

Using ISO 14001 Environmental Management Systems
to Manage for Sustainability

By Tanis L.P. Ostermann

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Department of Environment and Geography
University of Manitoba
Winnipeg

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ABSTRACT

Corporations are a significant contributor to global unsustainability. Use of ISO 14001 environmental management systems (EMS) are considered logical, needed tools for use in meeting corporate sustainability goals. By paying attention to where users identify benefit and challenges and to what sustainability ‘looks like’ an existing system can be adapted effectively. EMS Enablers were considered in the development of a Sustainability Enablers Model, for use with an existing, effective EMS. Planning Enablers include ensuring alignment of leader values, an appropriately scoped policy, base principles upon which to set objectives and comprehensive aspects. Implementation & Operation Enablers include effective engagement and reporting and operating within a learning organization. The primary Checking Enabler is operating with a learning organization in support of an effective corrective action process. Management Review Enablers include effective use of data by the leadership team to improve performance and alignment of leader or organizational values in motivating changes.

1 INTRODUCTION

1.1 Research Question and Objective

The aim of this research is to develop a management system model (the Sustainability Enablers Model, or SEM) that, when used, will help companies in their move towards sustainability. The Sustainability Enablers Model is based on strengthening certain elements of an existing, well-functioning ISO 14001:2004 Environmental Management System (EMS). As such, this thesis does not aim to provide all of the operational detail needed to fulfill each of the elements of the ISO 14001:2004 standard. The approach taken in this research, to provide recommendations for improvement to existing mature environmental management systems based on the ISO 14001 EMS standard, is used because that is the management system tool that many companies are familiar with and likely one of the few standardized management systems already in place. This is something that is likely to be cost effective as it will make use of existing, familiar systems. The caveat is that the system must be functioning well, senior management must want the system and see it as a vehicle to move towards sustainability. These points are addressed further in the thesis.

Existing corporate environmental management systems, as based on the ISO 14001 Environmental Management System standard, can be used to realize sustainability. This can be done through focus on several critical elements of the system while not materially deviating from the ISO 14001 EMS standard. I attempt to

highlight existing literature primarily in the areas of environmental management and corporate sustainability. True validation may only come through exercising an existing corporate EMS through several cycles. This is not a realistic or feasible task within the limitations of this study.

1.2 Exclusions

The Sustainability Enablers Model and associated commentary are intended as a starting point. The overall viability perceived or the measured success of existing ISO 14001 environmental management systems will not be addressed or debated as part of this research.

1.3 Method

This thesis has been set up so that readers may share a common, basic understanding of ISO 14001 environmental management systems and significant challenges that accompany implementation. A grounding in sustainability, its global and Canadian significance, is also presented to allow for context for the rest of the thesis. These two elements are combined to provide the reader with insight on the link between corporations, environmental management systems and sustainability. The final sections of the thesis are to present the most significant points for consideration when using an EMS to support sustainability efforts. Those points were consolidated to develop the Sustainability Enablers Model (SEM), identifying Planning Enablers, Implementation & Operation Enablers, Checking Enablers and Management Review Enablers (all of which are highlighted in addition to the key elements of the ISO 14001 Environmental Management System standard).

1.4 Structure: Key Points

Sustainability is addressed, through discussion in Chapter 3, in an effort to understand why organizational effort should be dedicated to modifying an existing ISO 14001 EMS. Research into this topic was intended to yield a base for the link between organizational efforts and the natural world. By better understanding the significance of sustainability one is better position to apply organizational and management system tools to move towards it.

Knowledge of ISO 14001 is necessary in order to draw subsequent conclusions on how it may be used to reach sustainability. ISO 14001, its components and noted success factors are presented in Chapter 4. In addition to answering ‘what is it?’, this chapter presents the existing components of the system. This is an important step in knowing what to build on to be successful in the use of a modified system (ie: the SEM). Industry and academic considerations of what a successful system looks like, as well as challenges in implementation, were researched in an effort to identify those that may support or be a hindrance to system modification. Motivations were assessed, using existing literature, in an effort to identify those types of motivations that will lead to successful use of an ISO 14001 EMS to move towards sustainability.

Chapter 5 brings together the information on sustainability and the information on environmental management systems. The link between the two is introduced by presenting findings regarding research into corporate sustainability. Of particular significance, and expanded upon, is The Natural Step and how it may be used to support corporate movement towards sustainability by being integrated into a management system. The contribution of The Natural Step comes in the form of

articulated system conditions that may be used as objectives or targets within a system.

Upon drawing the link between sustainability and environmental management systems, consideration must be given to specific adjustments that can be made to the system, or considerations that must be made, to allow a company to use their ISO 14001 EMS as a vehicle to move towards sustainability. This is done in Chapter 6. All is pulled together in Chapter 7, in the presentation of the Sustainability Enablers Model. It identifies those specific things that should be added or considered, based on the research presented in this thesis, for practical use of an EMS to move towards sustainability. The ‘specific things’ are identified as *enablers* – organizational factors that, when integrated into an existing, well-functioning system, gives the company a comprehensive tool to move towards sustainability. The enablers are presented as a model in an overlay of the ISO 14001 environmental management system components. The significance of the model is discussed in Chapter 8.

2 SUSTAINABILITY

2.1 Introduction

The most prominently, and first well-known definition of sustainable development came from *Our Common Future* (also known as the Brundtland Report) (WCED, 1987). The term was characterized as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). The creation of the World commission on Environment and Development, which authored the Brundtland report, was created by the United Nations in 1983. The origins of sustainable development within the UN began in 1972 with the first meeting of the UN Conference on the Human Environment. This was likely initiated as an effort to bridge the gap between ecological and human condition concerns associated with economic growth (Robinson, 2004). Following this the World Conservation Strategy (WCS) was published in 1980 by the International Union for the Conservation of Natural Resources. In 1982 the World Charter for Nature was created, as result of all the momentum behind the WCS (UNCSD, 2012). Since 1983 the most significant United Nations activities related to sustainable development have been in 1992, with the UN Conference on Environment and Development held in Rio de Janeiro which resulted in the Rio Declaration on Environment and Development, as published in *Agenda 21: A programme of Action for sustainable Development* (this was a driver in creation of the ISO 14001 EMS standard (ISO, 2007)). In June of 2012 the United Nations Conference on Sustainable Development will be reconvening as a ‘Rio + 20’ group to assess progress towards

earlier sustainable development commitments (UNCSD, 2012). Much of the diplomacy, facilitation and work of the United Nations efforts focusing on sustainable development have influenced subsequent organizations and authors.

Despite the commonly referred to Brundtland definition, it has been recognized that there is no operationally standard definition of sustainability (Elefsiniotis and Wareham 2005; Nattrass and Altomare, 1999; Redclift, 2005; Robinson, 2004; Vanclay, 2004; Voinov and Farley, 2007). However, according to Elefsiniotis and Wareham (2005) “it is not necessary to be able to define a concept in order to implement it”. The example given by the authors is that of justice: the concept will be defined as many different times for as many different people are asked. Regardless, individuals and nations continue in its pursuit. Individuals, groups and institutions that have different world views will have different goals; sustainability will mean different things to different people (Hueting and Reijnders, 2004; Robinson, 2004 Vanclay, 2004).

Specific to the definition postulated in *Our Common Future*, discrete criticisms of the definition and the ensuing confusion exist. Redclift (2005) identified three points of concern worth noting: (1) Needs will always be changing. It is unlikely that the needs of future generations will be the same as those of the current generation. (2) Needs are different in different cultures. (3) It is not clear what, specifically, is to be sustained. This same author contends that the definition and significance of sustainable development needs to be critically re-evaluated in consideration of changes in “the physical environment, information technologies and the human body” (Redclift, 2005). The term has also been seen as an oxymoron or a

contradiction in terms because of the inference that economic growth and environmental interests are working against one another (Robinson, 2004). While the previously noted author (Redclift, 2005) advocates is critical of the ambiguity of the definition, Robinson (2004) considers that the ambiguity may be to the greater advantage of society. The authors infers that the broader the definition the less likely that certain, and perhaps competing, interests will be excluded.

As per the language in *Our Common Future*, most authors on sustainable development can agree on some level of interface between economy, environment and society (Hueting and Reijnders, 2004). Howarth (2007) defines a sustainable society as one that “maintains the quality of human life opportunities from each generation to the next”. The author also contends that future generations are entitled to the same utility of resources as the current generation; lessening of available natural capital can only be justified when adequate compensation programs are put in place for future generations. Voinov and Farley (2007) suggest that in a very narrow context sustainability can be thought of as the maintenance of a given set of conditions (environmental, social and economic) at a level desired by humans. These same authors suggest that “as long as the system can adapt it is sustainable” (Voinov and Farley, 2007).

More specific to industrial and commercial production, Hueting and Reijnders (2004) provide the following definition of sustainability: “safeguarding the maximum attainable production level without putting at risk future production possibilities”. From a corporate perspective, the National Round Table on the Environment and the Economy (NRTEE) suggests that the ultimate objective of any company is to maintain

its own viability. To that end they must ensure they have adequate access to all types of capital, including natural and social (NRTEE, 2007).

Nattrass and Altomare (1999), using the system conditions of The Natural Step as a backdrop, have attempted to provide pragmatic, effective means for integrating sustainability into the corporate context. The primary means in which The Natural Step (as articulated by Nattrass and Altomare) supports this integration is by providing specific conditions that a company should strive for (contrary to criticisms of ‘sustainable development’ noted by Redclift (2005)). The Natural Step begins to paint a picture of what a sustainable society should look like and how a company should contribute. It espouses the “evolutionary corporation”, that is the company that works within natural systems, and the world as a whole, as it progresses. The system conditions, or sustainability goals, identified are clearly articulated as:

“In the sustainable society...

1. Nature is not subject to systematically increasing concentrations of substances extracted from the Earth’s crust;
2. Nature is not subject to systematically increasing concentrations of substances produced by society;
3. Nature is not subject to systematically increasing degradation by physical means;
4. Human needs are met worldwide.” (Nattrass and Altomare, 1999)

The system conditions identified above are addressed in greater detail later in this thesis. For the purposes of this thesis, ‘sustainability’ will be the primary term referenced and is intended to be synonymous (in principle) with ‘sustainable

development'. This author intends to refer to sustainability primarily from the perspective of 'environmental sustainability', with the belief that environmental sustainability is required before social and economic sustainability can be secured.

2.2 Significance to the Human Population

Human wellbeing is entirely dependent on the continuous supply of quality ecosystem services (Millennium Ecosystem Assessment 1, 2005). The ecosystem goods and services provided are summarized in Table 1. Cultural services provide humanity with opportunities for recreation and spiritual fulfillment. Underlying these are supporting services, such as nutrient cycling and photosynthesis (Millennium Ecosystem Assessment 1, 2005). The degree of human-induced change to ecosystems and the services they are capable of providing has dramatically increased over a relatively very short time. These changes have come about as societies have made gains in wellbeing through the exploitation and, in many cases, over-use of these services. The level of exploitation has led to nearly irreversible damage to some ecosystems. This has led to decreased wellbeing (ie: lack of food, water, places to live) in many areas across the planet. It has contributed to a greater gap between the advantaged and disadvantaged populations, with the disadvantaged populations often suffering for gains made by the advantaged populations. Also, communities and regions have become more vulnerable to natural disasters (Millennium Ecosystem Assessment 1, 2005).

2.3 Global Sustainability Status

The table below, consolidated from the Millennium Ecosystem Assessment 1 (2005) identifies the status, as of 2000, of critical ecosystem services. It is the declining or negative trend, or the potential to induce a negative trend, that drives the need for changes.

Table 1: Trends in the Enhancement or Degradation of Ecosystem Services Around the Year 2000. Information Compiled from Millennium Ecosystem Assessment 1 (2005).

Status	Service
Enhanced	Crops – <i>food, provisioning service</i>
	Livestock – <i>food, provisioning service</i>
	Aquaculture – <i>food, provisioning service</i>
	Global climate regulation – <i>regulating service</i>
	Spiritual and religious values – <i>cultural services</i>
Mixed (spatially or temporally)	Timber – <i>fiber, provisioning service</i>
	Cotton, hemp, silk – <i>fiber, provisioning service</i>
	Water regulation – <i>regulating service</i>
	Disease regulation – <i>regulating service</i>
	Recreation and ecotourism – <i>cultural services</i>
Degraded	Capture Fisheries – <i>food, provisioning service</i>
	Wild plant and animal food products – <i>food, provisioning services</i>
	Wood fuel – <i>fiber, provisioning service</i>
	Genetic resources – <i>provisioning service</i>
	Biochemical, natural medicines, and pharmaceuticals – <i>provisioning service</i>
	Fresh water – <i>provisioning service</i>
	Air quality regulation – <i>regulating service</i>
	Regional and local climate regulation – <i>regulating service</i>
	Erosion regulation – <i>regulating service</i>
	Water purification and water treatment – <i>regulating service</i>
	Pest regulation – <i>regulating service</i>
	Pollination – <i>regulating service</i>
	Natural hazard regulation – <i>regulating service</i>
	Aesthetic values – <i>cultural services</i>

The ‘enhanced’ or ‘degraded’ status of certain ‘cultural services’ listed by the Millennium Ecosystem Assessment were not provided. As such there were omitted in this table. ‘Supporting services’ were not included in the table because they were not assessed for ‘degradation’ or ‘enhancement’, as humans do not use these services directly.

According to the authors of the Millennium Ecosystem Assessment 1 (2005), there are certain spheres, at a global level, that have been degraded to the point that capacity to provide the needed service is severely threatened. The two areas are marine and coastal capture fisheries and loss of biodiversity. At regional levels, several areas of

concern were noted within the same context of severe degradation: inland waters, forests and dry lands (Millennium Ecosystem Assessment 1, 2005).

2.4 Canadian Sustainability Status

The Canadian federal Sustainable Development Strategy (FSDS) puts the concept of sustainable development into a Canadian context: “Advancing sustainable development is about safeguarding our future and improving the quality of life in Canada and for the global community” (Environment Canada, 2010). The FSDS promotes three primary, environmental areas that are key to securing a sustainable future. They are air quality; water quality and availability; and the protection of nature (Environment Canada, 2010). The following indicators and their status as noted are intended to provide insight into the national trends towards sustainability including those identified in the FSDS.

- Ground level ozone has increased by approximately 11% between 1990 and 2008 (Environment Canada 1, 2011)
- PM_{2.5} has not changed in a statistically significant way between 2000 and 2008 (Environment Canada 1, 2011)
- National greenhouse gas emissions generally rose between 1990 and 2008 (there was a slight decrease from 2007 to 2008, attributed to economic slowdown) (Environment Canada 2, 2011)
- National freshwater quality indicators (for protection of aquatic life) shows (all taken from Environment Canada 3, 2011):
 - Excellent at 5% of stations monitored

- Good at 37% of stations monitored
 - Fair at 40% of stations monitored
 - Marginal at 15% of stations monitored
 - Poor at 3% of stations monitored
- National water levels, between 1998 and 2007, were considered normal (Environment Canada 4, 2011)
- Of the 363 species assessed more than once, changes in risk of wildlife species disappearance from Canada, in 2010 are as follows (Environment Canada 5, 2011):
 - No change in 66% of those species assessed more than once
 - Increased risk in 22% of those species assessed more than once
 - Decreased risk in 12% of those species assessed more than once.

The Canadian Index of Wellbeing Network, based out of the University of Waterloo, reports on wellbeing at the Canadian national level. The Network produces the Canadian Index of Wellbeing (CIW), of which analysis of environmental indicators is a key component (Morgan, 2011). The author of the most recent environment report of the CIW provided status on several indicators that can be considered critical components in any discussion surrounding sustainability. Within Canada, the following observations have been made (all extracted from Morgan, 2011):

- Aerial pollutants are a concern, particularly to the health of Canadians;

- While overall, domestic energy demands are being met, the renewable portion of the national energy portfolio is quite small;
- Water usage remains high, while supply is diminishing in some areas of Canada;
- Energy (non-renewable) and metal sources are being depleted;
- Waste disposal is high;
- Overall, marine and terrestrial resource (both at the ecosystem and species level) trends are negative; and
- Forest resources are not in balance, leading to an erosion of ecosystem services.

3 EMS and ISO 14001

3.1 Environmental Management: What is it?

Practically, environmental management can be thought of as the process of handling issues in such a manner as to minimize or eliminate negative effects on the environment. In a corporate setting, environmental management can be considered a collection of continual, systemised processes that a company employs to reduce its negative impacts on the natural environment. One description of such an environmental management system (EMS) is “problem-identification and problem-solving tools, based on the concept of continual improvement”. (Annandale et al., 2004). Freimann and Walther (2001) echo this sentiment, pointing out that the system allows for the identification and resolution of environmental impact areas.

Chavan (2005) suggests than an EMS be considered a management tool to be applied to those activities that have a negative impact on the environment. It allows for structure in the way planning and implementing environmental protection initiatives are carried out. It enables monitoring and regular checks of environmental performance and facilitates integration of environmental considerations into other aspects of the company’s operation. Van der Vorst (1999) identifies the main principles of EMS as systemic, priority-driven, procedural, cyclical, informational and third-party reliant.

There can be considered three levels of organizational commitment, as it applies to environmental protection. The base level is a situation in which a company identifies and formally institutionalizes environmental objectives. A second, higher

level of commitment exists when a company endeavors to integrate environmental policy into general corporate policy. At this level, support is sought and obtained from all levels of employment, particularly senior management. The third, and highest commitment identified by the authors involves institution of a voluntary environmental protection instrument that is independently validated through some sort of certification (Nakamura et al., 2001). It is at this third level that a company will see the most significant benefit from an EMS. It is where the potential for the system to support changes in values and behavior is the greatest (Freimann & Walther, 2001).

3.2 ISO 14001 Context

3.2.1 Origin

The International Organization for Standardization (ISO) is the self-proclaimed “world’s largest developer of standards” and has been generating such standards since its inception in 1947. It is a non-governmental body composed of a representative from each of its 155 member countries. Canada is represented by the Standards Council of Canada (ISO, 2007)

Based on identified market need and agreement from within the organization, a new standard will be created. Based on the ISO commitment to sustainable development presented at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, an internal technical committee was formed to investigate standardization of environmental management (ISO, 2007). The ISO 14000 series of standards, including ISO 14001 - *Environmental management systems*

- *Requirements with guidance for use*, was released in 1996 with a new draft being released in 2004 (CSA, 2004).

3.2.2 Components

The philosophy of the ISO 14001 environmental management system standard is based on a Plan-Do-Check-Act cycle. Generally speaking, an organization would plan the goals and activities associated with an environmental policy. The organization would move into implementing those plans. Steps would then be taken to check the progress of the implementation and measure it against stated objectives. Based on the results of the check, action would be taken to adjust the plan. Throughout this cycle, the organization is to be striving for continual improvement of environmental performance. The elements of the standard and a description of the associated corporate obligations, in lay terms, are presented in Table 2 (CSA, 2004):

Table 2. ISO 14001:2004 Environmental Management System elements and organizational obligations. Information compiled from the ISO 14001:2004 Environmental Management System Standard (CSA, 2007).

ISO Element	Organizational Obligation
4.2 Environmental Policy	<i>Document a corporate policy stipulating that the company will meet or exceed legal obligations; continually improve; prevent pollution; set objectives and targets.</i>
4.3 Planning	
4.3.1 Environmental aspects	Define the activities, products and services that the company delivers that affect the environment and how they affect the environment. Of those, determine the ones that are most significant.
4.3.2 Legal and other requirements	Establish a procedure for identifying legal and other requirements; identifying how the legal and other requirements apply to the aspects.
4.3.3 Objectives, targets and programme(s)	Establish objectives and targets consistent with or in consideration of the corporation's environmental policy, aspects, legal and other requirements, views of interested parties, business requirements. Programs shall be put in place to ensure achievement of objectives and targets.
4.4 Implementation and operation	
4.4.1 Resources, roles, responsibility and authority	Management shall ensure resources available to maintain and improve the EMS. Roles, responsibilities and authorities shall be defined. A top management representative shall be appointed.
4.4.2 Competence, training and awareness	Ensure all people working for or on behalf of the company are suitably trained. Identify training needs associated with environmental aspects. People working for or on behalf of the company shall be aware of policy, importance of conformance with procedures, consequences of deviation, roles and responsibilities.
4.4.3 Communication	Establish a procedure for internal communication. Establish a procedure for receiving, documenting and responding to external communication.
4.4.4 Documentation	Certain elements of the EMS shall be documented.
4.4.5 Control of documents	Documents required by the standard shall be controlled.
4.4.6 Operational Control	For those operations contributing to the environmental aspects, ensure they are controlled such that actual or potential environmental impact is prevented or mitigated. Applicable procedures shall be communicated to other companies in the supply chain.
4.4.7 Emergency response	Establish a procedure to identify potential emergency situations. Have procedures in place to respond to those emergencies. Review and revise periodically.

Table 2 (continued). . ISO 14001:2004 Environmental Management System elements and organizational obligations. Information compiled from the ISO 14001:2004 Environmental Management System Standard (CSA, 2007).

4.5 Checking	
4.5.1 Monitoring and measurement	Establish procedures to monitor and measure key characteristics of operations that can have significant environmental impact.
4.5.2 Evaluation of compliance	Includes two subsections. Establish procedure for evaluating compliance with legal obligations. Establish procedure for evaluating compliance with other requirements.
4.5.3 Nonconformity, correction action and preventive action	Establish procedure for identifying, correcting and preventing nonconformities.
4.5.4 Control of records	Establish procedure to control records.
4.5.5 Internal audit	Conduct internal audits of the system at planned intervals to determine if EMS conforms to standard, has been properly maintained and to provide results to management.
4.6 Management Review	
	Top management shall review, periodically, the system to ensure continuing suitability, adequacy and effectiveness. Specific inputs shall be considered as part of the management review. Output includes recommendations for changes to the system or its components.

3.2.3 Application

ISO 14001, *Environmental management systems - Requirements with guidance for use* is considered by ISO to be “generic”. This means that it was developed with the intent that any organization, of any size with any type of output can implement and be registered to the standard. It is process based and focuses on what that organization does to manage its impact on the environment. The standard also specifies, in addition to impact reduction, that the organization must strive to continually improve its environmental performance (ISO, 2007).

As with all of the ISO standards, the ISO 14001 is voluntary. A company or organization may adopt any component of the standard or the entire standard as they see fit. If they choose to be registered to the standard they must fulfill all of the requirements and be certified by a third-party, accredited body. In Canada there are eight accredited ISO 14001 registrars (SCC, 2007).

3.3 Satisfaction with Environmental Management System

The limited direct research into leader satisfaction shows 82.5% of Canadian ISO 14001 certified companies surveyed cited that they were “satisfied” or “very satisfied” with the “overall quality of the EMS implemented” (Yiridoe et al., 2003).

Considering the limited research, the literature was reviewed for those factors or measures that could be used to gauge satisfaction. Those measures have been classified into the following categories: expectations, benefits and success. Table 3 summarizes those measures of satisfaction. The subsequent sections provide additional, referenced detail specific to each of them.

Table 3. Summary of Identified Measures of Satisfaction of ISO 14001 Implementation or Use, as Introduced in Section 3.3.

Category of Measure	Detailed Measure
Expectations	Improved corporate image
	Improved stakeholder relations
	Improved employee engagement
	Improved business & operating processes
	Improved environmental performance
	ISO 14001 registration
	Increased market access & customer relations
	Risk minimization
	Cost savings
	Legal compliance
	Improved regulator relations
	Improved financing options
Benefits	Improved environmental performance
	Improved awareness and education
	Standardization and process optimization
	Improved corporate image and stakeholder interests
	Improved compliance
	Increased market access and client access
	Cost savings
Success	Improved environmental performance
	Meeting of stated objectives
	ISO 14001 element specific

3.3.1 Expectations

As a gauge of overall satisfaction with their ISO 14001 registrations, surveyed Canadian companies were asked if the benefits of registration outweighed the costs and if they would engage in the process of implementation again, given the opportunity. In both cases, responses were overwhelmingly positive (Berthelot et al, 2003). Certainly a measure of satisfaction is the assertion by a manager that he or she would make the same decision again. This could be extended to the expectations of a system intended to support efforts towards sustainability.

Research into expectations of senior managers with respect to ISO 14001 commonly cites improved corporate image as a very important expectation. In a study of Swiss companies improvement in public image was noted as the most important expectation (Hamschmidt and Dyllick, 2001). In a study of ISO 14001 implementation in the People's Republic of China, 80% of survey respondents indicated that a primary motivation for implementing the standard was to improve corporate image among stakeholders (Matouq, 2000). Oil and gas operators in the UK expected several things to come out of their registration to the ISO 14001 standard. Notably, was the expectation of improved relationship with stakeholders (Strachan et al., 2003).

Employee engagement and awareness is also an often cited expectation. The managers of an American mid-size manufacturer “viewed the introduction of an EMS as a vehicle to increase employee responsibility, accountability and involvement” (Gallagher et al., 2005). An improvement in employee motivation was noted by Swiss companies (Hamschmidt and Dyllick, 2001). 80% of survey respondents in the People's Republic of China were hoping to find benefit from improved employee awareness (Matouq, 2000).

Improvement in business and operating process, often leading to improved environmental performance was frequently cited. Hamschmidt and Dyllick (2001) found that Swiss companies expected ISO 14001 implementation would result in a more standardized approach to environmental activities. Improvement of environmental management methods, as well as improved environmental performance, were given fairly high priority as an expectation by Chinese business leaders (Matouq, 2000). Managers in the UK oil and gas industry expected to see better environmental performance and an

improvement in internal business efficiency as a result of environmental management system implementation (Strachan et al., 2003). Managers of an American firm promoted cost savings through improved hazardous waste management, recycling and pollution prevention (Gallagher et al., 2005). One could assume that promotion of such practices is indicative of their expectations of achieving the end-points.

Additional expectations of environmental management system and/or ISO 14001 implementation noted in the literature include:

- Achievement of ISO 14001 certification (Hamschmidt and Dyllick, 2001)
- Risk minimization (Hamschmidt and Dyllick, 2001; Matouq, 2000)
- Market opportunities (Hamschmidt and Dyllick, 2001; Matouq, 2000)
- Cost savings (Hamschmidt and Dyllick, 2001; Matouq, 2000)
- Legal compliance (Hamschmidt and Dyllick, 2001)
- Improvement in relations with regulators (Hamschmidt and Dyllick, 2001; Matouq, 2000)
- Influence future policy and regulatory decisions (Hamschmidt and Dyllick, 2001)
- Provide adequate response to customer demands (Hamschmidt and Dyllick, 2001)
- Better financing options (Hamschmidt and Dyllick, 2001)

3.3.2 Benefits

Benefits of environmental management systems can be classified into broad categories of environmental performance; awareness and education; standardization and

process optimization; corporate interest and stakeholder interests; improved compliance; market access and client needs; and cost savings. These categories are further articulated in this section.

- Environmental performance - In a survey of Australian companies that had EMSs, 89.2% claimed that their EMS had influenced the company's environmental performance, with close to 70% of those saying that the influence was "medium/moderate" or "large" (Annandale et al., 2004). Improved environmental performance was noted in a US/Thai case study (Gallagher et al., 2005) and in the UK oil and gas sector (Strachan et al., 2003). Berthelot et al. (2003) identified benefits of ISO 14001 implementation among Canadian companies. Of those that had an EMS in place prior to registration to the standard, 89% of respondents claimed that the ISO 14001 system improved the company's environmental performance. For those companies that did not have an EMS in place prior to ISO 14001 registration 94% indicated that environmental performance had been improved. A study of Chinese corporations found that of those ISO 14001 certified firms surveyed, the majority claimed improved environmental performance. This came in the form of reducing resource use, reducing pollutant output and generally reducing environmental risk (Matouq, 2000). Some Swiss companies indicate the influence of the EMS on environmental performance was only supportive (Hamschmidt and Dyllick, 2001). On a list of "influences on company

environmental performance” that included internal and external motivations dealing with organizational structure, stakeholder interests, costs, regulatory environment and market pressure, EMS was ranked 12th out of 16 influences (Annandale et al., 2004).

- Awareness and Education - Improved employee environmental awareness is a commonly cited benefit to ISO 14001 implementation within a company (Gallagher et al, 2005; Strachan et al., 2003). At an industry level, ISO 14001 has been credited with a significant role in increasing employee awareness of environmental issues (Newbold, 2005). Research has also shown that environmental awareness among suppliers can also be improved (Zeng et al., 2005). Research into general environmental management systems (Annandale et al., 2004) also shows improved employee awareness as an implementation benefit.
- Standardization and Process Optimization - More systematic and/or standardized environmental management practices is a benefit that some companies attribute to implementation of an environmental management system (Annandale et al., 2004; Zeng et al., 2005). Gallagher et al. (2005) found that companies in a US/Thai study claimed that the ISO 14001 registration allowed for more proactive management of environmental issues. Integration of existing programs into an environmental management system, such as health and safety, and

facilitating improved risk assessment were benefits identified by Annandale et al. (2004). A benefit that is commonly identified is increased structure and standardization in the way environmental issues are managed. Link and Naveh (2006) hypothesized that ensuring regular use of the ISO 14001 elements will lead to greater standardization in environmental management. The same authors also hypothesize that this increase in standardization will lead to improvements in environmental performance.

- Corporate Image and Stakeholder Interests - Corporate reputation and improved public perception seemed to be significant benefits for companies that engage in ISO 14001 (Zeng et al., 2005). According to Potoski and Prakash (2005), the most significant benefit of the ISO 14001 standard is the international recognition, or brand identity. A study of ISO 14001 implementation in the UK oil and gas sector revealed several benefits to registering to the standard. The primary benefits cited were “external recognition” and improved reputation. Among Canadian companies surveyed, 89% said that ISO 14001 registration improved their corporate image (Berthelot et al., 2003). Gallagher et al. (2005) cited improved stakeholder relations as a result of ISO 14001 implementation.
- Improved Compliance – Although some studies (Annandale et al., 2004; Strachan et al., 2003) of environmental management system implementers

have shown improved compliance, the opposite has also been shown. As a whole, non-compliance rates among ISO 14001 registered companies have been found to be lower than in those companies that have not registered to the standard (Potoski and Prakash, 2005).

- Market Access and Client Needs - Those companies that are more export focused, as opposed to focused on domestic markets, may see greater benefit in visible commitment to environmental protection (Nakamura et al., 2001), such as certification to the ISO 14001 standard. Research participants indicated that the registration allowed them to respond to the current demands of their clients (higher if going straight for ISO 14001). Interestingly, if a company didn't already have an EMS in place and decided to register for ISO 14001, one of the least significant benefits noted was an increased Canadian client base (Berthelot et al., 2003). Berthelot et al. (2003) identified a benefit for those companies that did not have an EMS in place prior to ISO 14001 registration: 64% of respondents cited ability to keep up with competition. Some researchers (Bellesi et al. 2005) found that certification to the ISO 14001 standard provides exporting companies with a “substantial competitive advantage”, although product quality and price are still the most influential factors in considering suppliers, at an international level.

- Cost Savings – Saving resources and waste reduction has been noted as a benefit (Zeng et al., 2005). Annandale et al.(2004), Berthelot et al. (2003) and Strachan et al (2003) all identify some type of internal cost savings as a benefit to environmental management system or ISO 14001 implementation. In a New Zealand study, ISO 14001 was shown to have fewer financial benefits than two other models studied (Hughey et al., 2005). Research into Thai and American experiences showed the least proportion of respondents (14%) stated improved financial and banking opportunities as a result of ISO 14001 implementation (Gallagher et al, 2005).

3.3.3 Success

A Review of the literature revealed that different authors and practitioners have different measures of success. As an example, Zutshi and Sohal (2004) define successful implementation of the ISO 14001 standard as “being faster in implementation, accompanied with fewer impediments (such as resistance from stakeholders) and with quantifiable and non-quantifiable benefits”. In most reviewed literature the definition of success surrounds environmental performance, meeting of objectives and targets or success as per specific elements of the ISO 14001 standard.

- Environmental Performance - Some research suggests that the effectiveness of a formal environmental management system standard such as ISO 14001 should be measured by the improvement in environmental performance that the EMS facilitates. A Canadian study of Quebec paper mills found that those plants that adopted the ISO standard

generally were polluting more than those plants that did not adopt the standard. The researchers do acknowledge that there may have been other contributing factors to this discrepancy. In the same study, it was found that over time those plants without ISO 14001 registration saw “more significant emission reductions” as compared to those plants that did have the ISO 14001 standard in place (Barla, 2007). This is consistent with the findings by Boiral (2007): The relevance, usefulness and effect on environmental performance of ISO 14001 EMSs were not consistently recognized by registered Canadian companies.

- Administration - Research has been done suggesting that the presence of an ISO 14001 registration in an organization is not an adequate indicator of environmental performance. In this particular case, the Manitoba park system researchers note “each aspect is defined by a management objective which is to be realized by meeting particular performance measures through EMS implementation” (Bronson and Noble, 2006). This would suggest that if objectives and targets were met, assuming they were based on appropriate environmental aspects, would result in improved environmental performance. These authors contend that “the real measure of EMS effectiveness is whether stated environmental objectives are being realized, performance measures are being met and the environmental aspects identified are the correct ones”. Neither a positive or negative direct correlation between environmental performance and the

presence of an EMS could be determined in this study (Bronson and Noble, 2006). In a case study of Thai and American companies, an evaluation of one company's EMS involved determining the degree to which objectives and targets had been met (Gallagher et al., 2005).

- Element Specific - In an investigation into the relationship between motivations for ISO 14001 implementation and perceptions of effectiveness, Fryxell et al. (2004) asked survey respondents about their perceived effectiveness of specific ISO 14001 elements and the associated guidelines / practices that should be in place to support those elements.

3.4 Motivations for Instituting an EMS

If motivations for EMS implementation are weak then the effectiveness of the EMS, as perceived by the company, may diminish over time (Hamschmidt and Dyllick, 2001). This stipulation may affect the outcome of an EMS focused on sustainability. A study by Fryxell et al. (2004) concluded that perceived effectiveness of an EMS is greater for those firms whose primary motivations for registration were internal, versus external. More specifically, positive impact of an environmental management system can be associated with both the motivation for implementation and corporate culture (Freimann and Walther, 2001). Keysar (2005) suggests that if a system is deemed to be ineffective, or if goals are not being met, the motivation for using the system is one of the things that should be re-visited. Table 4 summarizes the motivations detailed and referenced in the subsequent sections.

Table 4. Summary of Identified Motivations of ISO 14001 Implementation, as Presented in Section 3.4

Category of Motivation	Detailed Motivation
Internal	Improving environmental performance
	Increasing environmental risk management
	Enhancing capability of personnel
	Achieving cost reductions
	Personal beliefs of senior management
	Desire to demonstrate environmental leadership
	Presence of internal (excluding leadership) entrepreneur
External	Market demand
	Regulatory pressure
	Parent company mandate
	Enhanced public image
	Stakeholder demand
	Improved accountability

3.4.1 Internal Motivations

In a study by Fryxell et al. (2004), companies were surveyed to, among other objectives, determine motivations for implementation of the ISO 14001 standard. Of eight motivations, four internal motivations were ranked in order by the respondents: “improving environmental performance”, increasing environmental risk management capabilities”, “enhancing the capability of personnel”, and “achieving cost reductions”. In this study it was found that the internal motivations for seeking registration were slightly more important than the external motivations.

The personal beliefs and feelings of a leader can be a significant motivating factor. In a case study examining ISO 14001 implementation in a segment of the New York City Transit Authority, one of the primary motivations identified was the personal beliefs of the senior manager (Krut and Strycharz, 1999). Raines and Prakash (2005) found that the most significant motivation for ISO 14001 registration (respondents were

asked to rank from a list of nine motivating factors) was to demonstrate environmental leadership.

Companies in which executives felt a personal responsibility to ensure their firms were environmentally responsible were more likely to be the companies to engage in the highest levels of environmental commitment (Nakamura et al., 2001). Interestingly, the same study recognized that exceptionally deep environmental commitment by executives may be negatively correlated with high levels of corporate environmental commitment. A possible explanation provided was that those individuals deeply committed may view institutionalized environmental protection initiatives more as public relations demonstrations than true commitments to improvement (Nakamura et al., 2001).

Research by Raines and Prakash (2005) suggest that a significant driver in implementing voluntary environmental protection schemes (such as ISO 14001, for example) is the “corporate environmental entrepreneur” (CEE). In fact, of the companies surveyed in developed nations, 74% indicated that there were CEEs. This is a person that promotes an environmental initiative as a solution to any number of challenges a company is facing. These people may also identify specific factors that serve as direct motivators for initiatives such as ISO 14001 registration.

For companies that had an EMS in place prior to ISO 14001 registration, the second and third most significant motivations were to improve the existing EMS and to improve environmental performance, respectively. Another study concluded that a significant motivation was to identify areas for improvement within the company (Zutshi and Sohal, 2004). A motivation for registration to the ISO 14001 standard by companies in the New Zealand wine industry was to improve quality (Hughey et al., 2005). A study

of Chinese firms registered to ISO 14001 identified an important motivation: improvement of management (Zeng et al., 2005).

In a recent report by the National Round Table on the Environment and the Economy (NRTEE), they suggest that the ultimate objective of any company is to maintain its own viability. To that end they must ensure they have adequate access to all types of capital, including natural and social (NRTEE, 2007). Perhaps it is this strategic goal that serves as sufficient motivation for some companies to find and implement a tool to help them better manage their impacts with the environment.

3.4.2 External Motivations

Jiang and Bansal (2003) categorized drivers for implementing more sound environmental management into broad categories, two of which are “institutional pressures” and “market demand”. In this study, managers of Canadian pulp and paper companies indicated that market pressure was the most significant motivation regarding environmental management practices. A study of UK firms with ISO 14001 registration surmised that “international competition” is a motivating factor for corporate leadership in deciding to implement the standard (Chapple et al., 2001). A motivating factor for a company to implement the ISO 14001 standard may be the presence of that company in international and export markets. This is supported by Prakash and Potoski (2006) who hypothesized that ISO 14001 adoption rates would be higher in countries whose major trading partners have high rates of ISO 14001 adoption (Prakash and Potoski, 2006).

A frequently cited reason for facility level ISO 14001 registration is that the parent company (or other higher organizational level) mandated the registration. Darnall (2006) studied the motivations for those parent companies in mandating certification of

their facilities. She found the following related to external motivating factors: Firms that operate within a more stringent regulatory framework are more likely to mandate their operating units to register; firms that perceive high market pressure are more likely to mandate registration by their operating units; access to complementary resources is more likely to lead firms to mandate their operating units to register. This is supported by Jiang and Bansal's research of Canadian pulp and paper companies. They found that the geographic location of company's head office affected the environmental management initiatives taken (Jiang and Bansal, 2003). Raines and Prakash (2005) found that being driven by parent company and desire for more marketing potential were in the top three motivations for ISO 14001 registration.

In a study by Fryxell et al. (2004), four of eight motivations identified were external. Two of these were presented in the top three most important motivations. The four external motivators were: "ensuring regulatory compliance", "enhancing the firm's reputation", "responding to customer requests and expectations", "responding to pressure from stakeholder groups". This study found that the internal motivations for seeking registration were slightly more important than the external motivations (Fryxell et al., 2004). Conversely, in a study of Swiss companies, Hamschmidt and Dyllick (2001) found that external motivations are more important drivers than internal motivations. This same study also found that motivations related to economics are more significant than those related to environmental performance (Hamschmidt and Dyllick, 2001).

The visibility of a given task, independent of the visibility of the firms, to external stakeholders was found to be a significant driver in pursuing ISO 14001 registration. These same authors also discuss environmental impact opacity (the difficulty with which

external stakeholders can measure and articulate the firm's impact) in the context of ISO 14001. They found that firms with higher environmental impact opacity had a greater propensity to register for ISO 14001 (Jiang and Bansal, 2003).

In a study of the UK oil and gas sector, it was found that the prime motivation for registration to the ISO 14001 standard by oil and gas operators was that companies believed it would allow them to publicly demonstrate that they had an effective EMS in place. For service firms in the same industry the perception that registration was just the cost of doing business was revealed as the main motivating factor. Service firms were being influenced by the actions of the oil and gas operators surrounding registration (Strachan et al., 2003).

In a study of Canadian companies, external motivating factors identified included: legal compliance assurance, increased ability to predict regulatory changes, anticipation of market demands, pressure from customers and clients. (Yiridoe et al., 2003). Of the motivations studied, customer pressure was ranked the lowest by survey respondents. In fact 81% of the survey respondents claimed that their customers or clients did not require registration to the standard, yet they registered anyway. Interestingly, 63% of the survey respondents indicated that they require or recommend to their clients or customers that they register to the standard. This suggests that organizations provide more significant motivation for registration than do customers (Yiridoe et al., 2003).

Improved corporate image was the primary reason cited for adoption of the ISO 14001 standard by Australasian companies. Other significant motivations were to identify areas for improvement and to comply with regulatory obligations. The same research identified the least significant motivations for registration as employee pressure,

international trade barriers and supplier pressure (Zutshi and Sohal, 2004). When ISO 14001 certified companies in Canada were asked to rank their motivations for registration, the primary motivation identified was to improve corporate image. Competitive edge was noted as a fairly significant motivator. For research participants, those with and those without pre-existing EMSs, the least significant reasons surrounding improved financing and loan options (Berthelot et al., 2003). In most of the companies visited by the author of a Canadian study, motivation for ISO 14001 registration did not come from the traditional ‘environmental’ stakeholders (such as Non-Governmental Organizations, community members, First Nations, etc.) but from the corporate or head office (Boiral, 2007).

Motivations for registration to the ISO 14001 standard by companies in the New Zealand wine industry include the influence of other industry players, improved accountability, improved quality and potential access to international trade (Hughey et al., 2005). In a study of Chinese firms registered to ISO 14001 two of the identified important motivations were access to international markets and to satisfy customer requirements. None of the survey companies in this study identified government satisfaction as a motivating factor for registration (Zeng et al., 2005).

The perceptions of business leaders in Manitoba do not indicate that a prime motivation for EMS implementation is concern over the environment. In a 2006 survey commissioned by The Winnipeg Chamber of Commerce and Meyers Norris Penny 3% of leaders indicated that “weather/environment” is an immediate business challenge. 7% of the same surveyed group acknowledged that “economic changes/environment” would be a significant challenge for them in the coming decade (The Winnipeg Chamber of

Commerce and Meyers Norris Penny, 2006). The issue of climate is certainly external to the company and may have influence in decisions to register or not register for ISO 14001.

In a quarterly survey of the largest Canadian companies, commissioned Report on Business Television and The Globe and Mail, Report on Business, the Gandalf Group compiled data regarding the perceptions of business leaders towards the environment. 12% of the executives of the companies surveyed cited “environment/climate change” as the most important issue facing Canada. 8% of same executives ranked the environment as the most important issue facing Canadian business (The Gandalf Group, 2007).

3.5 Challenges Implementing ISO 14001

Challenges in implementation of ISO 14001 are explored here with the expectation that challenges identified in the traditional sphere of environmental management or ISO 14001 maintenance would be extended to a system re-focused on sustainability. The points noted in this section also help to articulate the ‘well-functioning’ system referred to in the introduction. Table 5 summarizes the challenges identified in implementing ISO 14001. The information in the table is expanded upon, and referenced, in the subsequent sections.

Table 5. Summary of Identified Challenges in ISO 14001 Implementation or Use, as Presented in Section 3.5

Category of Challenge	Detailed Challenge
Administrative & Organizational	Time
	Documentation
	Integration with other systems and processes.
	Maintenance
	Organizational structure and responsibility
	Cost
	Mistaken focus on administration of the system, versus environmental improvements
	Over-emphasis on regulatory compliance
Cultural	Corporate culture
	Employee buy-in and motivation
	Management involvement and support
	Communication
	Audit-ready culture
	Contractor and supplier buy-in
	Adherence to intent of management system standard
	Motivation for registration
	Exclusion of indirect environmental impacts
Technical	Articulation value of the standard with respect to environmental performances
	Knowledge of ISO 14001 standard and management systems
	Concept of ‘environmental aspects’
	Finding opportunities for continual improvement
	Inadequate objectives
	Inadequate management review
	Inadequate audit strategy
	Knowledge of the natural environment and ecosystem function
	Inadequate change management strategies

3.5.1 Administrative & Organizational Challenges

There are common citations in the literature regarding administrative challenges. Time and documentation requirements are frequently cited challenges related to the administration and maintenance of ISO 14001 systems (Hughey et al., 2005; Matouq, 2000; Strachan et al., 2003; Zushi and Sohal, 2004). Integration with other business systems and process is also identified as challenging (Balzarova et al., 2005; Hughey et al., 2005) and in some instances integration is identified as a key to ensuring the EMS is supporting avoided or mitigated environmental impact (Hamschmidt and Dyllick, 2001).

Issues surrounding maintenance and long-term viability of an ISO 14001 environmental management system have been identified. Some research revealed that if a company is overly focused on initial implementation of the standard and not on the long term improvement and maintenance, implementation may not be successful. Also, designation of a specific person to administer the system over the long term is difficult (Balzarova et al., 2005). Matouq (2000) found that identifying the appropriate structure and responsibility is challenging to implementers.

In a survey of 133 ISO 14001 registered companies in 16 countries, Raines and Prakash (2005) found that 66% of companies did not conduct a cost-benefit analysis of ISO 14001 implementation. 22% did conduct such an analysis. One third of those companies that did go through a cost benefit analysis found that implementation of the standard would not be cost-effective but chose to register, regardless. This suggests that cost may not be a significant challenge for companies to overcome, with respect to making the decision to register or going through the implementation process. This is supported by Yiridoe et al. (2003) who found that 95% of ISO 14001 registered Canadian

companies surveyed reported cost of implementation to be “not important” or “somewhat important”. On the other hand, Matouq (2000) and Zushi and Sohal (2004) did indicate that cost was a challenge for some companies.

Ghisellini and Thurston (2005) hypothesize that the environmental performance of a company can be negatively affected by cognitive biases that stem from the ISO 14001 implementation process. More specifically, six “decision traps” were identified that can hinder the environmental performance. Several of these can be considered administrative in nature: focusing on the management and improvement of the system versus management and improvement of environmental performance; over emphasis on short-term goals; over emphasis on regulatory compliance; over emphasis on documentation. Annandale et al. (2004) found that although many survey respondents identified improvements in environmental performance in the early stages of EMS implementation, the improvements were “difficult to maintain over the longer term”.

Studies have identified external forces that can influence environmental performance. Some of these authors identify the forces separately from an environmental management system (Annandale et al., 2004). Some of those factors identified by Annandale et al., (2004) include:

- Parent company and/or Board of Directors
- Client and/or markets
- Corporate culture
- Regulations and other government obligations
- Cost savings
- Public perception

- Workforce
- Changes in technology
- Corporate environmental reports
- Monitoring and measurement tools

3.5.2 Cultural Challenges

In case-study research conducted by Balzarova et al. (2005) in the United Kingdom a barrier to ISO 14001 success identified was corporate culture. Krut and Strycharz (1999) echo this in their study of the New York City Transit Authority. Some of the more specific cultural challenges include: gaining employee buy in (Balzarova et al., 2005; Berthelot et al., 2003; Hughey et al., 2005) lack of management involvement (Balzarova et al., 2005; Berthelot et al., 2003) and support (Balzarova et al., 2005; Giles, 2005); communication and promotion of the EMS (Balzarova et al., 2005; Strachan et al., 2003). As well, promoting a culture accepting and understanding of the audit process and results and using the EMS as a framework for strategic planning were identified as important factors in realizing the environmental performance value of an EMS (Hamschmidt and Dyllick, 2001). Other challenges identified were communication of environmental issues to contractors, employee resistance to change, resistance from suppliers (Zushi and Sohal, 2004).

Research into the implementation of a similar standard, the ISO 9000 quality management system standard, revealed two of the top three challenges to be: “changing the department’s traditional politics and procedures” and “motivating personnel”. It is

interesting to note that in this study, despite challenges identified, there was no link drawn between challenges experienced and overall satisfaction with the ISO 9000 standard (Calisir et al., 2001). A challenge identified as impeding the realization of the value of the ISO 14001 management system, and therefore improvements in environmental performance, is that some companies do not adhere to the intent and principles of the standard once implemented (Boiral, 2007). Although the study did not speculate on specific reasons for this, the author did elude to some elements that could be focused on for improvement: employee involvement, employee and management perception of the system, lack of citable examples of improvements in environmental performance as a result of registration, awareness of the ISO 14001 standard and motivation for registration (Boiral, 2007). It should be noted that this study was considering ISO 14001 registration of an existing and functioning environmental management system. All environmental management system components must be used within the context of the existing corporate culture (Freimann & Walther, 2001).

Exclusion of indirect environmental impacts can pose a challenge in implementation or improvement of an environmental management system (Emilsson & Hjelm, 2007). An indirect environmental impact can be understood as the influencing of inputs or considerations of another group and how they may interact with the environment (Emilsson & Hjelm, 2007). The authors stipulate the most significant element hindering integration of indirect environmental impacts is an immature environmental management system. A mature system will showcase higher levels of environmental knowledge; higher levels of engagement which will be brought about by

increased interaction and communication; and a corporate focus on the longevity and significance of environmental work (Emilsson & Hjelm, 2007).

3.5.3 Technical Challenges

Some of the technical challenges experienced relate directly to the ISO 14001 standard. In a study of the New York City Transit Authority, technical ISO 14001 implementation challenges observed included articulating the value of the standard from the perspective of environmental performance (Krut and Strycharz, 1999). These same implementers initially struggled with the way they thought the standard should be implemented and organized, versus how they actually did their job. In a study of the UK oil sector, Strachan et al. (2003) observed difficulties with the standard itself. Also, the research participants were challenged with the concept of environmental ‘aspects’, training and finding opportunities for continual improvement. Balzarova et al. (2005) has identified inadequate objectives and targets, lack of regular management reviews, and an audit system that doesn’t fulfill the requirements as challenges that must be overcome.

Having appropriate knowledge from which to develop the initial baseline from which environmental data are collected and decisions made can be difficult for companies or individuals (Ghisellini and Thurston, 2005; Hughey et al., 2005). Delivering the appropriate knowledge to employees is also difficult (Balzarova et al., 2005; Berthelot et al., 2003; Matouq, 2000). The subjects of a study by Calisir et al. (2001) found using the requisite statistical tools to be difficult.

In a study of Chinese firms implementing the ISO 14001 standard, Matouq (2000) identified several technical challenges experienced by the companies being studied: correlating objectives and targets with legal requirements, new technology

implementation and process modification, procedures for monitoring and measurement, reviewing the firms environmental impacts, auditing, communication of EMS requirements, management system review and defining the environmental policy.

Indirect impacts can be difficult to manage. This may be due to a lack of understanding of the impact resulting from a decision or plan, the working definition of what constitutes an indirect impact (Emilsson & Hjelm, 2007).

3.6 Summary: ISO 14001 and EMS Points to Note

Environmental management can be thought of as the process of handling issues in such a manner as to minimize or eliminate negative effects on the environment. The ISO 14001 environmental management system standard brings this systemized approach to life by using a Plan-Do-Check-Act approach to environmental impact prediction and mitigation. As identified in Table 2, each component of the standard is made up of discrete elements. The ISO 14001 standard is voluntary and is intended for use by organizations of any size or function.

Understanding overall satisfaction, and how that satisfaction can be defined, with an existing EMS is an important step in determining the best ways to adjust an existing EMS to move towards sustainability. Upon reviewing the existing literature, satisfaction can be assessed through met expectations, realized benefits and perceived success. The same significance should be assigned to understanding the motivations for use of an environmental management system. Motivations, according to the literature, can best be divided into internal and external. Internal motivations tend to lead to greater realized satisfaction. Challenges in implementing ISO 14001 are reviewed to determine those

areas that may require special attention when modifying an existing system. Challenges identified through the literature can be grouped by administrative and organizational, cultural, technical and external.

4 The Link Between Corporate Sustainability and EMS

4.1 The Relationship Between Sustainability and Corporations

The benefits of integrating sustainability into corporate operations have been identified as cost avoidance, reduced cost, risk mitigation, partnership and investment opportunities, improved relations with stakeholders, attract and retain employees and maintenance of the critical ‘social license to operation’ (Environment Canada, 2010). Despite these identified benefits, Elefsiniotis and Wareham (2005) recognized the limited study on the link between the ISO 14001 series and sustainability. These same authors, however, did stipulate that the affirmation of a corporation to subscribe to a voluntary environmental standard, such as ISO 14001, is in keeping with the essence of sustainability (Elefsiniotis & Wareham, 2005).

It has been suggested that corporations are a “major source” of global unsustainability and that because of this cause-effect relationship, focusing on improvement of corporate sustainability efforts is a logical starting point in the movement towards broader sustainability (Gray and Bebbington, 2007). The culturally acceptable way to be successful in capitalist economies is at odds with the laws of nature (Hawken, 1993).

Instead, if companies made individual efforts, within their existing, useful structures, towards sustainability the collective unsustainability may be diminished. According to author Paul Hawken, “business has three basic issues to face: what it takes, what it makes and what it wastes” (Hawken, 1993). Three solutions are proposed to address these issues, all of which result in business emulating nature. First, value should

be assigned to waste. Second, a company should operate with reliance on solar energy to whatever extent possible. Third, diversity of product, service and operations should be fostered, in both time and space (Hawken, 1993).

In an analysis of the United Nations Global Compact, Neace (2005) identified “the new paradigm of competition” – one of transparency, collaboration and interconnectedness among and between all organizations (Neace, 2005). Businesses are in a position to support the movement towards sustainability, by operating within the ten principles introduced through the UN Global Compact, because they have many of the tools needed for development of creative solutions to sustainability issues. These tools include the knowledge of specific technical and process problems, skills for resolution of same, and understanding of risk assessment and mitigation and the ability to devise mutually beneficial solutions (Neace, 2005). The marrying of bodies of knowledge in business and ecological sciences would support this as well (Hawken, 1993). However, Neace (2005) acknowledges that the greatest challenges in successful implementation of needed initiatives, culture shifts, etc. include, among other things, corporate incompetency and lack of will on the part of leadership (Neace, 2005). ”The United Nations Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption”. The principles cover human rights, labour, environment and anti-corruption (United Nations Global Compact, 2011). The significant link, then, between the business-as-usual activities of corporations and the impact on or promotion of sustainability is strongly implied.

Through the Millennium Ecosystem Assessment 2 (2005) potential scenarios were assessed to determine the state of ecosystems and human wellbeing in 2050. All provide insight into possible ecosystem status, regional and global governance success and challenges, solution development and private sector requirements (Millennium Ecosystem Assessment 2, 2005). Regardless of the scenario, or combination of scenarios, that comes to fruition, the private sector will be witness to changes in several areas that require address: extent of stakeholder expectations and engagement; availability and quality of ecosystem services; internalization of impact; valuation of ecosystem services; trading partners and terms; regional and international conflict; worker health and availability; social licence to operate; investment potential (Millennium Ecosystem Assessment 2, 2005). A corporate management system, based on planning and feedback, should allow for business adaptation to these types of changes. Corporations are more likely to succeed if strategic planning includes use of information about ecosystem and ecosystem service status and sensitivities (Hawken, 1993; Keysar, 2005; Millennium Ecosystem Assessment 3, 2005).

Most environmental impact and management tools have historically been used for a single purpose or event. Many of these same tools are now being adapted for use to address broader sustainability issues. Specifically, it has been concluded by some authors that sustainability can be addressed by modifying and adapting EMS tools (Nattrass and Altomare, 1999; Van der Vorst et al., 1999). A possible use for an EMS, and in particular an EMS that is registered to the ISO 14001, as it relates to sustainability and sustainable development, is as a tool for setting and achieving goals supporting sustainability (Nattrass and Altomare, 1999). The EMS has been included by some

authors as a critical component of the industrial migration path to sustainability. Figure 1 illustrates this context (Nattrass and Altomare, 1999, as adapted from Beloff, 1998; Frankel, 1998; and Richards and Frosch, 1997).

Figure 1. Industry's Sustainability Learning Curve, as adapted with permission from Nattrass and Altomare (1999)

Industry's Sustainability Learning Curve					
		1 st Era Compliance	2 nd Era Beyond Compliance	3 rd Era Eco- Efficiency	4 th Era Sustainable Development
					Design for Sustainability
					Integrated Management Systems
					Environmental Cost Accounting
					Product Stewardship/DFE/LCA*
					TQEM / Environmental Management Systems
					Stakeholder Participation
					Pollution Prevention / Waste Minimization
					Pollution Control / Compliance
Corporate Response	Before 1970s Unprepared	1970s Reactive	1980s Anticipatory	1990s Proactive	2000s High Integration
Industry Goals	None	Regulatory standards	Cost Avoidance	Profit Centre Approach	Explicit mainstreaming of environmental goals

* DFE - Design for Environment; LCA - Life Cycle Analysis; TQEM - Total Quality Environmental Management

One author has drawn more specific links between sustainability and EMS By identifying the ISO 14001 EMS as a potential vehicle for moving a corporation closer to sustainability, with the guidance of specific system conditions of sustainability as adapted from The Natural Step (MacDonald, 2005). The author stipulates that while merely substituting “sustainability” for “environmental” when implementing or improving a management system is conceptually sound, without the additional support of tangible goals managers will not have success in using an EMS framework as a vehicle to move towards sustainability (MacDonald, 2005). There may be specific elements within the

ISO 14001 standard that better support integration of a sustainability component. Likewise, there are various points to be considered (fostered and avoided) during implementation and maintenance of an EMS that will help or hinder a corporations' movement towards sustainability. The system conditions outlined in The Natural Step, as will described in Section 4.2 provides something somewhat tangible and performance related to aim the environmental management system towards.

In a study of four UK companies in the precast concrete industry about how leaders were “managing for sustainability”, it was found that all companies had an ISO 14001 EMS in place (Holton et al., 2010). The systems had initially been put in place and used with a compliance focus. By using the existing systems to foster continual improvement, these companies had taken incremental steps toward managing for sustainability (Holton et al, 2010). By expanding the scope of their EMS to broader sustainability, the companies were better able to manage related issues within their companies.

4.2 The Natural Step

4.2.1 Introduction

One of the significant difficulties with planning for sustainability is understanding what sustainability looks like. More specifically, one must envision what sustainability looks like for the corporation. Among the variables that must be considered when articulating such a vision two are of particular importance that must be addressed at the beginning of the planning stage: the first is directly related to “what does a sustainable society look like”. Without this understanding the corporation does not have context for

forming an operational vision for sustainability. As pointed out by Keysar (2005), one of the weaknesses of the ISO 14001 standard is that it does not provide end-points or specific objectives to works towards for sustainability. The second question is related to control. While knowing what to aim for the corporation must be realistic in what it can control. It should be qualified that what a corporation is capable of controlling now may be a very simple version of what it is capable of controlling in the future, given the right leadership and circumstances. Both of these points can be addressed by considering The Natural Step. The considerations provided should also be considerations in maximizing the value of an environmental management system in contributing to sustainability. Although there are many inputs and outputs to consider in environmental management system, the points of consideration, and in particular the system conditions, provided by The Natural Step can be directly associated with the ISO 14001 environmental management system standard.

The physician Dr. Karl-Henrik Robèrt created The Natural Step framework to provide an easily understandable, naturally derived definition of sustainability (Nattrass & Altomare, 1999). The definition is an answer to the question ‘what does sustainability look like?’. The Natural Step (TNS) promotes and details the “evolutionary corporation” (Nattrass & Altomare, 1999). This is a corporation that works with the natural systems and the world as a whole as it progresses. It is a company that goes beyond merely predicting and reacting to certain changes in the natural environment and “consciously integrates its vision and operations with the natural cycles and process” (Nattrass & Altomare, 1999). In outlining The Natural Step Nattrass and Altomare have identified

that progressive companies, those that work with the laws of nature, are realizing greater success than those companies who do not (Nattrass & Altomare, 1999).

For business to move towards sustainability the natural environment must somehow be integrated into a corporation's vision and strategy. TNS framework suggests that there are four main processes that a company can undertake to allow for an optimal level of integration. The first step is for the leadership of the company to accept that the current social and business practices are unsustainable, and to make the commitment to move towards more sustainable practices. The second step is for business leaders to understand what is required for society and the organization within that society to be sustainable, or the system conditions. The third step is for the corporation to identify the sustainable future that the organization wishes to be a part of. It requires a company to look ahead within the constraints of current practices and norms to envision what is best. TNS framework identifies this process as back-casting. The fourth step is to identify strategies that will move the company towards the vision articulated in the third step ((Nattrass & Altomare, 1999)).

4.2.2 System Conditions

An environmental management system (EMS) can be a vehicle for moving towards sustainability (Hawken, 1993; Nattrass & Altomare, 1999). It can very easily be used in combination with a framework such as that provided through The Natural Step. Of particular importance are the system conditions identified through TNS. These system conditions can serve as the basis for the formation of objectives and targets, which are integral to the functioning and success of environmental management

practices. The system conditions are detailed more here, while the link between the system conditions and an EMS will be considered elsewhere in the paper.

Nattrass and Altomare (1999), provide a brief explanation of the significance of system conditions, or first order principles for sustainability. Referred to are the base criteria to which every other element of the system must consider. The authors go on to suggest that all other details of a system must be able to be aligned with one or more of those principles (system conditions).

The four system conditions provided by The Natural Step are detailed as follows (Nattrass & Altomare, 1999) :

“In the sustainable society, nature is not subject to systematically increasing (1) concentrations of substances extracted from the earth’s crust; (2) concentrations of substances produced by society; or (3) degradation by physical means. And in that society (4) human needs are met worldwide.”

These system conditions are detailed in this thesis because of the potential to use these conditions when setting objectives for improvements, which is a critical element of the ISO 14001 environmental management system (CSA ,2004). It is also one of the most challenging for companies because, as the ISO 14001 standard is process based and not output based, there are no absolute or relative guidelines for setting targets. In the absence of the required knowledge to set targets based on the needs of sustainability, more concrete end-points (or first order principles) must be provided to those that are implementing or improving their system. Using system conditions provides something

somewhat tangible and performance related to aim the environmental management system towards (Nattrass & Altomare, 1999).

4.2.2.1 First System Condition: Nature is not subject to systematically increasing concentrations of substances extracted from the Earth's crust.

This principle primarily addresses the buildup of naturally derived substances in the whole or in part of the ecosphere. It means that the flow of materials removed from the Earth's crust must not be greater than the flow of materials returned to the Earth's crust. Natural material movement within the ecosphere must not result in concentration of any one product. As an example, mining and eventual concentration of the mined product in wasted consumer goods would be bound by this condition. The risk of not fulfilling this system condition is that products will concentrate in the ecosphere at levels that become harmful and that which reversing any damage is not possible. High level controls associated with this system condition include the volume of product extracted, substitution with less rare resources, and the capability to return extracted volumes to a form that is re-useable (Nattrass & Altomare, 1999).

4.2.2.2 Second System Condition: Nature is not subject to systematically increasing concentrations of substances produced by society.

This first order principle addresses the manufacture, use and eventual waste of anthropogenic substances (example: polyvinyl chloride). The condition implies that only that quantity and type of human made substance that can be broken down and incorporated into natural cycles may be used. Similar to System Condition 1, flows of these substances must not result in the concentration of the substance at a level greater than what can be naturally handled in the whole or any part of the ecosphere. The risk of not fulfilling this system condition is that products will concentrate in the ecosphere at

levels that become harmful and that which reversing any damage is not possible. High level controls associated with this system condition include the type and quantity of material produced, substituting more innocuous products for more toxic or persistent products and the capability to extend the use of the product through re-use or recycling (Nattrass & Altomare, 1999).

4.2.2.3 Third System Condition: Nature is not subject to systematically increasing degradation by physical means.

This system condition is primarily concerned with the exploitation of natural flows and commodities beyond what can be naturally mended. It incorporates the maintenance of productivity of natural cycles and products, as well as the maintenance of biodiversity (Nattrass & Altomare, 1999). The risk of not fulfilling this system condition is that the ecosystem services upon which humanity depends will lose their capacity to provide. High level controls associated with this system condition would include consideration of the types of ecosystem goods and services used, substituting low impact activities for high impact activities, as well as consideration of how goods and services are used (Nattrass & Altomare, 1999).

4.2.2.4 Fourth System Condition: In society human needs are met worldwide.

This system condition is dependent on the previous three system conditions. It suggests that without protecting the natural resources base human needs cannot be met. It infers human needs worldwide can only be met while ensuring the System Conditions one through three are adhered to. Therefore, this system condition is relative and is not provided in absolute terms. If this system condition is not met then it will be difficult to meet the other three system conditions. Controls associated with this system condition

include levels of efficiency and fairness with which resources are used and dispersed (Nattrass & Altomare, 1999). The previous three system conditions are based on science, while this fourth system condition is based not just on science but on the collective moral compass. This can be demonstrated by the focus of the system condition on both equity of dispensation and efficiency of use (Nattrass & Altomare, 1999).

4.2.3 Considerations for Incorporation of System Conditions into an Environmental Management System

It should be noted by the reader that even with a clearly articulated vision of sustainability all other elements of an environmental management system must be robust to carry the corporation towards the vision. Robèrt et al. (2002), discuss the five levels of planning for sustainability within the context of using tools such as environmental management systems. The link between the EMS and sustainability is as follows: the EMS is used as a vehicle to establish a plan to reach the sustainable state identified when applying the five levels of planning. (Robèrt et al., 2002). This link is further established in The Natural Step.

As Nattrass and Altomare suggest, The Natural Step framework is most effective, and the system conditions most likely to be realized, when used in conjunction with a tool such as an environmental management system (Nattrass & Altomare, 1999). The authors identified significant points of consideration when using such tools to further sustainability, within the framework of The Natural Step. The points are as follows (Nattrass & Altomare, 1999):

- i. A cultural change is likely required to sincerely move towards sustainability. Such a change is best accomplished if viewed positively.

- ii. Support, and action demonstrating that support, from top leadership will support the changes necessary to move towards sustainability.
- iii. The move towards sustainability will likely include some mistakes. Only a learning organization will make use of those mistakes so as to move as quickly and effectively towards the goal.
- iv. Corporate vision must be aligned with the vision of employees that make up the corporation.
- v. Sustainability must mean the same thing to the people within the corporation. This shared understanding is necessary for promoting change.
- vi. It is important to have measurement that will feed information back on a variety of topics. Measurement is necessary at all levels of the corporation.
- vii. All stakeholders should be aware of how their relationship with the company is related to sustainability.
- viii. The individual steps taken to make the shift to corporate sustainability must be done in consideration of financial and operational viability.
- ix. The system conditions are best employed using tools such as environmental management systems.

Point ix of the preceding list is addressed through the premise of this thesis. It seeks to find ways to modify and/or use existing environmental management systems (based on the ISO 14001 standard) to move towards sustainability.

5 ENVIRONMENTAL MANAGEMENT SYSTEMS AS A VEHICLE FOR SUSTAINABILITY

5.1 Introduction

It is difficult to begin quantifying the problems associated with overall unsustainability within corporations and the impact on global, or even national, sustainability. By observation, it is apparent that many companies are behaving unsustainably and hindering any broader efforts. This author assumes, perhaps naively, that if companies and their leaders are provided with more insight into how *unsustainability* might be avoided, and how sustainability may be incorporated into operations, such would be the case.

There is potential to use the ISO 14001 standard as a way to operationalize the sometimes operationally abstract notion of sustainability (Elefsiniotis & Wareham, 2005). As the discipline and use of environmental management system tools has matured, several implications have been identified. These include a reevaluation of the boundaries of traditional environmental management, aligning environmental management strategy and improvements with the general corporate strategy and building complementary relationships between different environmental management system tools (Van der Vorst, 1999). These points, in addition to the considerations of satisfaction, the motivations and the challenges associated with ISO 14001 and EMS implementation identified in Chapter 4, present specific pieces of an existing system that can be adjusted to reflect a greater focus on sustainability. The literature introduced in the subsequent sections of this chapter identify such system pieces, but also provide insight into the value of using an existing environmental management system as a sustainability tool.

5.2 Strategic Context

For a corporation to strive for, and ultimately reach, sustainability within the society they operate, a management system is virtually imperative (Robèrt, Schmidt-Bleet et al., 2002). While the management system, in this case based on the ISO 14001 environmental management system, can be considered a tool for achievement of goals it is only the last of five critical steps necessary for sustainable development, as per Robèrt, Schmidt-Bleet et al., (2002). The authors identify five levels of strategic planning as follows:

1. *Principles for the constitution of the system:* This level represents the system that is being focused on. For the purposes of this study, and as per the authors' assertions, this level represents the ecosphere.
2. *Principles for a favorable outcome of planning within the system:* This level stipulates the goal for the system in question. In this case, sustainability for the ecosphere. This can be further broken down into the four System Conditions necessary for sustainability, as noted in Section 4.2 of this thesis. Each of the System Conditions, once transformed into specific corporate objectives, can be further broken down into two mechanisms: dematerialization and substitution.
3. *Principles for the process to reach this outcome:* At this level, principles are those that will be adhered to while striving to maintain the earlier stated principles. In the case of sustainability, the following principles should be adhered to, to reach a favorable outcome: backcasting, ensuring each investment is a useful tool towards sustainable development, good

return on investment, precautionary principle, dialogue and encouragement with stakeholders, transparency.

4. *Actions that comply with the principles for the process to reach a favorable outcome in the system:* At this level the principles of level 3 are applied in taking specific actions to achieve the outcomes desired, as per level 2. Key to success at this stage is to try implementing actions that comply with all of the system conditions (ie: to be avoided is compliance with one system condition at the violation of another).
5. *Tools to monitor and audit the suitability of the actions in achievement of the principles and the status of the system:* At this level a systemized approach to planning and implementation is utilized, such as an environmental management system. Within that system a corporation would monitor the progress towards their stated objectives, while ensuring that the stated objectives contribute to sustainability. Also at this level, the impacts to the system (level 1 – ecosphere) must be monitored to ensure that the stated objectives contribute to sustainability (level 2 – sustainability for the ecosphere). For the tools used at this level to be effective, the users must be aware of the principles laid out in the first four levels (Robèrt, Schmidt-Bleet et al., 2002).

5.3 Considerations for Successful Use of an EMS to Move Towards Sustainability

Link and Naveh (2006) sought to validate several hypotheses relating standardization of practices, as per the ISO 14001 standard, employee / management discretion and environmental performance. The authors found that greater

standardization in managing environmental issues lead to greater environmental performance. The authors also found that greater standardization leads to greater employee discretion in managing issues, and that increased discretion by management yields greater environmental performance (Link and Naveh, 2006). When considering factors necessary for success, the level of standardized operational practices and management discretion should be considered. Price (2005) echoes these findings and suggests that for success in moving an entity towards sustainability, environmental considerations have to be standard practice in all operations.

Price (2005) provides several factors that can be considered essential for realizing maximum benefit from an ISO 14001 environmental management system:

- Demonstrated senior management commitment, including allocation of appropriate resources.
- Utilizing external service providers where internal gaps in knowledge or human resources were identified.
- Consideration of the audience and their level of knowledge, interest and required future engagement. This is also noted by Emilsson & Hjelm (2007).
- Awareness by all employees of the potential of the system to be used in continually improving environmental performance, and the motivation by the employees to use such a system.
- Providing feedback to all employees on environmental and system performance, as they relate to employee actions.

- An initial working / steering group that hold similar views with regard to the need for environmental considerations and the potential of a systemized approach in integrating those considerations.
- Employing external responsibility for identifying legal requirements and keeping such an inventory up to date.
- Realizing and communicating that not all benefits and aspects (environmental interactions) are quantifiable.
- Dedicated, enthusiastic environmental personnel whose responsibility is to keep maintain and coordinate improvement of the EMS.
- Personnel identified from the various areas as having been identified as having an environmental impact and having those personnel function as internal liaisons (Price, 2005).

Emilsson & Hjelm (2007) suggest that the maturity of an environmental management system will influence the ability for integration and consideration of indirect environmental impacts. The authors contend that without due consideration, the use of the ISO 14001 environmental management system standard as a tool to move towards sustainability may not be realized to its full potential (Emilsson & Hjelm, 2007). Such consideration will require the identification of indirect impacts and measurement of same. Should the indirect environmental impacts not be mitigated, action will be required (Emilsson & Hjelm, 2007). Action to minimize indirect impacts will be most successful if corporate groups are encouraged to work with the impacts that are of most significance to them. Other specific factors noted by the authors as being crucial for successful

integration of indirect environmental impacts are system maturation, engagement, pride and best practices (Emilsson & Hjelm, 2007).

5.3.1 Vision and Intent

5.3.1.1 Corporate and Sustainability Vision

The leader that can effectively communicate a clear vision of sustainability and how the corporation fits into that is more likely to foster the organizational learning necessary for a shift in focus to sustainability (Molnar and Mulvihill, 2002; Nattrass and Altomare, 1999). Corporate leaders must communicate “common goals based on sustainability principles “to bolster employee engagement (Keysar, 2005). Senior management values, which can be considered to be reflective of organizational values, with respect to environmental stewardship and responsibility can be indicators of successful implementation of EMS (Hanson et al., 2004). The significance of this is that if the values of senior leadership are not in line with that required for realizing sustainability, the effectiveness of an EMS in enabling that realization will be compromised.

5.3.1.2 Policy

Four points by which an environmental policy may be measured as effective (as opposed to overall system effectiveness, which is touched on in Chapter 4) are: achievability; accessibility by interested parties; internally communicated; appropriate to scale and type of operations (Fryxell et al., 2004). Policy review is also an opportune time to consider establishment of an overall sustainability policy, in lieu of a strictly

environmental policy. One author recommends the development of this policy take place after there is an understanding of baseline energy and material flows and an understanding of how it will avoid violating the system conditions while still adding value to the customer (MacDonald, 2005).

5.3.1.3 Motivation

Fryxell et al. (2004) hypothesize that the effectiveness of an environmental management system will be influenced by the motivations for implementation of the systems. The authors found that for those corporations that had internally driven motivations for implementation of an EMS, such as a desire to improve environmental performance or increase the capability of the work force, resulted in increased perceived effectiveness of the EMS. In general, the stronger the motivations the more favorable the environmental management system is perceived (Fryxell et al., 2004). The motivations for implementation will also reflect the corporate culture, which will be indicative of the success of and value realized from the system (Freimann & Walther, 2001). This would affect the capacity of an implemented environmental management system to support integration of sustainability. An EMS implemented under duress, or with weak, externally driven motivations, may not be as useful a tool for realizing sustainability as the EMS that is highly valued and improved because of internally driven motivations. If one presumes that the corporate decision to move towards a more sustainable operation is an internally driven one, then any modifications made to an existing EMS to achieve such ends are more likely to be effective.

5.3.2 Corporate Culture

5.3.2.1 Organizational Culture and Environmental Performance

Corporate culture, for better or for worse, must absolutely be considered and in some cases adjusted to ensure the effective use of an environmental management system (Balzarova et al., 2006; Emilsson & Hjelm, 2007; Van der Vorst, 1999). This is particularly true for those companies that have historically been primarily or only profit driven and view all things ‘green’ or environmental as an externality that must simply be ‘dealt’ with (Halme, 1997). From this position, the leader that wishes to move towards improved environmental performance must have a learning organization that can adapt to changing conditions and information (Balzarova et al., 2006; Dodge, 1997; Freimann & Walther, 2001; Molnar and Mulvihill, 2002;). Two key elements in securing cultural change are top management commitment (that is demonstrated by action) and employee capacity and sense of ownership of the change (Halme, 1997).

The change needed can come through top-down, bottom-up or middle-up-down drivers. Regardless, the style and capability of the leader will be instrumental in allowing the change to happen in a way that is most suited to the company at the time (Halme, 1997). Authors have identified that the change that happens slowly and incrementally may be more successful (Molnar and Mulvihill, 2002). If the values of the employer are shared with those of the employees, the latter will have a greater sense of job satisfaction (Dodge, 1997). This has positive implications for the promulgation of environmental improvements through appropriate behavior.

In Goel’s (2009) proposed core values for sustainable development are “learning excellence” and “process performance excellence”. As a corporation promotes these

values within, it will promote continuous learning by the individual employees and by the organization as a whole. By promoting a culture of learning, the people that make up the company will be more open to any new system requirements needed to achieve sustainability, as well as the need for sustainable development. This type of learning can be enabled by having strong process management. This will allow for harmonized system improvement and individual learning, which lends to greater likelihood for uptake and innovation (Freimann & Walther, 2001; Goel, 2009;). As promoted by Freimann & Walther (2001), for true protection of the environment, and by extension, honest movement to sustainability, every member of a company must be involved. The need for promotion of the learning organization is also recognized by Neace (2005). The author argues that to effectively operationalize sustainability principles and policies, leadership must endorse and enable networking, both internal and external, such that information and learning can be shared, and such that feedback can be sought and utilized. This type of networking should be done both vertically and horizontally within industry sectors (Neace, 2005).

Balzarova et al. (2006) considered the impact of organizational culture on the success of ISO 14001 implementation as part of a case study of two different organizations. In one of the cases studied the authors found that the organization was able to achieve ISO 14001 registration but unable to maintain it (Balzarova et al., 2006). The four categories of contributing factors identified at the company in question were: 1) limited focus on registration to the standard and not ongoing maintenance and value; 2) lack of management support; 3) inefficient audit system; 4) lack of employee involvement (Balzarova et al., 2006). In the second case of the same study the authors

observed a company, through experience with implementation of ISO 9000, that focused on integrating environmental management into existing process and structures; garnering support from all employees at all organizational levels and communicating progress and goals (Balzarova et al., 2006).

5.3.2.2 Organizational Culture and the Role of the Leader

According to Nattrass and Altomare (1999), “leadership is the cornerstone of any major change initiative” More specifically, demonstrated support from top management is critical for success of an EMS (Daily and Huang, 2001). As implementation of a corporate management system can be considered a major change initiative, leadership capability is critical in ensuring continually improving environmental performance. From the perspective of promotion and implementation of environmental initiatives, of which development of an environmental management system would be considered, leadership can come from several areas within the company (Nattrass and Altomare, 2002). Most commonly cited are from the CEO / C-Suite organizational level, but also through a Corporate Environmental Entrepreneur (CEE) (Raines and Prakash, 2005).

For the necessary cultural change to occur certain conditions must be met, including the willingness and ability of the employees to respond as needed (Halme, 1997). A significant role of the leader of the organization is to enable a suitable level of readiness in her or his employees to allow the change to occur. The leader’s style is not only critical in answering ‘Can we make the change?’, but also in answering ‘How fast can we make the change?’ (Dodge, 1997). The leader must remove barriers that would otherwise prevent a wanted or needed change from occurring (Halme, 1997).

A leader has to be able to, in some cases, act “upon weak signals” (Halme, 1997) that suggest a change in culture or business direction is required, but which change is in contrast to the existing corporate beliefs and practices (Halme, 1997). In the presence of any type of change, leaders may be required to respond to the natural reactions of employees: in response to uncertainty about the needed change people may step back and wait for signals or demonstration from leadership (Halme, 1997). Regardless of the level of uncertainty, a leader must be able to secure the cooperation of the employees and coordinate actions (Dodge, 1997) so that the organization can move towards improved environmental performance as a whole.

A leader would need to deal with three cultural elements to secure a shift in environmental values within an organization: “direction” (Dodge, 1997), or the extent of cultural support of environmental programming and improvement; “pervasiveness” (Dodge, 1997) or the extent to which the necessary values and traits are shared within an organization; and “strength” (Dodge, 1997), or the commitment to values and principles necessary for improved environmental performance. Appropriate recruitment and selection of employees with the desired core competencies will aid in the required change in culture (Steen et al., 2009).

There is a noted gap in the literature studying the link between individuals, such as corporate leaders, and sustainability or environmental outcomes (Orlitzky et al., 2011). Work that does exist indicates that more effective leadership in the interest of sustainability related performance, will inspire employees to work towards those same interests (Orlitzky et al., 2011; Papalexandris and Galanaki, 2009).

5.3.2.3 Leader Behavior and Qualities that Enable Success in Managing for Sustainability

The time and accountability of leadership at all levels of the company must be taken into account in the integration of management system components. Directly or indirectly, management denies or grants resources and permissions that can be the system successful (Giles, 2005).

A competent management team is required to help move the company towards sustainability. Some of the competencies required include being able to view issues and problems from a systems perspective; the ability to integrate information on a variety of economic, environmental and social issues; the ability to develop models for doing business that enable the necessary change or innovation (Holton et al., 2010). In a case study conducted by Balzarova et al. (2006) a barrier identified in the successful implementation of an ISO 14001 EMS was “the value system that had been created in the company...” (Balzarova et al., 2006). Dodge (1997) articulates that leadership style is linked to the personal values of the leader. The implication is that strong personal valuation of ecology and obligation to environmental protection will be linked with a leadership style that is more facilitating of the actions needed to realize the values. This was recognized as such within the organization studied by Balzarova et al. (Balzarova et al., 2006). A positive correlation between the personal values of the leader and the success in implementing an EMS has also been noted by Hanson et al. (2004)

Nattrass and Altomare (2002) referenced members of Starbucks leadership relying on their own personal style of “servant leadership” whereby one views him or herself as serving at the pleasure of employees, community and other stakeholders. Taking this approach means that the leader is always asking how the stakeholder needs are met and what can be done better. As in all the cases investigated by Nattrass and

Altomare (2002), Starbucks and Nike leadership teams have successfully managed the integration of sustainability, using tools such as the ISO 14001 environmental management system. Ideally, a leader would have personal values associated with both environmental protection and protection of profit, requiring “sustainable management” (Dodge, 1997).

Effective movement of the corporation towards sustainability relies on senior level commitment. As described by Nike executives by Nattrass and Altomare (2002), this commitment must be demonstrated through what the C-Suite says, the existence of appropriate policies that outline the how the company will operate, as well as providing necessary human and financial resources (Nattrass and Altomare, 2002). The commitment must be delivered frequently, consistently and be accompanied by action (Nattrass and Altomare, 2002).

In a review of two companies and their respective experiences with ISO 14001 implementation and maintenance, Balzarova et al. (2006) identified four key areas that were critical determinants of success. Of these, one was classified as Process by the authors. This category was intended to include “the behaviours, attitudes, and interactions that occur within the organization at the individual, group and intergroup level” (Balzarova et al., 2006). This would also extend to communication: Open communication between a leader and an employee can quell uncertainty and insecurity, making the employee more likely to work within his or her sphere of control to further the change required (Halme, 1997). Processes and attitudes that supports organizational learning and a culture of experimentation have also been identified as necessary for

success in environmental performance (Nattrass and Altomare, 1999; Nattrass and Altomare, 2002).

Allowing internal, ‘grass-roots’ groups and ideas to flourish as well as sincerely considering changes in direction recommended by non-executive members will promote improved environmental performance (Nattrass and Altomare, 2002). These initiatives may be established organically or as a result of information or influence from external sources. Ensuring staff are allowed and encouraged to interact with and seek information from external groups and organizations (Halme, 1997; Nattrass and Altomare, 2002) is a key element in removing knowledge and other barriers necessary for cultural change. Another enabler is the promotion of differences of opinion among employees and acting on those differences when appropriate (Halme, 1997). In addition to bringing in and fostering new ideas, this will also demonstrate a level of commitment that is required in the ISO 14001 EMS.

According to Tanzil and Beloff (2006) there are several variables that will contribute to how the leaders of an organization prioritize the activities leading to sustainability. Some of those variables include the type of industry or business, specific operating conditions, concerns of the community and the history of the issue and the company’s relation to the issue (Tanzil and Beloff, 2006).

In a study done by Calisir et al. (2001) barriers and challenges to implementation of a quality management system (ISO 9000), which is based on the same management system as ISO 14001, were investigated. The authors identified several challenges directly related to corporate culture that should be taken into consideration when adapting an existing EMS to allow for improved integration of sustainability.

5.3.3 Environmental Aspects

In considering whether or not the development and use of environmental aspects in an EMS is effective, six points can be considered: reliability of the method in establishing the aspects; method of implementation of aspect consideration; periodic review of the aspects; consideration of a broad scope of products and activities; if the aspects are kept up-to-date; consideration of as many aspects as possible (Fryxell et al. 2004). Regardless of the above points, the company must still consider what it puts into the environment, what it takes out and what it produces (Hawken, 1993).

MacDonald (2005) identifies elements that should be included in consideration of Environmental Aspect that will enable the use of the ISO 14001 standard in supporting sustainability goals:

- Establish the baseline of energy and material inputs and outputs, as well as the processes utilizing the inputs and producing the outputs;
- Identification of aspects relative to the baseline created and in consideration of the four system conditions, as per The Natural Step (MacDonald, 2005).

In considering environmental aspects, a corporation must, to take advantage of the value of the ISO 14001 standard and any potential to move towards sustainability, account for indirect environmental impacts. Emilsson & Hjelm (2007) define an indirect environmental impact as follows:

“Indirect environmental impact constitutes any change to the environment, whether adverse or beneficial, wholly or partially resulting from an element of an

organization's activities or products or services, influencing other actors' prerequisites to perform their activities".

More specifically, indirect impacts can include "directions, advice, various decisions, sharing of knowledge and information, research, and environmental monitoring..." (Emilsson & Hjelm, 2007).

Identification of social aspects is an integral component of an environmental management system and may have to be strengthened to move towards sustainability. People are included in the definition of environment, as per the ISO 14001 standard (ISO, 2007) and are considered in the system conditions proposed by The Natural Step (Nattrass and Altomare, 1999). MacDonald (2005) proposes working definition for social aspects: "ways in which (the company) supports or inhibits the ability of communities and stakeholders to meet their needs through diversity and self-organization" (MacDonald, 2005). This definition is useful, as it has been observed that social issues have been progressively marginalized through the pursuit of sustainable development and sustainability (Vanclay, 2004). Concurrence can be found with Emilsson & Hjelm (2007) that environmental aspect considerations should be inclusive of indirect environmental impacts. The inclusion of the indirect impacts, and the preceding aspects that cause them, has been challenging to many practitioners. However, successful consideration can be seen in mature systems when users know how the system is expected to work and what the potential value is (Emilsson & Hjelm, 2007). Therefore, the timing of inclusion of these impacts, by consideration of appropriate aspects, may be well suited to reconsideration of an existing environmental management system as one capable of being a vehicle for sustainability.

5.3.4 Setting and achieving objectives and targets

As pointed out by MacDonald (2005), the ISO 14001 Environmental Management System standard focuses on relative improvements in performance. The standard has settled on this approach in an effort to be all things to all companies. In doing this the setting and achievement of objectives and targets has been a more difficult part of the standard to employ. To allow leaders and staff to focus efforts, the system conditions should be used as the direction in which to aim efforts of an environmental management system. Using the system conditions as broad goals still allows for enough customization and discretion in the specific objectives and targets that they can be suitable for any company. To this end it will be useful to articulate what the sustainable future looks like and the company's place within that future. More specifically, "imagine and develop options to deliver the same or added value to customers without contributing to violations of the System Conditions" (MacDonald, 2005).

A cornerstone of environmental management practices is the use and influence of metrics. To ensure environmental impacts are being avoided or mitigated and that operational controls are working monitoring programs must be in place. As well, the progression towards set targets must be monitored. The results of these measurements should influence continual improvement efforts. A significant challenge to overcome in this area is the difficulty in defining social indicators, as opposed to defining environmental and economic indicators which are relatively well established (Vanclay, 2004).

MacDonald promotes a five-level planning approach, as translated into terms specific to sustainability, into Element 4.2 (Planning) of the ISO 14001 standard. The

author suggests this approach will provide companies with more specific direction for using ISO 14001 as a vehicle for sustainable development (MacDonald, 2005). Based on the system conditions laid out as part of The Natural Step, the author has provided four very specific objectives for a corporation:

1. “Eliminate its contribution to systematic increases in concentrations of substances from the Earth’s crust,
2. Eliminate its contribution to systematic increases in concentrations of substances produced by society,
3. Eliminate its contribution to systematic physical degradation of nature,
4. Eliminate its contribution to the undermining of humanity’s ability to meet its needs worldwide”.

Two points should be considered when determining the effectiveness of objectives and targets: relationship between the objectives and targets and the corporation’s aspects; practicality of the objectives and targets (Fryxell et al., 2004). Goel (2009) proposes that any objectives related to sustainability should also have a demonstrable link to global sustainability. MacDonald (2005) acknowledges the difficulty in addressing, in particular, the social needs as they relate to sustainability. This difficulty arises from differing views on responsibilities, needs and a corporation’s potential for degradation of needed resources (MacDonald, 2005). The author does suggest the high level goals of a company be reflective of the system conditions needed for sustainability.

Despite finding that internally perceived effectiveness of an environmental management system can be correlated with strong, internally driven motivations for implementation, authors have found that the effectiveness of set objectives and targets in meeting corporate goals is greater in those systems where implementation was externally driven (Fryxell et al., 2004). Points to be considered relevant to the achievement of objectives and targets

Goel (2009) provides some criteria for establishing sustainability metrics. As with all performance indicators, those tracking sustainability should be few, able to be modified to reflect changing circumstances, relevant to the corporations operations and aspirations and should be easily understood by employees and other relevant stakeholders. To meet the system conditions outlined in The Natural Step, programmes must be set up based on dematerialization and substitution. These programmes should include strategies for validating their effectiveness (MacDonald, 2005). A key component of measurement is understanding the baseline material and energy flows, activities and behaviors of the organization. It is only through this understanding that appropriate objectives and targets can be set, and movement can be made to make the company more sustainable (MacDonald, 2005). Stakeholder involvement in development or pre-testing of sustainability indicators can increase the chances of using these indicators to successfully communicate progress (Chess et al., 2005).

Effectiveness of the review of the EMS and environmental performance by senior management should take into account certain points: communication of content of review; time designated for review; communication of audit results; corrective actions being taken in response to non-conformances (Fryxell et al., 2004). Within this,

additional consideration, for achievement of objectives and targets, must be given to the development of unambiguous implementation plans as critical to the achievement of set objectives and targets (Fryxell et al., 2004; Nattras and Altomare 1999; Van der Vorst, 1999).

Additional considerations a business must make in successful navigation towards sustainability have been outlined by the Millennium Ecosystem Assessment. Specifically, a company will be better positioned if it is able to understand ecosystem services. This would include being able to identify those that the company needs and those that the company affects (which would include those in the supply chain), incorporate consideration of the ecosystem services into strategic planning, manage interaction with the services in an integrated manner, use the ecosystem services more efficiently. Businesses are also advised to engage in vertical, horizontal, civic and governmental partnerships to increase knowledge of ecosystem services and increase the likelihood of successful management of these services. Stakeholder considerations should also be sincerely taken into account, both in understanding stakeholder concerns and needs (including those of customers) and in communicating ecological impact of corporate operations (Millennium Ecosystem Assessment 3, 2005).

5.3.5 Employee Awareness and Engagement

A culture that empowers employees is critical to managing for sustainability. Such empowerment will enable employees to make improvements and try different things (Daily and Huang, 2001). Employee empowerment is also a success factor in corrective action development and implementation (Daily and Huang, 2001). According to these same authors, employees need to be rewarded for their contribution to

sustainability and the related corporate goals. This will demonstrate commitment and further engage the employees in initiatives.

Training and awareness of employees should be considered a major component of the environmental management system and a significant contributor to successful implementation (Molnar and Mulvihill, 2002; Nattrass and Altomare, 1999; Sammalisto and Brorson, 2008). This would likely hold for a shift in focus of a management system, such as a shift towards sustainability. Some of the keys to ensuring that training and awareness are successful include ensuring that all employees are, to some degree, included in the training (Sammalisto and Brorson, 2008). Exposure by all employees to a consistent message and the relevant information will support changes in behavior, including greater cohesiveness surrounding personal values, which contributes to incorporation of sustainability considerations in a given set of processes (Sammalisto and Brorson, 2008). Some of the specific discussion points to be considered include: corporate goals, aspects, policy, legal and other requirements, specific environmental issues the company may be associated with and the results, including resolution, of any audits or assessments (Sammalisto and Brorson, 2008). Also, critical to employee engagement is an understanding of baseline sustainability issues (Holton, 2010). Within these discussion, or training points, a consistent core should be established. Other items may be taught to different audiences in different contexts, depending on the identified needs of the company (Sammalisto and Brorson, 2008). MacDonald (2005) advocates the addition of an element to the ISO 14001 standard requiring the identification of barriers to sustainable actions and achievements (MacDonald, 2005). Important to identify with staff are the major barriers to implementation or success of environmental

management: time; information; support; knowledge; interest (Sammalisto and Brorson, 2008).

Improved awareness of sustainability and its importance has been identified as an important vehicle in moving towards sustainability. The American Environmental Protection Agency (EPA) initiated a program with the objective of advancing sustainability. A mechanism that was identified as supporting this objective was to promote the increased understanding of the potential integration of the physical and social sciences (Koehler and Hecht, 2006). As per The Natural Step, as referenced by MacDonald (2005), one of the first steps a company must do is ensure a suitable level of comprehension and responsiveness to sustainability and the way the organization might look or function in a sustainable society (MacDonald, 2005). In striving to achieve the appropriate levels of knowledge the corporation will realize an increased level of engagement in their employees (Emilsson & Hjelm, 2007). One characteristic of a mature environmental management system is the focus on communication and engagement of management and the workforce. This will result in increased knowledge of the system, required practices and the importance of sustainability (Emilsson & Hjelm, 2007).

5.3.6 Stakeholder Engagement

Sustainability definitions, including that of The Natural Step, includes a consideration of the society in which an entity operates. Finding an effective way to engage stakeholders will enable the movement towards sustainability. This is echoed by Neace (2005) and Van der Vorst (1999).

The corporation needs to understand stakeholder expectations and stakeholders need to be made aware of progress (Castka et al, 2004). In establishing a methodology for a study whose purpose was to assess the relationship between the motivations for EMS implementation and the perceived effectiveness of the EMS, Fryxell et al. established certain points of consideration for evaluating the effectiveness of stakeholder engagement (Fryxell et al., 2004). Those points are: whether the corporation is actively trying to learn the beliefs and judgments of stakeholders; if the corporation is confident in its knowledge of stakeholders concerns and expectations; if through the course of engagement the corporation has gained new information (Fryxell et al, 2004).

Participation and consideration of all stakeholders should be done in a democratic fashion (Goel, 2009). Along with this, is the need for stakeholders to be able to access accurate information relevant to corporation operations and projects (Goel, 2009). The author also stipulates that establishing balance between all stakeholder needs is critical to sustainable development within a corporation (Goel, 2009). Critical to achieving this is an effective mechanism for capturing and considering stakeholder feedback (Goel, 2009).

Without thoughtful, deliberate and structured approach to accounting for stakeholder interests and concerns, achievement of sustainability goals will be very problematic. When considering stakeholders, two particular points should be considered. First: Who are the stakeholders and what do they perceive to be the problem. Second: should a decision making process involve all stakeholders. Developing an approach that addresses the two above points will enable an understanding of “common interests” and respective responsibilities (Azapagic and Perdan, 2005)

When considering sustainability, as when considering the triple bottom line (Vanclay, 2004), a corporation may face challenges in incorporating the views and interests of their stakeholders. Each advocacy group, shareholder, community member, etc. may potentially have a different opinion on the degree to which sustainability should be considered and even within that, the various influences that make up the operationalization of sustainability.

Consideration must be made of what information suppliers need to know and how that information will be provided to them (Hanson et al., 2004). Of course, validation of the effectiveness of this flow of information must also be considered. According to Koehler and Hecht (2006), who were reporting on the results from an Environmental Protection Agency forum on sustainability, as a minimum directly affected stakeholders should be engaged. Ideally, discussions surrounding sustainability should be done at a level and within a context that allows for participation and input of all stakeholders (Koehler and Hecht, 2006).

5.3.7 Reporting

Annandale et al. (2004) compared the perceived effectiveness of environmental management systems (EMS) and corporate environmental reporting (CER) on corporate environmental performance. Although the authors found that the perceived effectiveness of an EMS on environmental performance was greater than that of CER, one should be considered as an integral component of the other. It can be argued that the effectiveness of one will most certainly be less than the effectiveness of the use of some type of CER within the framework of an EMS. Although the ISO 14001 standard does not have a requirement for formal, external environmental reporting it does require that a process for

external communication be established. It is the contention of this author that one of the very few flaws of the standard is the lack of requirement for regular, external reporting of environmental performance to stakeholders. Gray and Bebbington (2007) suggest reluctance among corporate leaders to truly communicate the progress of the corporation towards sustainability. Within this, becomes the reluctance to communicate the ability of the corporation to achieve a certain level of sustainability. Overall, although external reporting and associated feedback could be a powerful tool for management in movement towards sustainability, it is an area that is very underdeveloped (Gray and Bebbington, 2007).

Goel (2009) identifies core values for sustainability that should be adhered to within a corporation. Transparency is one such value (Goel, 2009). A mechanism that can be used to foster transparency is corporate reporting of activities, goals and progress. However, a risk that all companies must face is ensuring that sustainability is taken further than just reporting on pre-determined metrics (Vanclay, 2004). External reporting should be considered a valuable tool in understanding how well the company is communicating and how well it is performing (Herremans et al, 1999). A company may want to consider employing specific stakeholder engagement strategies prior to setting the format of and populating the report for the purpose of better understanding expectations and report value (Herremans et al, 1999).

A significant challenge faced by industry in moving towards sustainability is initiating a reporting or accounting structure intended to incorporate social, economic and environmental elements while (intentionally or unintentionally) not adhering to the spirit of sustainability (Vanclay, 2004). Even while forming corporate strategy with the true

intent of moving towards sustainability, whether by integrating or separating the economic, social and environmental spheres, the corporation runs the risk of having a sphere ignored or subordinated to other issues (Vanclay, 2004).

5.3.8 Measurement

Panelists at an EPA forum intended to advance sustainability recognized that it is often easier to identify and measure what is not sustainable, rather than what is (Koehler and Hecht, 2006). Members at this same forum identified typical management systems as having insufficient capacity for tracking environmental changes (Koehler and Hecht, 2006). According to panelists at an EPA sponsored forum on sustainability, a significant challenge in moving towards sustainability is the lack of high quality data. According to the authors that presented the results of this forum, this lack of data limits the ability to develop sound sustainability indicators (Koehler and Hecht, 2006). Although the context of the forum was within public policy, it is likely that the same could be applied to the availability of data and its relationship to sustainability indicators within a company.

According to Holton et al. (2010), effective monitoring of environmental performance is critical to corporate movement towards sustainability. It is through this monitoring that assurance of continual improvement can be gained. Keysar (2005) identified such monitoring as critical to success in a corporation contributing to sustainability. This has also been echoed by Molnar and Mulvihill (2002).

It has been suggested that an effective means of including social considerations in sustainability policy and practice is to include measurement of well-being (Koehler and Hecht, 2006). This measurement would be subjective, and although recommended in the

context of government policy, may also be useful in the corporate setting where stakeholder engagement is a necessary element of the social license to operate.

One key element of the environmental management system that might be measured, in the interest of greater understanding of the success of implementation, is the success of training and awareness programming. Some possible metrics include: participation; relevance; awareness and attitude; management support and personal involvement and responsibility; including personal contribution to sustainability; identification of factors that can impede environmental performance (Sammalisto and Brorson, 2008).

Tanzil and Beloff (2006) stipulate that metrics need to be associated with specific goals and the important issues that need to be managed. Specific to sustainability the authors suggest metrics for material intensity, water intensity, energy intensity, toxic release and solid wastes. The authors identify quantification of environmental and related audits, as well as adoption of industry or international standards as examples of management metrics. These two sets of examples show the difference in lagging (the former) and leading (the latter) metrics (Tanzil and Beloff, 2006). While one type of metric may provide indication of a specific objective within a broader goal, the other will be better at predicting the health of the management system that supports achievement of the objectives. As suggested by Talberth (2008) companies can begin to use specific microeconomic indicators to help them gauge the sustainability of their operations. Five specific measures are identified:

- “certification of products, operations, and supply chains;
- Zero waste;

- Eco-efficiency;
- Workplace well-being; and
- Community vitality”

Beloff and Beaver (2000), as cited in Tanzil and Beloff (2006), identify several attributes that should be considered when establishing metrics in support of sustainability programming and/or objectives:

- Easily understood;
- Reproducible;
- Robust;
- Non-perverse
- Use existing data and/or data collection regimes, where possible;
- Complement existing regulatory programming;
- Useful for decision making;
- Relatable to supply chain or product life cycle;
- Scalable
- Protective of proprietary information (Tanzil and Beloff (2006).

5.4 Summary: Points to Note Regarding the Use of an EMS to Move Towards Sustainability

The literature identifies several key points that should be considered when modifying an environmental management system for use towards sustainability. The first point to note is how the use of an environmental management system fits into broader corporate planning. As was introduced earlier from Schmidt-Bleet et al. (2002), as one of

the five stages of strategic planning, the implementation and use of an environmental management system represents the last stage.

Considerations for successful use of an existing environmental management system to support the drive towards sustainability include those related to ensuring a solid vision of sustainability and having an accepting, learning corporate culture. Within the latter is special consideration of the important role the leader has in ensuring success. Additional considerations for success including ensuring that the appropriate environmental aspects and impacts are used, the setting of appropriate objectives and targets, fostering high levels of employee and stakeholder awareness and engagement, having suitable reporting as well as having suitable capacity for measurement.

6 THE SUSTAINABILITY ENABLERS MODEL

Based on the existing scholarship in the areas of corporate sustainability and environmental management a model showing the inclusion of specific enablers is presented in Figure 2 and articulated in more detail in this section. In this context, enablers are considered those actions or organizational elements that if undertaken in tandem or integrated with, the standard elements of the ISO 14001 standard will yield management system results more supportive of overall sustainability, versus the intended ‘environmental’ performance. These enablers are as defined by this author based on the findings of the previously cited research. Each are aligned with a stage of the ISO 14001 standard, namely Planning; Implementation and Operation; Checking and Management Review. These enablers should be considered in line with all of the other elements of the ISO 14001 standard, as detailed in Table 2 and Figure 2.

6.1 Planning Enablers

The elements of the ISO 14001 standard that are to be considered within the Planning stage include identification of environmental aspects, identification of legal and other requirements and the setting of appropriate objectives. For ease of presentation, consideration of environmental policy is also included in this section. In addition to these points, several points should be considered that will strengthen the planning components of an environmental management system such that it can be adapted to sustainability.

The values of the leadership team and the motivations for taking steps toward sustainability should be considered. As has been identified throughout this thesis, internal motivations and closely aligned personal values of the leadership team (ie: values

in line with sustainability) are likely to result in greater success. These values will shape a revised policy and the integration of the policy into operations. In addition to the traditional perspective of ‘environmental aspects’, those aspects that do or could result in socio-economic impacts should be sincerely considered. These points, in addition to use of base sustainability principles, such as those referred to in The Natural Step, will support development of meaningful objectives and targets.

6.2 Implementation and Operation Enablers

The elements of the ISO 14001 standard that are to be considered within the Implementation and Operation stage include identification of roles, responsibilities and authorities; identifying needed training and awareness and delivering same; establishing appropriate communication practices; generating appropriate documentation and ensuring that documentation is controlled; controlling operations to minimize impact; and planning for emergencies. In addition to these points, several points should be considered that will strengthen the Implementation and Operation components of an environmental management system such that it can be adapted to sustainability.

Employee engagement, which would include meaningful training in sustainability principles, necessary rewards and work group structure, is critical to success of the management system. Closely related to this is sincere stakeholder engagement, which would include identification of all possible stakeholders and deciding at what levels to engage and integrate their views. This would lead to, and benefit from, external stakeholder reporting on the goals and progress of the company. Nurturing the learning organization will result in the development of more innovative controls for mitigating

impact, which will positively affect employee and stakeholder engagement in the company.

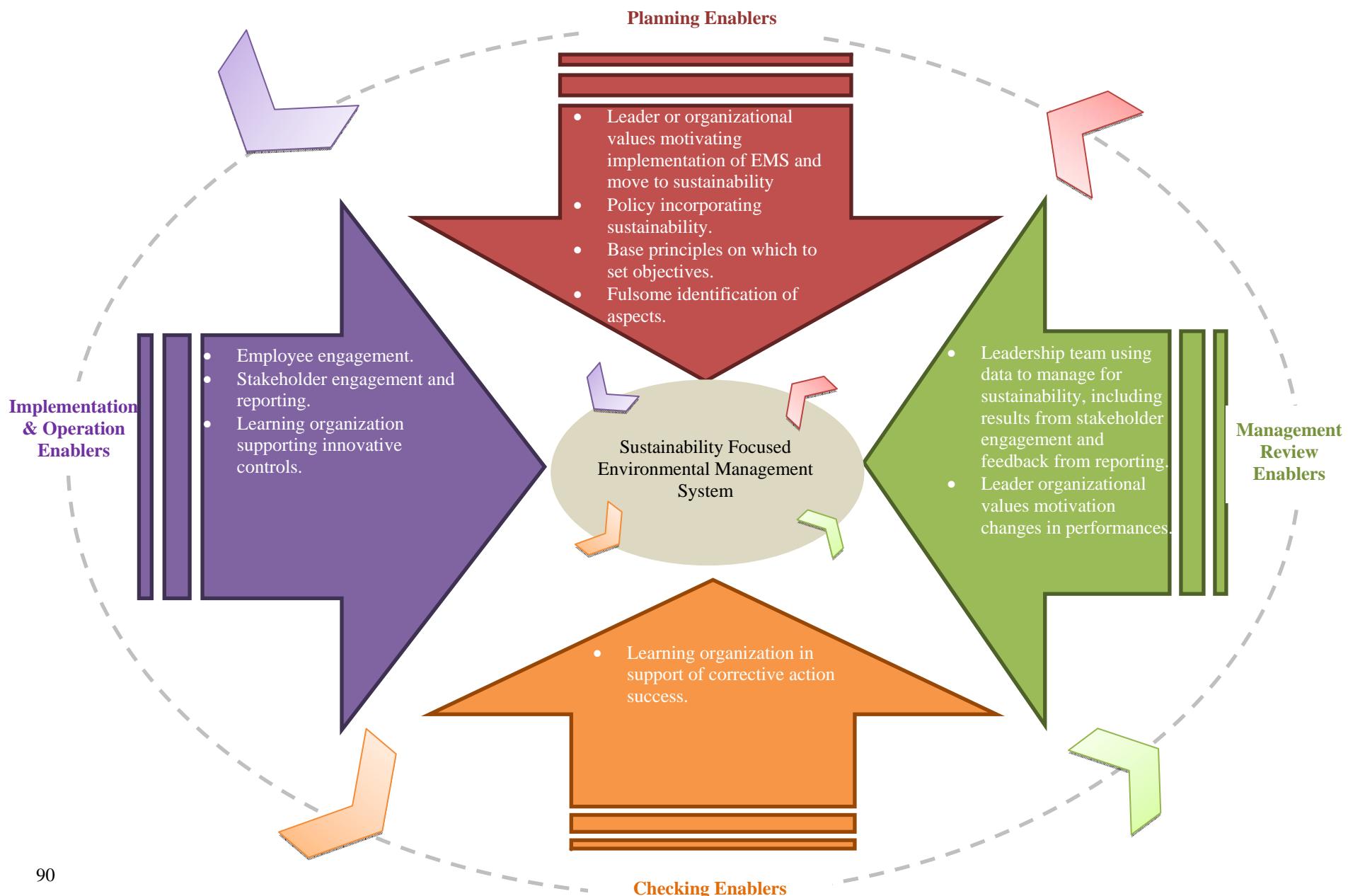
6.3 Checking Enablers

The elements of the ISO 14001 standard that are to be considered within the Checking stage include development of monitoring and measuring practices such that impact control measures and progress towards objectives can be tracked; development of methods for evaluation compliance with legal and other requirements; methods for identification of nonconformities, then subsequently correcting and preventing same; controlling records and establishing a suitable internal audit program. In addition to these points, a corporate culture that embraces organizational learning should be fostered. This will support successful identification of nonconformance and noncompliance instances and lead to sincere interest in rectifying.

6.4 Management Review Enablers

The Management Review element includes specific inputs that the leadership team should consider in ensuring the continuing suitability, adequacy and effectiveness of the system. In addition to these specific inputs special focus should be paid to understanding and utilizing results from stakeholder engagement processes and feedback from external reporting initiatives. These, combined with strong, personal sustainability and continual improvement values of the leadership team will lead to the required changes and system improvements that will move the company closer to sustainable development.

Figure 2. Sustainability Enablers Model: Identification of those enablers, when used with a well functioning ISO 14001 environmental management system, will allow for meeting sustainability performance points, rather than just environmental.



7 DISCUSSION

7.1 The Making of the SEM: Supporting Sustainability with an Environmental Management System

This work was initiated in an effort to provide evidence, within academia and to industry, that a company need not buy into yet another moniker, newly named management system or off-the-shelf, external solutions package. It was intended to show, through review of previous works, that a company successfully using the ISO 14001 Environmental Management System standard need make only a few changes to realize greater gains. Those gains would be within the broader context of sustainability, rather than within the original ‘environmental’ scope of the system.

Through review of the literature it became apparent that minimal evidence exists of corporations successfully or unsuccessfully modifying their EMS in the interest of supporting greater sustainability. However, ample scholarship existed on various elements of the standard that could be modified, as well as other factors for success for consideration that could yield sustainability if simply built into an existing EMS. This realization led to the development of the model (Figure 2) that identifies enablers to be used, per the ISO 14001 standard. This author asserts that the whole is, indeed, greater than the parts that led to the SEM. The structure of this thesis introduces the context for the type of organizational or system change needed to address sustainability demands. Namely, the origin, components and success factors for ISO 14001 implementation and the link between environmental management systems and sustainability.

7.2 Enablers and Themes that Support Sustainability, Within the Sustainability Enablers Model

No other documented, modified, full environmental management systems were identified to account for implementation of sustainability. For those authors that have assessed how to move from strictly ‘environmental’ to ‘sustainability’ within the context of the ISO 14001 system, it has been done so at the philosophical, element, or component level. An analysis of those results collectively demonstrate several, specific enablers that can support transition from ‘environmental’ to ‘sustainability’. In this context, enablers are considered those actions or organizational elements that if undertaken in tandem or integrated with, the standard elements of the ISO 14001 standard will yield management system results more supportive of overall sustainability, versus the intended ‘environmental’ performance. The existing literature and the enablers that can subsequently be articulated, can be considered within three themes: knowledge, culture and leadership.

7.2.1 The Significance of Knowledge, Awareness and Engagement

The utility of the ISO 14001 environmental management system to move towards sustainability will be maximized if ecological, organizational and stakeholder knowledge are sought and incorporated. More specifically, policy development, in the interest of sustainability, should occur after a full understanding of energy and materials flows for the organization is articulated (MacDonald, 2005). Nattrass and Altomare (1999) and Molnar and Mulvihill (2002) advocate for understanding and incorporation of sustainability knowledge into policy development. Knowledge of ecological and

sustainability principles is also critical in setting meaningful objectives and targets, which, if realized, will result in positive change in sustainability performance (Keysar, 2005; MacDonald, 2005; Nattrass and Altomare, 1999; Robert, Schmidt-Bleet et al., 2002). A fulsome identification of aspects, using ecological and organizational knowledge, is also a critical (Emilsson & Hjelm, 2007; Hawken, 1993; ISO, 2007; MacDonald, 2005; Millennium Ecosystem assessment 3, 2005; Nattrass and Altomare, 1999). (As the reader will recall from Figure 2, development of a meaningful policy, identification of all aspects and setting of suitable objectives are key Planning Enablers).

Ensuring employees are aware of their impact on sustainability and that they are engaged in any process meant to improve that performance, are key Implementation & Operation Enablers (Daily and Huang, 2001; Dodge, 1997; Freimann & Walther, 2001; Halme, 1997; Holton, 2010; Keysar, 2005; Koehler and Hecht, 2006; MacDonald, 2005; Price, 2005; Sammalisto and Brorson, 2008;). Several authors have identified low employee engagement as a barrier in seeing full value in a management system, and improvements in related performance (Balzarova et al., 2005; Berthelot et al., 2003; Hughey et al., 2005; Zushi and Sohal, 2004).

Engaging stakeholders, not just for the purposes to securing the proverbial ‘social license to operate, but to truly understand where liabilities and opportunities lie within the ISO 14001 management system is an Implementation & Operation Enabler. Consideration of stakeholder needs, knowledge and interest is an important factor in ensuring maximized value from the ISO 14001 system (Emilsson & Hjelm, 2007; Price, 2005). This is echoed, within the context of sustainability by Neace (2005), Van der Vorst (1999), Castka et al, (2004), Goel (2009). The use of meaningful reporting out on

sustainability performance to the right stakeholders, in a manner that is meaningful to them, it also an Implementation & Operation Enabler (1999; Goel, 2009; Gray and Bebbington , 2007; Herremans et al.). Using feedback from stakeholders, perhaps through the reporting process, is a critical Management Review Enabler (Gray and Bebbington ,2007; Herremans et al., 1999) – ensuring that the actions and performance of the organization are desirable and making changes if they are not.

The use of data generated as a result of monitoring in support of correcting identified non-conformances and making management system changes towards greater sustainability form Checking Enablers and Management Review Enablers. Holton et al. (2010), Keysar (2005) and Molnar and Mulvihill (2002) all espouse the importance of effective monitoring and use of data to move towards sustainability within a managed system.

7.2.2 The Significance of the Corporate Culture

Corporate culture, for better or for worse, must absolutely be considered and in some cases adjusted to ensure the effective use of an environmental management system (Balzarova et al., 2006; Emilsson & Hjelm, 2007; Van der Vorst, 1999). The ability of an organization to constantly seek out innovative controls to those corporate activities that may negatively impact sustainability, to share and communicate a common interest in sustainability and learn from and improve upon mistakes made contributes significantly as an Implementation & Operation Enabler, a Checking Enabler and a Management Review Enabler. Nattrass and Altomare (1999) stipulate that only a learning

organization, one that can learn quickly from mistakes made and adapt to changes, will be able to make full use of a management system gear towards sustainability. This is echoed by Dodge (1997), Molnar and Mulvihill (2002), Freimann & Walther (2001), Balzarova et al (2006) and Neace (2005).

7.2.3 The Significance of the Leadership

The influence and significance of corporate leadership is very clear and can be linked back to scholarship supporting the significance. From the point of being motivated to move towards sustainability, to articulating a vision of sustainability to giving the mandate and tools to get “there”, a leader’s demonstration of commitment is critical. The role of leadership contributes to enabling a shift from environmental management to managing for sustainability, using an existing ISO 14001 system, in many ways.

The motivations to move towards sustainability and use an environmental management system can affect the level of success realized. Several authors discuss the link between strong, including personal, motivations for improved sustainability-related performance and the success in an environmental management system in realizing that improvement (Freimann and Walther, 2001; Hamschmidt and Dyllick, 2001; Keysar, 2005; Nakamura et al., 2001; Raines and Prakash, 2005). The willingness of a corporate leader to truly see change within her or his organization, and to demonstrate the commitment to achieve that change is critical in realizing success in the use of a modified ISO 14001 environmental management system (Balzarova et al, 2006; Hanson et al,

2004; Nattrass & Altomare, 1999; Neace, 2005; Price, 2005;). These elements are critical Planning Enablers, as per Figure 2.

7.3 The Link Between Knowledge, Culture and Leadership as Related to Sustainability Enablers

As can be inferred by review of the extracted research in the preceding sections of this thesis, certain points of consideration must be made for a company to realize success in converting its' environmental management system into one that meets the demands needed to move towards sustainability. Those points were consolidated to develop the Sustainability Enablers Model identifying Planning Enablers, Implementation & Operation Enablers, Checking Enablers and Management Review Enablers (all of which are highlighted in addition to the key elements of the ISO 14001 Environmental Management System standard). Within these specific enablers, articulated as they are so that practitioners may find immediate value in them, certain broader themes were identified. Those were (1) knowledge, awareness and engagement; (2) corporate culture; and (3) leadership. The relationship between those themes can be considered as follows:

Knowledge, and the associated engagement, within an employee or stakeholder group can enable better operation of an existing, well-functioning environmental management system, in support of sustainability. Availability and use of that data will be supported by a strong culture of learning and improvement. The culture of the organization, including the sustainability vision to which it subscribes,

will be strongly (if not exclusively) influenced by the leadership of the corporation.

7.4 The Strength and Challenge of the Sustainability Enablers Model

Considerable scholarship exists lamenting on the importance and opportunity of a strong management system to move towards sustainability (Hawken, 1993; Holton et al, 2010; Keysar, 2005; MacDonald, 2005; Millennium Ecosystem Assessment 3, 2005; Nattrass and Altomare, 1999; Van der Vorst et al., 1999;). The ISO 14001 Environmental Management System standard has already been vetted, insomuch as it is currently used by over 49,000 organizations across the world, a number that has been steadily increasing since 1995 (Earthtrends, 2012). The enablers introduced in the SEM are not new. They are summarized points, gathered from numerous academic sources which have, in part or in whole, demonstrated their respective effectiveness in using an EMS to move towards sustainability. The primary strength comes from the base upon which it is built (the ISO 14001 environmental management system) and the placement of known enablers within the existing base.

Within a well- functioning EMS, as was stipulated earlier in this paper, very little adjustment is likely needed to see gains in sustainability. The most significant challenge lies in ensuring that the existing EMS is, indeed, well- functioning. With that challenge, comes the more germane elements of leadership values and motivations, corporate culture and availability and access to knowledge. If these enablers are not in place within a corporation, then the strength of the SEM presented in Figure 2 will not be realized.

7.5 Determination of validity and viability

The Sustainability Enablers Model presented in this paper could likely only be validated by immersion within a company and tracking of its sustainability performance over a typical business cycle. To test the SEM itself, testing could be done within companies that have the demonstrated enablers in place (appropriate leadership, culture and knowledge transfer) and those that don't. Additional research into the link between leadership and sustainability or effectiveness of environmental management systems would also support validation of the SEM.

The viability of the SEM would be ensured through continued monitoring of sustainability performance. Assuming a corporation has an existing, well-functioning EMS the survival of the system for use towards sustainability, would be guaranteed by a strong corporate culture. The leadership that influences the culture and the knowledge transfer within that, will implicitly demand continual review and improvement of sustainability performance and improvement of the system that governs it. Evidence of continual improvement is a cornerstone of an environmental management system.

8 References

- Annandale, D., Morrison-Saunders, A., Bouma, G. (2004). The impact of voluntary environmental protection instruments on company environmental performance. *Business Strategy and the Environment*. **13**, 1-12.
- Azapagic, A. and Perdan, S. (2005). An integrated sustainability decision-support framework Part I: Problem structuring. *International Journal of Sustainable Development & World Ecology*. **12**, 98-111.
- Balzarova, M.A., Castka, P., Bamber, C.J., Sharp, J.M. (2006). How organisational culture impacts on the implementation of ISO 14001:1996 – a UK multiple-case view. *Journal of Manufacturing Technology Management*. **17**, 89-103.
- Barla, P. (2007). ISO 14001 certification and environmental performance in Quebec's pulp and paper industry. *Journal of Environmental Economics and Management*. **53**, 291-306.
- Bellesi, F., Lehrer, D., Tal, A. (2005). Comparative Advantage: The impact of ISO 14001 environmental certification on exports. *Environmental Science and Technology*. **39**, 1943-1953.
- Berthelot, S., McGraw, E., Coulmont, M., Morrill, J. (2003). ISO 14001: Added value for Canadian business? *Environmental Quality Management*. Winter, 47-57.
- Boiral, O. (2007). Corporate Greening Through ISO 14001: A Rational Myth? *Organization Science*. **18** (1), 127-146.
- Bronson, J. and Noble, B. (2006). Measuring the effectiveness of Parks Canada's environmental management system: a case study of Riding Mountain National Park. *Canadian Geographer*. **50(1)**, 101-113.
- Calisir, F., Bayraktar, C.A., Beskese, B. (2001). Implementing the ISO 9000 standards in Turkey: A study of large companies' satisfaction with ISO 9000. *Total Quality Management*. **12(4)**, 429-438.
- Castka, P., Bamber, C.J., Bamber D.J. and Sharp, J.M. (2004). Integrating corporate social responsibility (CSR) into ISO management systems-in search of a feasible CSR management system framework. *The TQM Magazine*. **16(3)**, 216-224.
- Chapple, W., Cooke, A., Galt, V., Paton, D. (2001). The Characteristics and attributes of UK firms obtaining accreditation to ISO 14001. *Business Strategy and the Environment*. **10**, 238-244.

Chan, E.S.W. and Wong, S.C.K. (2006). Motivations for ISO 14001 in the hotel industry. *Tourism Management*. 27, 481-492.

Chavan, M. (2005). An appraisal of environment management systems: A competitive advantage for small businesses. *Management of Environmental Quality*. 16(5), 444-463.

Chess, C., Johnson, B.B., and Gibson, G. (2005). Communicating about environmental indicators. *Journal of Risk Research*. 8(1), 63-75.

CSA (Canadian Standards Association). (2004). The ISO 14000 Essentials: A practical guide to implementing the ISO 14000 standards. 2nd Edition.

Daily, B.F. and Huang, S. (2001). Achieving sustainability through attention to human resource factors in environmental management. *International Journal of Operations and Production Management*. 21(12). 1539-1552.

Darnell, N. (2006). Why firms mandate ISO 14001 certification. *Business & Society*. 45(3), 354-381.

Dodge, J. (1997). Reassessing Culture and Strategy: Environmental improvement, structure, leadership and control. In R. Welford (Ed.), *Corporate Environmental Management 2: Culture and Organizations*. (104-126). United Kingdom: Earthscan.

Earthtrends. (2012). Economics, Business and the Environment
http://earthtrends.wri.org/searchable_db/results.php?years=1995-1995,1996-1996,1997-1997,1998-1998,1999-1999,2000-2000,2001-2001,2002-2002&variable_ID=567&theme=5&cID=1,6,9,10,11,13,14,15,16,17,19,23,24,25,26,27,28,32,33,37,38,39,43,45,47,48,50,53,54,55,59,62,63,70,73,76,79,81,82,83,84,85,86,87,89,90,91,92,93,94,95,96,98,99,100,103,104,108,109,110,111,113,114,117,121,122,126,129,131,134,136,137,138,139,140,141,143,144,145,146,147,148,149,151,152,156,157,160,161,162,165,166,167,168,170,173,174,175,176,179,182,183,184,185,187,188,189,190,191,194,195,202,204,205,209,217,222,223&ccID=0

Elefsiniotis, P. and Wareham, D.G. (2005). ISO 14001 Environmental management standards: Their relation to sustainability. *Journal of Professional Issues in Engineering Education and Practice*. 131(3), 208-212.

EMAS (Eco-Management and Audit Scheme). (2007).
<http://www.emas.org.uk/aboutemas/mainframe.htm>

Emilsson, S. & Hjelm, O. (2007). Managing Indirect Environmental Impact within Local Authorities' Standardized Environmental Management Systems. *Local Environment*. 12(1), 73-86.

Environment Canada (2010). Planning for a sustainable future: A federal sustainable development strategy for Canada. Sustainable Development Office; Environment Canada; Government of Canada.

Environment Canada 1 (2011). Environmental Indicators: National Air Quality
www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=4B5631F9-1

Environment Canada 2 (2011). Environmental Indicators: National Greenhouse Gas Emissions www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=FBF8455E-1

Environment Canada 3 (2011). Environmental Indicators: Water Quality Indicators www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=68DE8F72-1

Environment Canada 4 (2011). Environmental Indicators: Water Levels www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=7FAF3303-1

Environment Canada 5 (2011). Environmental Indicators: Changes in Wildlife Species Disappearance Risks www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=C48CCBC7-1

Freimann, J. & Walther, M. (2001). The impacts of corporate environmental management systems: A comparison of EMAS and ISO 14001. *GMI*. **36**, 91-103.

Fryxell, G.E., Wing-Hung Lo, C., Shan Chung, S. (2004). Influence of motivations for seeking ISO 14001 certification on perceptions of EMS effectiveness in China. *Environmental Management*. **33(2)**, 239-251.

Ghisellini, A. and Thurston, D.L. (2005). Decision traps in ISO 14001 implementation process: case study results from Illinois certified companies. *Journal of Cleaner Production*. **13**, 763-777.

Giles, F. (2005) Integrating managers into environmental management systems. *Environmental Quality Management*. **Summer**, 31-38.

Goel, R. (2009) Integrated Management System (BEST) for Sustainable Development through Process Approach. *Proceedings of International Conference on Energy and Environment*. 734-739.

Gray, R. and Bebbington, J. (2007). Corporate Sustainability: accountability or impossible dream? In G. Atkinson, S. Dietz and E. Neumayer (Eds). *Handbook of Sustainable Development*. (376-390). United Kingdom: Edward Elgar Publishing Limited.

Halme, M. (1997). Developing an Environmental Culture Through Organizational Change and Learning. In R. Welford (Ed.), *Corporate Environmental Management 2: Culture and Organizations*. (79-103). United Kingdom: Earthscan.

Hamschmidt, J. and Dyllick, T. (2001). ISO 14001: Profitable? Yes! But is it eco-effective? *GMI*. **34**, 43-54.

Hanson, J.D., Melnyk, S.A., Calantone, R.J. (2004). Core Values and Environmental Management. *GMI*. **46**, 29-40.

Hawken, P. (1993). The Ecology of Commerce: A declaration of sustainability. United States: HarperCollins Publishing Inc.

Herremans, I.M., Welsh, C., Kane, D. and Bott, R. (1999). How an environmental report can help a company 'learn' about its own environmental performance. *Eco-Management and Auditing*. **6**, 158-169.

Holton, I., Glass, J., and Price, A.D.F. (2010). Managing for sustainability: findings from four company case studies in the UK precast concrete industry. *Journal of Cleaner Production*. **18**, 152-160.

Howarth, R. (2007). Towards an operational sustainability criterion. *Ecological Economics*. **63**, 656-663.

Hueting, R. and Reijnders, L. (2004). Broad sustainability contra sustainability: the proper construction of sustainability indicators. *Ecological Economics*. **50**, 249-260.

Hughey, K.F.D, Tait, S.V. and O'Connell, M.J. (2005) Qualitative evaluation of three 'environmental management systems' in the New Zealand wine industry. *Journal of Cleaner Production*. **13**, 1175-1187.

ISO (International Organization for Standardization). (2007). International Organization for Standardization. www.iso.org/iso/en/aboutiso.

Jiang, R.J. and Bansal, P. (2003). Seeing the need for ISO 14001. *Journal of Management Studies*. **40(4)**. 1047-1067.

Keysar, E. (2005). Procedural integration in support of environmental policy objectives: Implementing sustainability. *Journal of Environmental Planning and Management*. **48(4)**, 549-569.

Koehler, D.A. and Hecht, A.D. (2006). Sustainability, wellbeing, and environmental protection: perspectives and recommendations from an Environmental Protection Agency forum. *Sustainability: Science, Practice, & Policy*. **2(2)**. 22-28.

Krut, R. and Strycharz, J. (1999). ISO 14001 and design for the environment: A strategy for proactive design in building design, construction and renovation. *GMI Theme Issue: ISO 14001: Case Studies and Practical Experiences*. **28**, 69-78.

Link, S. and Naveh, E. (2006). Standardization and discretion: Does the environmental standard ISO 14001 lead to performance benefits? *IEEE Transactions on Engineering Management*. **53(4)**. 508-519.

MacDonald, J.P. (2005). Strategic sustainable development using the ISO 14001 standard. *Journal of Cleaner Production*. **13**, 631-643.

Matouq, M. (2000). A case-study of ISO 14001-based environmental management system implementation in the People's Republic of China. *Local Environment*. **5(4)**, 415-433.

McAlpine, P. and Birnie, A. (2005). Is there a correct way of establishing sustainability indicators? The case of sustainability indicator development on the Island of Guernsey. *Local Environment*. **10(3)**, 243-257.

Millennium Ecosystem Assessment 1 (2005). *Ecosystems and Human Well-Being, Volume 1: current state and trends: findings of the Conditions and Trends Working Group*. United States: Island Press

Millennium Ecosystem Assessment 2 (2005). *Ecosystems and Human Well-Being, Volume 2: Scenarios: Findings of the Scenarios Working Group*. United States: Island Press.

Millennium Ecosystem Assessment 3 (2005). *Ecosystems and Human Well-Being: Opportunities and challenges for business and industry*. World Resources Institute, Washington, DC.

Molnar, E. and Mulvihill, P.R. (2003). Sustainability-focused organizational learning: Recent experiences and new challenges. *Journal of Environmental Planning and Management*. **46(2)**, 167-176.

Morgan, A. (2011). Environment: A report of the Canadian index of well-being (CIW). Canadian Index of Wellbeing Network; University of Waterloo; Faculty of Applied Health Sciences.

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.

Nattrass, B and Altomare, M. (1999). *The Natural Step for Business: Wealth, Ecology and the Evolutionary Corporation*. Canada: New Society Publishers.

Nattrass, B and Altomare M. (2002). *Dancing with the Tiger: Learning Sustainability Step by Natural Step*. Canada: New Society Publishers.

Neace, M.B. (2005). The UN Global Compact: moving toward sustainable development by adopting a new paradigm. In E. Tiezzi, J.C. Marques, C.A. Brebbia, S.E. Jorgensen (Eds). *Ecosystems and Sustainable Development VI*. (25-34). United Kingdom: WIT Press.

Newbold, J. (2006). Chile's environmental momentum: ISO 14001 and the large-scale mining industry – Case studies from the state and private sector. *Journal of Cleaner Production*. **14**, 248-261.

NRTEE (National Round Table on the Environment and the Economy). (2007). Capital Markets and Sustainability: Investing in a Sustainable Future (State of the Debate Report).

Orlitzky, M., Siegel, D.S., Waldman, D.A. (2011). Strategic Corporate Social Responsibility and Environmental Sustainability. *Business Society*. **50** (6). 6-27.

Papalexandris, N. and Galanaki, E. (2009). Leadership's impact on employee engagement: Differences among entrepreneurs and professional CEOs. *Leadership & Organization Development Journal*. **30** (4). 365-385.

Potoski, M. and Prakash, A. (2005). Green clubs and voluntary governance: ISO 14001 and firm's regulatory compliance. *American Journal of Political Science*. **49**(2). 235-248.

Prakash, A. and Potoski, M. (2006). Racing to the bottom? Trade, environmental governance, and ISO 14001. *American Journal of Political Science*. 50(2), 350-364.

Price, T.J. (2005). Preaching what we practice: experiences from implementing IO 14001 at the University of Glamorgan. *International Journal of Sustainability in Higher Education*. **6**(2), 161-178.

Quality Network (2007). British Standard 7750 from the Quality Network. <http://www.quality.co.uk/bs7750.htm#Description>

Raines, S.S. and Prakash, A. (2005). Leadership Matters: Policy entrepreneurship in corporate environmental policy making. *Administration & Society*. **37**(1), 3-22

Redclift, M. (2005). Sustainable Development (1987-2005): An Oxymoron Comes of Age. *Sustainable Development*. **12**, 000-000.

Rigling Gallagher, D., Andrews, R.N.L., Chandrachai, A., Rohitratana, K. (2004). Environmental management systems in the US and Thailand: A case comparison. *GMI*. **46**, 41-56.

Robèrt, K.-H., Schmidt-Bleek, B., Aloisi de Larderel, J., Basile, G., Jansen, J.L., Kuehr, R., Price Thomas, P., Suzuki, M., Hawken, P., Wackernagel, M. (2002). Strategic sustainable development – selection, design and synergies of applied tools. *Journal of Cleaner Production*. **10**, 197-214.

Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological Economics*. **48**, 369-384.

Sammalisto, K. and Brorson, T. (2008) Training and communication in the implementation of environmental management systems (ISO 14001): a case study at the University of Gävle, Sweden. *Journal of Cleaner Production*. **16**, 299-309.

SCC (Standards Council of Canada). (2007). Accredited: Management systems certification bodies. http://www.scc.ca/en/programs/iso_reg/accredited_clients.shtml

Strachan, P.A., Sinclair, I.M., Lal, D. (2003). Managing ISO 14001 implementation in the United Kingdom continental shelf (UKCS). *Corporate Social Responsibility and Environmental Management*. **10**, 50-63.

Steen, S.L., Noe, R.A., Hollenbeck, J.R., Gerhart, B., Wright P.M. (2009) *Human Resource Management* (2nd Ed.). 135-171. Canada: McGraw-Hill Ryerson Limited.

Talberth, J. (2008). A new bottom line for progress. In Starke, L. (Ed.) *2008 State of the World: Innovations for a Sustainable Economy: A Worldwatch Institute Report on Progress Towards a Sustainable Society*. (18-31). United States: W.W. Norton & Company, Inc.

Tanzil, D. and Beloff, B.R. (2006). Assessing Impacts: Overview on Sustainability Indicators and Metrics. *Environmental Quality Management*. **Summer**, 41-56.

The Gandalf Group. (2007). C-Suite Survey on Climate Change. www.gandalfgroup.ca/downloads/2007/Q1/c-suite_mar_2007_presentation.pdf.

The Winnipeg Chamber of Commerce and Meyers Norris Penny. (2006). 4th Annual Manitoba Business Leaders Index. www.winnipeg-chamber.com/pdf/MBLI%20combined.pdf.

World Commission on Environment and Development (WCED). (1987). Report of the World Commission on Environment and Development: Our Common Future A/42/427.

United Nations Conference on sustainable Development (UNCSD). (2012). The History of sustainable Development in the United Nations. <http://www.uncsd2012.org/rio20/history.html>

United Nations Global Compact (2011). On-line description of UN Global Compact. <http://www.unglobalcompact.org/>

Vanclay, F. (2004). The triple bottom line and impact assessment: How do TBL, EIA, SIA, SEA and EMS relate to each other? *Journal of Environmental Assessment Policy and Management*. **6(3)**, 265-288.

Van der Vorst, R., Grafe-Buckens, A., and Sheate, W.R. (1999). A systemic framework for environmental decision-making. *Journal of Environmental Assessment Policy and Management*. **1 (1)**, 1-26.

Voinov, A. and Farley, J. (2007). Reconciling sustainability, systems theory and discounting. *Ecological Economics*. **63**, 104-113.

Yiridoe, E.K., Clark, J.S., Maret, G.E., Gordon, R., Duinker, P. (2003). ISO 14001 EMS standard registration decisions among Canadian organizations. *Agribusiness*. **19 (4)**, 439-457.

Zeng, S.X., Tam, C.M., Tam, V.W.Y., Deng, Z.M. (2005). Towards implementation of ISO 14001 environmental management systems in selected industries in China. *Journal of Cleaner Production*. **13**, 645-656.

Zutshi, A. and Sohal, A. (2004). Environmental management system adoption by Australasian organisations: part1: reasons, benefits and impediments. *Technovation*. **24**, 335-357.