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## The Purpose of ISO 14001 Certification: Independent Assurance or Improved Environmental Management System?

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#### Abstract

This study provides evidence of the value of third party certification of environmental management systems. We examine the relative importance of improving an environmental management system as a result of certification, versus being able to communicate the quality of that system credibly to outsiders through third party certification. We use survey data where one half of the respondents had indicated that they had an environmental management (EMS) in place before seeking ISO 14001 certification, while the other half of respondents did not. Our analyses comparing the two groups find that the group already having an EMS report similar motivations for ISO 14001 certification and perceive to have received similar levels of benefits as firms having no pre-certification EMS. We conclude that even for organizations that already have an EMS, the ability to communicate credibly the quality of that system is a compelling reason to obtain ISO certification.

Key Words: ISO 14000, Assurance Services, Environmental information, Environmental management systems

### Introduction

Members of society are increasingly holding companies accountable for their environmental performance, thus creating an impetus for companies to improve their performance in this area, and to provide information regarding that performance to decision makers (Friedman and Miles, 2001). The increasing tendency for companies

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to issue sustainability reports and provide assurance on those reports suggests that there are factors at play motivating companies to produce information on environmental performance and other dimensions of sustainability (Simnett, Vanstraelen, and Chua, 2009) (hereafter SVC) although competing theories exist of whether companies do so to ultimately serve shareholders or whether they do so to serve a greater good (Moser and Martin, 2012). In either case, the process of improving and reporting environmental performance has been hindered by: 1) the absence of widely accepted environmental reporting standards, and 2) a perceived lack of credibility of firms' environmental disclosures, linked at least in part to the fact that they are typically not verified by independent third parties (Beets and Souther, 2003).

To address these problems, the accounting profession has devoted significant time, effort and resources to develop alternate performance reporting in the areas of sustainability and corporate social responsibility. Significant initiatives include the formation of the International Integrated Reporting Council whose mission is to "create a globally accepted Integrated Reporting framework which brings together financial, environmental, social and governance information in a clear, concise, consistent and comparable format. The aim is to help with the development of more comprehensive and comprehensible information about organizations, prospective as well as retrospective, to meet the needs of a more sustainable, global economy." (International Integrated Reporting Council, 2012).

Nevertheless, assurance over sustainability reporting remains problematic. In a recent survey of 178 organizations, Ballou et al (2012) reported that still only one-third obtained assurance over their sustainability reporting. It is also not clear who should provide assurance and what criteria should be used: O'Dwyer (2011) notes that there are competing bodies vying to develop criteria and provide assurance over corporate social responsibility claims, and the accounting profession has struggled to expand assurance into non-financial areas.

For the accounting profession, is it worth the investment to try to develop assurance mechanisms over corporate reporting? We attempt to shed light on the importance companies place on the ability to credibly communicate their performance in environmental reporting using a unique data set comparing companies that had answered a survey on ISO 14000 certification where one half of the companies had a pre-existing environmental management system in place before seeking external certification and one half did not.

The International Organization for Standardization (ISO) has developed and published the ISO 14000 family of International Standards. The objective of these standards, which have been available since 1996, is to define the underlying principles of a sound EMS, in their view. ISO also provides certification that the EMS meets ISO 14000 standards, through attestation by a third party (a registration body or "registrar"). While other frameworks for corporate social responsibility are under development, the ISO 14000 standards enjoy wide acceptance: as of 2008, 188,815 companies worldwide had received ISO 14000 certification (ISO, 2008).

Both the implementation of an EMS, and ISO certification, remain at the discretion of individual companies. Therefore, companies can choose whether or not to implement an EMS; whether or not to meet ISO 14000 standards; and whether or not to obtain ISO 14001 certification attesting that they conform to those standards.

From the point of view of both shareholders and management, an EMS with ISO 14001 certification can have many benefits, including 1) improving the environmental management system as a result of certification; and 2) being able to credibly communicate the quality of that system to outsiders through the certification procedures performed by the independent third party. The goal of this study is to attempt to isolate and compare the value of these two components of the certification process.

To accomplish this objective, we present the results of analyses performed on survey data originally gathered by Berthelot *et al* (2003). In that study, one half of the respondents indicated that they had an environmental management (EMS) in place before seeking ISO 14001 certification, while the other half of respondents did not. By comparing the results of these two groups, we address two questions: How important is it to a company to be able to credibly communicate aspects of non-financial performance, specifically environmental performance? More specifically, do companies believe that ISO 14001 certification is perceived as a credible signal of environmental performance?

We find that the benefits of certification for companies with an EMS already in place are judged to be high, and equally as significant as benefits to companies that have neither an EMS nor certification. Therefore, it appears that the ability to credibly communicate environmental performance achievements to decision makers through ISO 14001 certification is perceived to be critical. This suggests that efforts to improve assurance services over environmental reporting are important, and even perhaps that the lack of credible assurance services may prevent some companies from investing in environmental management systems if they are unable to communicate that performance to stakeholders in a credible manner.

The remainder of this paper is organized as follows: Section II summarizes the literature regarding the demand for assurance services. Section III discusses criteria for reporting environmental performance, the ISO 14000 family of standards and the perceived benefits and costs of the implementation of an EMS and its certification according to those standards. Section IV discusses our research methodology and sample description. Section V deals with the analysis of the results of the survey, and section VI contains conclusions, limitations and extensions of this study.

#### The Demand for Assurance Services

A fairly large volume of research has addressed the value of financial statement audits. An analytical-theoretical stream of research, following from Jensen and Meckling (1976), proposes that audits reduce the agency costs arising from inherent

conflicts of interest between owners and managers by serving as a monitoring mechanism (Senkow *et al.*, 2001). As a result, even when financial statement audits are not required by regulation, it has been suggested that firms will often still engage financial statement audit services (Thornton, 1992). Empirical research has supported this contention: Following a change in legislation in Canada in 1994 that eliminated a mandatory requirement for certain private companies to have their financial statements audited, Senkow *et al.* (2001) found that many such companies still retained their audit. Similarly, Abdel-Khalik (1993) performed a survey of fully-manager-owned private U. S. corporations not subject to mandatory audits, and found many were still party to lending agreements requiring audited financial statements. Therefore, even in the absence of regulation, some firms will still subject themselves, or will be subjected, to financial statement audits or will choose to enter into contracts that require those audits.

Firms also have an incentive to release information about other aspects of their performance in order to signal their quality and hence distinguish themselves from poor performers (Akerlof, 1970; Spence, 1973). The provision of unaudited information regarding environmental performance has generally been perceived as non-credible, perhaps because the pre-condition for a credible signal, that the costs of the signal must differ between the high performers and low performers, probably does not hold. Thus, all will invest in the signal and it will fail to differentiate (Spence, 1973). It would appear that this skepticism is warranted. For example, Li, Richardson and Thornton (1997) found that even disclosures of environmental liabilities required for external financial reporting correlated poorly with actual performance.

As is the case with financial statement audits, firms may therefore submit to costly assurance services to enhance the credibility of their disclosures. For example, assurance services have been provided to certify product quality (Sun and Cheng, 2002), security for E-commerce transactions (Gendron and Barrett, 2004), fair labour conditions (Bernstein, 2003), and sustainability reporting (SVC, 2009; Wallage, 2000).

In all these areas, firms will choose whether to allocate resources to improve performance with respect to that dimension. Since certification is voluntary, firms must then determine whether it is worthwhile to seek an independent certification of their performance. That assessment will entail a consideration of the costs of certification and the perceived benefits. The benefits would be based, at least in part, on the extent to which the assurance service is seen as being credible, and the extent to which assurance over the subject matter affected the actions of the information recipients in such a way as to increase the cash flows to the firm. To date, few large scale research studies have examined the demand for such services (Knechel *et al*, 2006).

A key hurdle to conducting research in this area is the difficulty of identifying a control group and having enough data to make valid statistical inferences. While research exists on the benefits of ISO 14000 certification, it is often based on small

samples. Little survey research has been conducted (Psomas *et al*, 2011). Even if data can be gathered about ISO 14001 certified companies, identifying a control group of non-ISO 14001 is even more difficult, particularly if companies are private. In this study, our control group is not companies that have not pursued ISO 14000 certification. Rather, all our companies pursued certification, but the companies in our treatment group had no EMS before certification, while the control group did have one.

Our data for this study was originally collected by Berthelot *et al* (2003). They identified a large group of Canadian firms that have received ISO 14001 certification. One section of their survey addressed whether respondents had an EMS in place before seeking ISO 14001 certification, and the extent of that EMS. Interestingly, exactly half of the respondents of that survey had a pre-existing EMS while the other half did not. This data therefore provides the opportunity to study the value of certification by comparing the benefits received from companies addressing two needs (not having an EMS, and not having it certified) from companies addressing only one need (not having the EMS certified).

## Sustainability Reporting and Criteria For Environmental Performance: The ISO 14000 Family

SVC documented that, of 40,993 companies in the period 2002-2004, 5.1% (2,113) produced sustainability reports, and 31% of those reports were assured. They categorized the contents of the sustainability reports using six categories of non-financial indicators contained in the Global Reporting Initiative (2007): economic, environment, labour, human rights, product responsibility, and society. Of their sample of companies issuing sustainability reports, 56.7% included environmental reports.

Despite the fact that more companies are producing sustainability reports, Manetti and Becatti (2009) note that concerns remain over the credibility of such reports. In an effort to bridge this "credibility gap", the International Auditing and Assuracnce Standards Board issued ISAE 3000, which applies to qualified accounts auditors who undertake external verifications of non-financial reports. One of the main elements of ISAE 3000 is the identification of suitable reporting criteria.

One set of criteria that can be applied to environmental performance are the standards of the ISO 14000 family, which were introduced in 1996 by the International Organization for Standardization. These standards delineate the basic elements that an EMS must possess in order to achieve certification. The standards are grouped around seven themes, namely: 1) environmental management systems; 2) environmental auditing; 3) assessment of environmental performance; 4) eco-labeling; 5) product lifecycle assessment; 6) environmental aspects in product design and development, and 7) definitions used (Society of Management Accountants of Canada, 1998).

Critics contend that ISO 14000 certification places too much emphasis on a company developing systems and procedures that conform with its own environmental policy, which does not necessarily lead to improvements in environmental performance (Watson and Emery, 2004; Paulraj and de Jong, 2011). Moreover, some contend that external verifiers do not conduct effective investigations (Watson and Emery, 2004). Finally, certification is extremely costly. Paulraj and deJong (2011) found that the stock market reaction of US firms announcing ISO 14001 certification was negative, indicating that shareholders perceived the costs of certification exceed the benefits.

Nevertheless, early research studies pointed to many benefits that can result from the certification of companies to ISO 14000 standards (Angel del Brio et al., 2001; Montabon et al, 2000). These benefits could be grouped into six broad categories: 1) improved ability of business to deal with environmental risk (Matuszak-Flejszman and Bramorski, 2001; Rondinelli and Vastag, 2000); 2) improvement of production processes and operational efficiencies (Chin and Pun, 1999; Maslennikova and Foley, 2000; Matuszak-Flejszman and Bramorski, 2001; Ofori et al., 2000; Quazi et al., 2001; Rondinelli and Vastag, 2000; Thornton, 1999); 3) improvement in competitiveness by appealing to customers who either prefer to patronize environmentally sensitive companies or who may require ISO 14001 certification from their suppliers (Chalfant, 2000; Chin and Pun, 1999; Corbett and Kirsch, 2001; Quazi et al., 2001; Standards Council of Canada, 2000); 4) response to pressures from public and environmental groups; 5) protection of the company, its management and shareholders from litigation (Blue, Meneguzzi and Cole, 1992; Stammer, 1995) and 6) enhanced financing opportunities by shielding creditors from potential risks (Farlinger, 1992).

In the literature cited above, it is difficult to disentangle the effects of 1) adopting an EMS or improving an EMS already in place, and 2) credibly communicating the quality of the EMS through the assurance service provided by an independent third-party (Boritz and Cockburn, 1998). For example, the profit impact of improvements in production process should occur once an EMS is adopted, regardless of whether it is certified or not. However, improvements in competitive positioning may occur only if the company can credibly communicate its EMS quality through certification, particularly if ISO 14001 certification is required by the customer.

Firms adopting ISO 14001 certification that had no pre-existing EMS will reap the benefits arising from both effects. However, firms that already had an EMS would already be achieving some measure of environmental management. For them, a greater proportion of the ISO certification benefits should be associated with the credible signal effect compared to firms who had no EMS in the first place.

By comparing the perceived benefits and costs reported by each group, we can measure, to some extent at least, the benefits that accrue primarily from the *credibility* that comes from ISO certification, versus the benefits that accrue from *improving* the EMS. That is, companies without a pre-existing EMS are improving their environmental management system *and* the credibility of communication regarding

the quality of that system. Companies with a pre-existing EMS will benefit less from improvements to their environmental management, as they already had an EMS that should have presumably procured a certain measure of environmental management already. If the benefits received by this latter group are perceived to be as great as the no-EMS group, this leads us to believe that the benefits of improving an EMS, which are largely inapplicable to the EMS group, are of relatively little importance. Furthermore, if both groups report equal perceived benefits, this leads us to believe it is the assurance component provided by ISO 14001 certification that is of primary importance to the organizations. Such a finding would underline the importance of credible assurance services in this area.

We therefore investigate the following hypothesis:

H1<sub>0</sub>: General managers of companies with a pre-existing EMS will perceive that they receive benefits from ISO 14001 accreditation equal to those received by companies without a pre-existing EMS.

Hypothesis 1 treats the existence of an EMS before certification as a dichotomous condition. However, the extent of an EMS may perhaps be more accurately considered to be along a continuum. For an environmental management system to receive ISO 14001 certification, several elements are required. Although a certified EMS must contain all of the relevant elements, non-certified companies that implement an EMS can choose to only partially implement a system by adopting only a subset of the elements. The more fully a company had implemented an EMS to ISO 14000 standards prior to attaining certification, the fewer will be the benefits of ISO 14001certification related to improve environmental management. The benefits related to the third party assurance function of ISO 14001, on the other hand, should be invariant to the extent of a pre-existing EMS. If the benefits related to improve environmental management are generally insignificant relative to the benefits of third party assurance, then the overall benefits should be invariant to the extent of the pre-existing EMS.

We therefore investigate the second hypothesis:

 $H2_0$ : The extent of a pre-existing EMS will not affect the responses of general managers regarding the perceived benefits of certification.

## **Research Methodology**

## **Research Design**

Most previous research regarding the difficulties of ISO 14001 certification and the benefits of certification has been based on case studies. In contrast, our research is based on data gathered through a survey originally reported in Berthelot *et al.* (2003). The survey was sent to a large sample of Canadian firms, from several industries, who had received ISO 14001 certification. The objective of Berthelot *et al.* (2003) was to identify the motivations, perceived benefits, and problems encountered by companies achieving certification. No hypotheses were advanced or tested regarding differences

between firms with a pre-existing EMS versus those without. As such, and in contrast to this study, the goal of Berthelot *et al* (2003) was not to "disentangle" the benefits of improving an EMS from the benefits related to communication of EMS quality through the certification process. Therefore, our study attempts to isolate more precisely the relative value of the individual benefits of certification, and uses data from a large sample of firms to investigate this question.

The survey instrument used by Berthelot *et al* (2003) was developed from results of previous empirical research into benefits and motivations of companies who had received ISO 14001certification discussed in the previous section. The instrument had been pilot tested by a group of 29 MBA students to ensure that the questions were clearly worded and valid. All weaknesses noted were corrected.

### **Sample Description**

The Berthelot *et al* (2003) sample consisted of all companies who had obtained ISO 14000 certification who were registered in the *WORLDPREFERRED.COM* database as of February 2002. This database is maintained by the World Preferred Registry, an organization that verifies and reports on the registration activities and certificates issued by Certification Bodies (Registrars). The main purpose of the World Preferred Registry is to provide a list of ISO certified suppliers available to the general public. Inclusion on the registry is free of charge for companies that are certified by an ISO 14001 registrar.

In all, 546 Canadian companies were registered in the *WORLDPREFERRED.COM* database. A questionnaire and a prepaid, anonymous return envelope were mailed to the general manager of each accompany. General managers were selected as they usually have a wider perspective of the corporate culture of their company. To encourage a greater response rate, respondents were offered a copy of the main findings of the study if they participated and indicated that they wished to receive them.

Of the 546 companies or subsidiaries targeted for study, 131 general managers completed and returned the questionnaire, providing a response rate of 24%. This response rate is unsurprising given the nature of the firms targeted (Baruch, 1999), and given that only one mailing was sent (Shermis and Lombard, 1999; Kerlinger, 1986). Baruch (1999) found that the response rate for surveys sent to members of top management was typically between 23 and 40%. Shermis and Lombard (1999) and Kerlinger (1986) reported that a single mailing of a survey instrument will usually produce a response rate of less than 20%. Using a similar methodology as ours, Angel del Brio *et al.* (2001) achieved a response rate of less than 7%. Of the 131 questionnaires returned for our study, 2 were unusable.

Table 1 shows the descriptive statistics regarding the respondents and their company or subsidiary. The average age of the respondents was 44 years, and they had an average of 6.26 years of experience in their current position. As mentioned, exactly half of the respondents (63 out of 125, or 50.4%), had already put an EMS in place

before taking steps toward certification to ISO 14000 standards. Two-thirds of responding companies were already certified to one of the ISO 9000 standards. Finally, 62% of respondents stated that their company or subsidiary operated in an

Variables - respondents	Mean	Median
Age (in years)	44.06	46
Years of work experience in current position	6.26	5
Variables - companies	Ν	Percentage
Company implemented an environmental management system before the necessary steps to obtain certification under standard ISO 14000	63	50.4 %
Company was certified under another standard from the ISO 9000 series before being certified under standard ISO 14000	86	66.7 %
Company operates within an industry that poses high environmental risks	80	62.0 %
Company operates within an industry considered to be a major polluter	49	38.3 %

#### **Table 1. Descriptive Statistics**

#### **Result and Discussion**

As mentioned, the respondents of the Berthelot et al (2003) sample were, as it turned out, equally divided into two groups: one group that had a pre-existing EMS before seeking ISO 14001 certification, and one group that did not. Table 2 presents descriptive statistics by group, to provide assurance as far as possible that there were no other systematic differences between the two groups that could confound the results in that they could impact a firm's assessment of either the costs or benefits of certification, regardless of whether that firm had an EMS in place or not. For instance, larger firms might gain greater market share as a result of ISO 14001 certification. Conversely, smaller firms which have less visibility could benefit greatly from the signal sent by ISO 14001 certification. Similarly, it could be reasonable to expect that firms in a high polluting industry would perceive greater benefits from ISO 14001 certification than firms in low-polluting industries. Finally, firms who have already sought ISO 9000 certification could be pre-disposed to attribute higher benefits to ISO 14000 certification as they were ready to repeat the experience. They also could experience lower costs as they have familiarity with ISO frameworks, processes and certification as the structures and philosophies of ISO 9000 and ISO 14000 are similar (Psomas et al, 2011).

There were no significant differences between the pre-existing EMS group and no-EMS group in terms of the likelihood that they operated in industries with high environmental risks, that they operated in industries considered to be a major polluter, or if they had ISO 9000 certification. There was also no significant difference in the size of companies in the two groups, as proxied by number of employees.

Table 2. Descriptive Statistics by Group							
Panel A:		Industry	poses high envir	Pearson			
					Chi-Square		
		no	yes	Total			
Pre-existing EMS	no	26	36	62			
	yes	20	43	63	1.40		
	total	46	79	125			
Panel B:		Industry	considered to be	a major polluter	Pearson		
					Chi-Square		
		no	yes	Total			
Pre-existing EMS	no	41	21	62			
	yes	36	26	62	0.89		
	total	77	47	124			
Panel C: Organization has ISO 9000 certification				Pearson			
					Chi-Square		
no			yes	Total			
	no	17	45	62			
yes		25	38	63	2.11		
	total	42	83	125			
Panel D			Without	With	Т		
			Pre-existing	Pre-existing	Statistic		
			EMS	EMS			
			Mean (S.D.)	Mean (S.D.)			
Number of Employees			1,743	1,308	0.39		
			(6,204)	(6,324)			

## Table 2 Descriptive Statistics by Group

\* Significant at the 0.10 level.

Significant at the 0.05 level.

† ‡ Significant at the 0.01 level.

Table 3 presents measures of the extent of the pre-existing EMS for that group. The characteristics listed are those that are required by ISO 14000, and companies had to rate, on a scale of 1 to 7, the amount by which their pre-existing EMS addressed that characteristic.

Table 3. Extent of Environmental	Management System in Place Before ISO
14001	Certification

Characteristic	Mean	Media	S.D.
	N=64	n	N=64
		N=64	
An environmental policy which was both clearly defined and communicated to all employees	4.6	5.0	1.9
An inventory of the environmental impact of its activities, products and services	4.0	4.0	1.9
An inventory of all environmental acts and regulations applicable to your company	5.0	5.0	1.7
Set objectives and goals for all functions and at all levels of the company which could play an environmental role	3.8	3.5	1.9
Steps to attain set objectives and goals for all functions and at all levels of the company which could play an environmental role (ex. definition of responsibilities, methods, deadlines, technological and training needs)	3.8	3.0	1.8
Official documentation on all the elements of the current environmental management system	3.8	3.0	2.0
Procedures for identifying environmental emergencies and appropriate responses	5.4	6.0	1.6
Measurement and surveillance system of the environmental repercussions of activities and operations	4.6	5.0	1.7
A preventative and corrective intervention plan in cases of non- conformity with the objectives and goals set	4.1	4.0	2.0
Auditing system for the current environmental management system	4.0	4.0	2.3
A periodical review of the current environmental management system by senior management	4.1	4.0	2.0

Table 3 presents the mean and median response, and standard deviation of responses of companies who had reported having an EMS in place before seeking ISO 14001 certification. For each question, companies reported whether their pre-existing EMS contained the element listed, from a scale of 1 (=not at all) to 7 (=completely).

To test our first hypothesis, we analyze the reasons companies give for seeking ISO 14001 certification. A comparison between the EMS and non-EMS first is reported in Table 4. Respondents reported on a numerical 7-point scale, ranging from 1 ("not important") to 7 ("very important"), the importance of various factors to their decision to either adopt an ISO 14001 certified EMS (for companies without a pre-existing EMS) or to certify their pre-existing EMS. For 12 out of the 17 factors, companies without a pre-existing EMS rated the factor as more important, on average, than companies with an EMS. This would be consistent with companies without an EMS in place having greater motivation to take action than companies with a pre-existing EMS. However, for all but one of the factors, the differences were not significant.

This indicates that even companies who already have an EMS find many factors lead them to gain certification. The greatest difference was the importance of protecting management against lawsuits: companies with a pre-existing EMS rated this as significantly less important than companies without an EMS. Presumably, this reflects a belief that actual environmental management, rather than communication about management, is more relevant to management's liability in this regard. Thus, management that had an adequate EMS could be adequately protected from litigation, even if that EMS was not certified.

	Wi	th	W	ith	
	Pre-ex	isting	Pre-ex	isting	
	EN	1S	EN	1S	
	Mean	S.D.	Mean	S.D.	Т
Improved environmental performance	5.6	1.3	5.8	1.4	-0.49
Improved manufacturing process	3.7	1.9	3.8	2.1	-0.29
Improved employee working conditions	4.0	1.7	4.0	2.1	0.05
Cost savings	4.1	1.9	4.1	2.0	0.06
Openings to international markets	4.5	2.1	4.2	2.3	0.85
Increased client base in Canada	4.0	2.0	3.6	2.2	1.17
Improved corporate image	6.2	1.2	6.1	1.2	0.32
Respond to current client demands	4.7	2.0	4.3	2.3	1.17
Respond to public pressure	3.8	2.1	3.5	2.1	0.70
Respond to environmentalists' criticisms	3.5	2.2	3.4	2.0	0.25
Gain a competitive edge	5.4	1.5	5.2	1.9	0.91
Keep up with the competition	4.1	2.0	3.8	2.2	0.73
Company protection against lawsuits	4.5	1.9	3.9	1.9	1.63
Management protection against lawsuits	4.5	1.7	3.7	1.9	2.32†
Shareholder protection against lawsuits	3.6	2.0	3.7	1.9	-0.15
Improved bank loan facility	2.8	1.8	3.0	2.1	-0.57
Improved financial opportunities other than through banks	2.5	1.5	2.9	2.0	-1.15

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\* Significant at the 0.10 level.

† Significant at the 0.05 level.

Significant at the 0.01 level.

This table compares the mean rating of respondents to importance of possible reasons for getting ISO certification, or for having their EMS certified under ISO. For each factor, respondents rated the importance on a 7 point scale, where 1 was "not important" and 7 was "very important". The t-statistic is the result of an independent samples 2-sided T-test.

Table 5 reports the results from a question that asked respondents to indicate how many of the benefits listed in Table 4 had actually been realized as a result of ISO 14001 certification. In every case, either an equal or greater percentage of companies without a pre-existing EMS reported receiving the benefit in question than companies

with a pre-existing EMS. This is consistent with companies without a pre-existing EMS getting a "greater bang for their buck" from ISO certification than companies who already had an EMS. However, once again these differences were generally not significant; leading once again to the inference that certification provides important benefits. The two benefits that had significant differences were "responding to current client demands" and "improved financial opportunities other than through banks". For both these questions, a greater percentage of companies without a pre-existing EMS reported experiencing these benefits than companies with an EMS already in place.

	Without pre-	With Pre-	
	existing EMS	existing EMS	D (1)
	0 /		Pearson Chi-
	% repor	ting yes	Square
	05	0.0	F Statistic
Improved environmental performance	95	90	0.98
Improved manufacturing process	52	48	0.16
Improved employee working conditions	65	53	1.64
Cost savings	53	47	0.36
Openings to international markets	45	33	1.32
Increased client base in Canada	17	17	0.00
Improved corporate image	98	95	1.07
Respond to current client demands	78	61	3.68*
Respond to public pressure	52	42	0.99
Respond to environmentalists' criticisms	48	36	1.25
Gain a competitive edge	76	67	1.05
Company protection against lawsuits	57	47	0.87
Management protection against lawsuits	52	45	0.28
Shareholder protection against lawsuits	38	35	0.04
Improved bank loan facility	33	17	2.52
Improved financial opportunities other than through banks	20	6	2.89*

Tabla 5	Popofite	of ISO	14 001	Cortification
Table 5	. Benefits	01 150	14 001	Certification

\* Significant at the 0.10 level.

† Significant at the 0.05 level.

Significant at the 0.01 level.

This table reports the percentage of respondents in each group who indicated that they had experienced the benefit in question as a result of ISO 14001 certification.

Hypothesis 2 investigates whether the perceived benefits of ISO certification are the same, regardless of the extent of the EMS that was in place before beginning the certification process. Again, we believe that such a finding would lend support to the notion that it is the ability of firms to credibly communicate the quality of their EMS through ISO certification that is of essential importance. To investigate this, we

determine whether the extent of a pre-existing EMS has significant explanatory power when regressed on measures of perceived benefits and motivations.

Table 6 compares the mean scores of respondents with and without a pre-existing EMS for summary measures of their assessments of certification. "Strength and Breadth of Reasons" is the sum of all the ratings given by each respondent for the reasons for certification listed in Table 4. "Number of Perceived Benefits" is the total number of benefits listed in Table 5 that each respondent reported receiving as a result of certification. "ISO was worth it" was a yes/no assessment given by each respondent. "Likelihood of Repeating Experience of ISO 14000 Certification" was an assessment given by each respondent, on a scale of 0% to 100% of their assessment of the probability that they would repeat the certification experience. It is interesting that average likelihood of repeating the certification experience. None of the differences between the two groups were statistically significant, again pointing to the conclusion that, even with an existing EMS, certification is seen as a highly beneficial activity.

	With		Without		
	Pre-exist	ting EMS	Pre-existin	ng EMS	
	Mean	S.D.	Mean	S.D.	T Statistic
Strength and Breadth of Reasons	68.9	18.3	67.7	22.8	0.31
Number of Perceived Benefits	6.5	2.5	6.1	3.1	0.93
Likelihood of Repeating Experience of ISO 14000 Certification	94.3	13.4	92.6	15.9	0.67

**Table 6. Test of Mean Differences for Summary Measures** 

\* Significant at the 0.10 level.

† Significant at the 0.05 level.

Significant at the 0.01 level.

This table compares the mean scores of respondents with and without a pre-existing EMS. "Strength and Breadth of Reasons" is the sum of all the ratings given by each respondent for the reasons for certification listed in Table 4. "Number of Perceived Benefits" is the total number of benefits listed in Table 5 that each respondent reported receiving as a result of certification. "Likelihood of Repeating Experience of ISO 14000 Certification" was an assessment given by each respondent, on a scale of 0% to 100% of the probability that they would repeat the certification experience. The t-statistic is the result of an independent samples 2-sided T-test.

Finally, we performed four separate ordinary least squares regressions – one regression for each of the summary measures used in Table 6. The independent variable of interest is the extent of the pre-existing EMS, which is a sum of the number of features of the EMS that a firm reported having in place before seeking certification (companies with no pre-existing EMS received a value of zero). We also included our control variables of : 1) whether the firm was in a high polluting industry or not; 2) whether the firm had ISO 9000 certification or not; and 3) the number of employees in a firm, as a proxy for size. As shown in Table 7, the bivariate

correlations between the independent variables are all insignificant, so we did not have to adjust for multicollinearity in our linear regressions.

Our results are presented in Table 8. We found that firms with ISO 9000 certification reported experiencing more benefits than firms without this certification. It is possible that this is a "halo" effect where firms perceive more benefits because they were pleased with the first ISO certification. We did not find that the extent of a pre-existing EMS had an effect on the perceived benefits of ISO certification, consistent with the notion that it is the communication of EMS quality that is of essential importance.

	Extent of EMS	ISO 9000	High Environmental Risk	Number of Employees
Extent of EMS ISO 9000	1.00	074 1.00	.124 147	057 154
High Environmental Risk			1.00	.124
Number of Employees				1.00

#### **Table 7. Bivariate Correlations Between Independent Variables**

\* Significant at the 0.10 level.

\* Significant at the 0.05 level.

Significant at the 0.01 level.

This table presents the bivariate correlations between the independent variables used in the regressions presented in Table 8. Extent of EMS is the number of features present in the EMS of the firm before seeking certification as reported in table 2. High environmental risk is a dummy variable taking the value of 1 if the firm reports being in a high risk industry. ISO 9000 is a dummy variable taking the value of 1 if the firm had ISO 9000 certification.

Table 8. Ordinary Least Squares Linear Regression Results for Sum	mary
Dependent Variables	

Dependent Variable	Standardi	Standardized Beta Coefficients (T statistics) of Independent Variables:				
	Extent of EMS	ISO 9000	High risk	Number of Employees		
Strength of Reasons	0.05 (0.54)	0.11	0.13 (1.49)	0.07 (0.74)	.033	
Number of Benefits	-0.01 (-0.08)	0.18 (1.99†)	0.09 (1.00)	-0.08	.044	
Likelihood of Repeating Process	0.02 (0.28)	0.02 (0.17)	0.11 (1.18)	-0.06 (-0.64)	.015	

\* Significant at the 0.10 level.

\* Significant at the 0.05 level.

\$ Significant at the 0.01 level.

This table presents regression results for three separate regressions, each with a different dependent variable. "Strength and Breadth of Reasons" is the sum of all the ratings given by each respondent for the reasons for certification listed in Table 4. "Number of Perceived Benefits" is the total number of benefits listed in Table 5 that each respondent reported receiving as a result of certification. "Likelihood of Repeating Experience of ISO 14000 Certification" was an assessment given by each respondent, on a scale of 0% to 100% of their assessment of the probability that they would repeat the certification experience. In all the regressions, the independent variables are the extent of EMS, which is the number of features present in the EMS of the firm before seeking certification as reported in table 2; High risk is a dummy variable taking the value of 1 if the firm had ISO 9000 certification.

The preceding analyses found that there were generally no differences between the benefits perceived and motivations of companies, regardless of the extent of an EMS in place before seeking certification. Although that leads us to conclude that the third party attestation provided by ISO 14001 certification is of far greater importance than the improvements to the EMS, there are other competing explanations. It is possible that the lack of differences between the groups was due to either insufficient statistical power, or that our instruments of measure were not precise enough to capture differences between the two groups.

We performed an additional analysis to help determine whether the lack of difference between the groups with- or without a pre-existing EMS was due to problems with our analysis or with the measurement instrument. Specifically, we looked at the results of three questions posed to the survey respondents that related specifically (and solely) to the importance of improved EMS performance. Those questions were the importance of the following benefits: 1) improved environmental performance; 2) improved manufacturing process; and 3) improved employee working conditions. We reason that these benefits are clearly related to EMS performance, and not to third party attestation. We further reason that the importance of these benefits should decline as the extent of the pre-existing EMS increases.

Results of this analysis are presented in Table 9. Multivariate General Linear Model results indicate that the extent of the pre-existing EMS significantly reduced the importance attached to these three benefits, both at an individual level of analysis and overall. That provides us with some assurance that our lack of differences in the main analyses was more likely attributable to the fact that improving the EMS is less important than attestation, and not to measurement imprecision or lack of statistical power.

# Table 9. General Linear Model Multivariate Regressions for Assessments of Importance of Benefits Derived from Improved Environmental Performance

Dependent Variables	Explanatory Effe	Explanatory Effect of Extent of EMS	
	F statistic	Significance	
Improved Environmental Performance	1.42	0.09	
Improved Manufacturing Process	1.60	0.04	
Improved Employee Working Conditions	2.12	0.00	
Overall	1.28	0.05	

Notes:

This table presents multivariate test results for a general linear model with three dependant variables: the assessed importance, on a scale of 1 (=not important) to 7 (very important) of 1) improved environmental performance; 2) improved manufacturing processes; and 3) improved employee working conditions. The independent variable is the extent of EMS, which is the number of features present in the EMS of the firm before seeking certification.

## Conclusion

The results of the study show that even for firms having an EMS, the ability to credibly communicate their performance through certification is very important. Further, despite the fact that critics contend ISO 14001certification does not improve environmental performance and ISO 14001 certification lacks rigour (Watson and Emery, 2004), companies in our sample placed considerable value on receiving ISO 14001 certification. Both firms with a pre-existing EMS and without expected to realize many benefits, did indeed experience many benefits, and overwhelmingly found the experience of ISO 14001 certification to be worthwhile.

Our study was performed on a sample of Canadian companies. Therefore, the perceived benefits and costs are based on the Canadian legislative and cultural context. Although ISO certification has been successfully applied in a wide variety of legislative contexts (Thornton, 1999), it is possible that the benefits and costs may be different in another country, particularly if that country was either more or less sensitive to environmental concerns than is Canada. It would be interesting to examine if our results hold in such different contexts.

Secondly, our study primarily examines the benefits and costs perceived by general managers in the companies in our survey. It is possible that their perceptions may differ from others in their firms. It is also possible that the actual benefits and costs may differ from these perceptions, although in many cases it may be impossible to know, for example, what the firm's cost and availability of financing would be if it had not attained ISO certification.

Finally, our sample includes only firms that *have* chosen to adopt ISO certification. Firms that have not chosen to do so may have different perceived or real costs and benefits attached to ISO certification. An interesting extension of this study would be to survey companies that have chosen either: 1) not to adopt an environmental management system; 2) not to adopt an EMS that conforms to ISO 14000 standards; or 3) not to obtain certification of their EMS.

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