and Management, 30, 381-395.

Hoffman, A. 2001. Linking organizational and field-level analyses – the diffusion of corporate environmental practice. Organization and Environment, 14, 133-156.

Hoffman, A. 2000. Competitive Environmental Strategy: A Guide to the Changing Business Landscape. Island Press, Washington, D.C.

Hoffman A. 1999. Institutional evolution and change: Environmentalism and the U.S. chemical industry. Academy of Management Journal, 42, 351-371.

Hoffman A. 1997. From Heresy to Dogma: An Institutional History of Corporate Environmentalism. New Lexington Press, San Francisco.

Johnstone, N., Serravalle, C., Scapecchi, P., Labonne, J. In press. Project background, overview of the data and summary results, in: Johnstone N. (Ed.) Environmental Policy and Corporate

Behaviour. Edward Elgar Publishing, in association with Organisation for Economic Co-Operation and Development, Northampton, MA.

Kennedy P. 1994, A Guide to Econometrics, Third Edition, MIT Press, Cambridge: MA.

Khanna, M., Anton, W.R.Q. 2002. Corporate environmental management: Regulatory and market-based incentives. Land Economics, 78, 539-558.

Khanna, M., Damon, L.A. 1999. EPA's voluntary 33/50 program: impact on toxic releases and economic performance of firms. Journal of Environmental Economics and Management, 37, 1-25.

King, A., Lenox, M. 2000. Industry self-regulation without sanctions: The chemical industry's Responsible Care Program. Academy of Management Journal, 43, 698-716.

King, A., Lenox, M. 2001. Who adopts management standards early? An examination of ISO 14001 certifications, in Nagao, D. (Ed.), Best Paper Proceedings: Fifty-ninth Meeting of the Academy of Management. Academy of Management: Washington, DC, ONE A1-A6.

King A., Lenox M., Terlaak A. 2005. The strategic use of decentralized institutions: Exploring certification with the ISO 14001 management standard. Academy of Management Journal, 48, 1091-1106.

Kitazawa, S., Sarkis, J. 2000. The relationship between ISO 14001 and continuous reduction programs. International Journal of Operations, Production Management, 20, 225-248.

Klassen, R.D., McLaughlin, C.P. 1996. The impact of environmental management on firm performance. Management Science, 42, 1199-1214.

Klassen, R.D., Whybark, D.C. 1999. The impact of environmental technologies on manufacturing performance. Academy of Management Journal, 42, 599-615.

Kollman, K., Prakash, A. 2001. Green by choice? Cross-national variations in firms' responses to EMS-based environmental regimes. World Politics. 53, 399-430.

Konar, S., Cohen, M.A. 1997. Information as regulation: The effect of community right to know laws on toxic emissions. Journal of Environmental Economics and Management, 32, 109-124.

Levy, D.L. 1995. The environmental practices and performance of transnational corporations, Transnational Corporations, 4, 44-67.

Marshall, M.E., Mayer, D.W. 1991. Environmental training: It's good business. Business Horizons, March/April, 54-57.

Melnyk, S.A., Sroufe, R.P., Calantone, R.L. 2003. Assessing the impact of environmental management systems on corporate and environmental performance, Journal of Operations Management, 21, 329-351.

Meyer, J., Rowan, B. 1977. Institutionalized organizations: formal structure as myth and ceremony. American Journal of Sociology, 83, 340-363.

Nakamura, M., Takahashi, T., Vertinsky, I. 2001. Why Japanese firms choose to certify: A study of managerial responses to environmental issues. Journal of Environmental Economics and Management, 42, 23-52.

Nash, J., Ehrenfeld, J. 1997. Codes of environmental management practice: assessing their potential as tools for change. Annual Review of Energy and Environment, 22, 487-535.

Netherwood, A. 1998. Environmental management systems, in: Welford, R. (Ed.), Corporate Environmental Management 1. Earthscan, London, pp.37-60.

Nunnally, J.C. 1978. Psychometric Theory, 2nd edition. McGraw-Hill, New York.

Oliver, C. 1997a. The influence of institutional and task environment relationships on organizational performance: The Canadian construction industry. Journal of Management Studies, 34, 99-124.

Oliver, C. 1997b. Sustainable competitive advantage: Combining institutional and resource-based views. Strategic Management Journal, 18, 697-713.

Oliver, C. 1991. Strategic responses to institutional pressures. Academy of Management Journal, 16, 145-179.

Peglau R. 2005. ISO 14001 Certification of the World. Federal Environmental Agency, Berlin.

Perrow, C. 1986. Complex Organizations: A Critical Essay. Random House, New York.

Podsakoff, P.M., Organ, D.W. 1986. Self-reports in organizational research. Journal of Management, 12, 531-544.

Porter, M., van der Linde, C. 1995. Green and competitive. Harvard Business Review, 73, 120-138.

Potoski, M., Prakash, A. 2005a. Covenants with weak swords: ISO 14001 and facilities' environmental performance. Journal of Policy Analysis and Management, 24, 745-769.

Potoski, M., Prakash, A. 2005b. Green clubs and voluntary governance: ISO 14001 and firms' regulatory compliance. American Journal of Political Science, 49, 235-248.

Ray, G., Barney, J., Muhanna W. 2004. Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view. Strategic Management Journal, 25, 23-37.

Rivera, J. 2002. Assessing a voluntary environmental initiative in the developing world: The Costa Rican certification for sustainable tourism. Policy Sciences, 35, 333-360.

Rockness, J., Schlachter, P., Rockness, H.O. 1986. Hazardous waste disposal, corporate disclosure, and financial performance in the chemical industry, in: Neimark, M. (Ed.) Advances in Public Interest Accounting, 1: JAI Press, Greenwich, pp.167-191.

Rondinelli, D., Berry, M. 2000. Environmental citizenship in multinational corporations: social responsibility and sustainable development. European Management Journal, 18, 70-84.

Roth, K. 1995. Managing international interdependence: CEO characteristics in a resource-based framework. Academy of Management Journal, 38, 200-231.

Russo, M.V., Fouts, P.A. 1997. A resource-based perspective on corporate environmental performance and profitability. Academy of Management Journal, 40, 534-559.

Sastry, A.M., Bernike, J.W., Hart S.L. 2002. Changing shades of green: Coupling and decoupling in Monsanto's environmental orientations, in: Hoffman, A., Ventresca, M. (Eds.), Organizations, Policy and the Natural Environment. Stanford University Press, Palo Alto, CA, pp.262-290.

Scott, W.R. 2001. Institutions and Organizations. Sage Publications, Thousand Oaks, CA.

Sharma, S. 2000. Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. Academy of Management Journal, 43, 681-697.

Sharma, S., Vredenburg, H. 1998. Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. Strategic Management Journal, 19, 729-753.

Shrivastava, P. 1995. Ecocentric management for a risk society. Academy of Management Review, 20, 118-137.

Stanwick, P.A., Stanwick, S.D. 2001. CEO compensation: does it pay to be green? Business Strategy and the Environment, 10, 176-182.

Stead, W.E., Stead, J. 1992. Management for a Small Planet. Sage Publications, Newbury Park.

Suchman, M.C. 1995. Managing legitimacy: strategic and institutional approaches. Academy of Management Review, 20, 571-610.

Tallman, S., Li, J. 1996. Effect of international diversity and product diversity in the performance of multinational firms. Academy of Management Journal, 39, 179-196.

Tan J., Peng H.W. 2003. Organizational slack and firm performance during economic transitions: Two studies from an emerging economy. Strategic Management Journal, 24, 1249-1263.

Tilley, F. 1999. Small-firm environmental strategy: The UK experience. Greener Management International, 25, 1-14.

Wooldridge J.M. 2002. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: The MIT Press.

Zutshi, A., Sohal A.S. 2004. Adoption and maintenance of environmental management systems: critical success factors. Management of Environmental Quality: An International Journal, 15, 399-419.

Table 1. Factor loadings for Institutional Actors and Employee influences [a]

Influence Item	Factor 1: *Social Pressures*	Factor 2: *Employee Commitment*	Factor 3: *Market Pressures*
Influence of labor unions on environmental practices	**0.68**	0.06	0.05
Influence of trade associations on environmental practices	**0.67**	0.24	0.23
Influence of environmental groups on environmental practices	**0.78**	0.15	0.21
Influence of community groups on environmental practices	**0.71**	0.25	0.15
Influence of management employees on en environmental practices	0.22	**0.88**	0.12
Influence of non-management employees on environmental practices	0.23	**0.87**	0.14
Influence of household consumers on environmental practices	0.28	-0.12	**0.66**
Influence of commercial buyers on environmental practices	0.09	0.18	**0.81**
Influence of suppliers on environmental practices	0.15	0.32	**0.69**
Cronbach Alpha	0.75	0.83	0.63

[a] Loadings stronger than ± 0.50 are bold. Extraction method was principal component analysis with varimax Kaiser normalization.

Table 2. Correlations and descriptive statistics[a]

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Business performance	1.00												
2	EMS comprehensiveness	0.10**	1.00											
3	Regulator influences	0.00	0.22**	1.00										
4	Inspection frequency	0.02	0.26**	0.16**	1.00									
5	Market pressures	0.08**	0.14**	0.17**	0.05*	1.00								
6	Social pressures	-0.05	0.23**	0.29**	0.15**	0.09**	1.00							
7	Ownership pressures	0.00	0.33**	0.13**	0.11**	0.03	0.17**	1.00						
8	Quality management system	0.10**	0.27**	0.05	0.04	0.06*	0.05	0.08**	1.00					
9	Health & safety management system	0.05	0.12**	0.01	0.08**	0.04	0.08**	0.17**	0.02	1.00				
10	Employee commitment	0.09**	0.31**	0.13**	0.08**	-0.08**	-0.09**	0.15**	0.11**	0.11**	1.00			
11	Environmental R&D budget	0.03	0.20**	0.09**	0.16**	0.07**	0.13**	0.08**	0.03	0.06*	0.07*	1.00		
12	Export orientation	0.05	0.12**	-0.06*	0.03	-0.04	-0.06*	0.09**	0.13**	0.03	0.11**	0.00	1.00	
13	Facility size	0.04	0.44**	0.20**	0.24**	0.09**	0.17**	0.27**	0.22**	-0.02	0.13**	0.13**	0.12**	1.00
	Mean	0.23	0.08	2.46	5.10	-0.06	0.10	0.21	0.75	0.57	0.19	0.06	0.70	5.34
	Standard deviation	0.98	0.95	0.69	7.83	0.96	0.97	0.41	0.43	0.50	1.01	0.24	0.46	1.06

[a] N = 1355

* p < .05 (two-tailed test), ** p < .01 (two-tailed test)

Table 3. Regression analysis results[a]

	Predicting EMS Comprehensiveness[b]								Predicting Business Performance[c]	
Independent	**Model 1— Restricted Model**		**Model 2— Institutional Pressures**		**Model 3— Resources & Capabilities**		**Model 4— Combined Model**		**Model 5— Business Performance**	
Variable	*Coefficient*	*Std Error*	*Coefficient*	*Std Error*	*Coefficient*	*Std Error*	*Coefficient*	*Std Error*	*Coefficient*	*Std Error*
Regulator influences			0.064*	0.036			0.017	0.035		
Inspection frequency			0.012***	0.003			0.010***	0.003		
Market pressures			0.074***	0.022			0.081***	0.021		
Social pressures			0.074***	0.023			0.101***	0.023		
Ownership pressures			0.275***	0.055			0.219***	0.052		
Quality management system					0.328***	0.050	0.300***	0.049		
Health & safety management system					0.045	0.047	0.012	0.046		
Employee commitment					0.180***	0.021	0.194***	0.020		
Environmental R&D budget					0.396***	0.074	0.302***	0.076		
Export orientation					0.127***	0.047	0.119***	0.046		
EMS comprehensiveness									0.176**	0.088
Facility size	0.367***	0.019	0.299***	0.021	0.299***	0.019	0.244***	0.020	-0.026	0.041
Food	-0.409***	0.094	-0.403***	0.093	-0.192**	0.090	-0.207**	0.090	-0.108	0.102
Machine	-0.471***	0.067	-0.378***	0.065	-0.406***	0.064	-0.327***	0.062	-0.272***	0.089
Metal	-0.253***	0.065	-0.184***	0.064	-0.226***	0.062	-0.167***	0.061	-0.288***	0.080
Nonmetal	-0.395***	0.110	-0.399***	0.106	-0.248**	0.109	-0.260**	0.104	-0.211	0.143
Paper	-0.346***	0.091	-0.311***	0.088	-0.177**	0.086	-0.156*	0.082	-0.269**	0.110
Textiles	-0.816***	0.103	-0.702***	0.100	-0.615***	0.101	-0.528***	0.100	-0.825***	0.156
Transport	-0.203**	0.099	-0.165*	0.097	-0.148	0.093	-0.116	0.090	-0.058	0.113
Wood	-0.550***	0.095	-0.492***	0.091	-0.307***	0.093	-0.270***	0.091	-0.584***	0.148
Canada	-0.534***	0.075	-0.433***	0.073	-0.605***	0.072	-0.520***	0.071	0.600***	0.105
Germany	-0.579***	0.054	-0.382***	0.060	-0.552***	0.052	-0.403***	0.058	0.289***	0.089
Hungary	-0.663***	0.062	-0.514***	0.064	-0.590***	0.066	-0.475***	0.068	0.422***	0.105
Constant	-1.083***	0.121	-1.186***	0.147	-1.243***	0.119	-1.184***	0.146	0.288	0.178
R-squared	0.324		0.363		0.398		0.431		0.079	
Adjusted R-squared	0.318		0.355		0.391		0.422		0.071	
LR test[d]			80.56***		158.02***		234.66***		4.57**	

[a] N = 1355. Heteroskedasticity-robust standard errors are shown.
[b] EMS comprehensiveness is the dependent variable in models 1 through 4.
[c] Business performance is the dependent variable in model 5 and the two stage least squares estimate of EMS comprehensiveness is the independent variable of interest. [d] Likelihood ratio test of a model against a restricted model that includes a constant, facility size, and dummy variables for industry and country effects.
*** p < 0.01, ** p < 0.05, * p < 0.10