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The Effectiveness of International Environmental Regimes: The Case of the ISO 14000 Regime

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Abstract

The Effectiveness of International Environmental Regimes:
The Case of the ISO 14000 Regime

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ISO 14000 is a series of international environmental standards, which emerged in response to the combined forces of global economic integration, a shift from command-and-control regulations to voluntary forms of environmental protection, and the promotion of sustainable development. The most important component of ISO 14000, and the only element that can be certified, is ISO 14001 Environmental Management System (EMS). It is a process-based, generic, voluntary standard, which does not set specific performance targets. It aims primarily to eliminate non-tariff trade barriers and improve environmental performance on a continuous basis. Since its introduction in 1996, the number of ISO 14001 certifications has increased dramatically, but it has been adopted unevenly around the world. Given the objective of ISO 14000 to be "practical, useable, and useful" to any type and size of organization, this thesis examines the structures and procedures of ISO 14000 and who has and has not adopted the standard and why. Despite the efforts of ISO, ISO 14000 standards are developed predominantly by large-scale economic actors and technical experts from developed countries. As the current adoption pattern indicates, the implementation cost and technical complexity of

the standard is preventing many, such as small-and-medium-enterprises and organizations in developing countries, from adopting the standard. To achieve universal adoption, the thesis suggests that it is necessary to enhance the level of representation of international actors, and multiple stakeholders, and to increase the environmental accountability of the standard by strengthening capacity building and ensuring transparency of performance.

"As long as we have hope, we have direction, the energy to move, and the map to move by. We have a hundred alternatives, a thousand paths and an infinity of dreams. Hopeful, we are halfway to where we want to go; hopeless, we are lost forever."

- Hong Kong proverb

Table of Contents

List of Figures

List of Tables

Chapter One:

Emergence of International Environmental Standard, the ISO 14000 series

ISO 14000, officially known as the ISO 14000 series, is a collection of international, voluntary standards that have been developed by the International Organization for Standardization to assist organizations worldwide to improve their environmental performance. The ISO 14000 environmental management standards are guidelines designed to create standardized global procedures for corporate environmental management. The core of the series, ISO 14001, which defines the elements of an environmental management system (EMS), was introduced in 1996, with ISO 14010 that deals with environmental auditing. It was followed by ISO 14020 (environmental labelling) and ISO 14040 (life cycle assessment) in 1998, and ISO 14030 (environmental performance evaluation) in 1999 (see Appendix A for a list of ISO 14000 standards). Together, ISO 14000 represents the world's first international environmental set of standards. Since their introduction, businesses and organizations have been adopting the standards at a rapid rate, reflecting a growing acknowledgment by businesses and governments that ISO 14000 has the potential to improve environmental performance and reduce non-tariff barriers to trade by providing one, universally recognized, environmental standard. This thesis will

examine the potential for ISO 14000[1] to truly achieve these objectives, by examining who is and who is not adopting the standard worldwide, and why. But first, this chapter looks at how the first international environmental standards, ISO 14000 series emerged, and what ISO 14001-EMS is.

During the last half of the 20th Century, environmental policymaking, traditionally the domain of governments, has increasingly been driven by the involvement of the public as well as the private sector. Growing public demand for a better environment has also led the private sector to become more environmentally aware and even proactive in its business operations. In this chapter, I argue that ISO 14000 can be seen as a product of the interaction between growing environmental awareness and global economic integration over the course of the past three decades. It is widely agreed that rapid economic growth worldwide and increasing global economic integration since the 1970s have had a negative impact upon the environment, and fostered a widespread realization of the links between economic activity and environmental degradation. This concern was behind the establishment of the World Commission on Environmental and Development (WCED) in 1983 resulting in its landmark report *Our Common Future*, also known as the Brundtland Report. In the report, WCED highlighted the inseparability of development and environmental issues in both developed and developing nations, as well as the concept of sustainable development to advance international development. WCED argued that achieving sustainable development would require the combined

[1] This thesis refers to 'ISO 14000', with particular focus on ISO 14001-Environmental Management Standard.

commitment of individuals, voluntary organizations, and businesses as well as governments in new forms of international co-operation. One such international initiative was ISO 14000. ISO 14000 emerged primarily as a result of the Uruguay round of GATT (General Agreement on Tariffs and Trade) ending negotiations in 1994 and the United Nations Conference on Environment and Development (UNCED) held in Rio in 1992. While GATT concentrated on the need to reduce non-tariff barriers to trade, the Rio Summit generated a commitment to protection of the environment worldwide and the concept of sustainable development.

At the same time, the environmental regulatory system, along with regulatory systems in general, has undergone a radical shift from traditional command-and-control mechanisms to voluntary measures, while businesses have begun to be more conscious of and proactive in environmental issues and an initiator in environmental policy making. First to emerge were national and regional environmental standards. The British Standards Institute (BSI) was the first to develop an environmental management system, BS 7550, in 1992. The Canadian Standards Association (CSA) developed its own environmental management, auditing, eco-labelling and other standards, the European Union developed all of these plus Eco-Management and Audit Scheme (EMAS) regulation, and many other countries such as US, Germany and Japan have introduced eco-labelling programs. In the wake of the increase of environmental standards worldwide and the rapid acceptance of ISO 9000 (quality management system), ISO assessed the need for international voluntary environmental management standards, culminating in the development of the ISO 14000 series.

This chapter comprises three sections. The first section looks at how environmental awareness and global economic integration merged at the UNCED in Rio in 1992 and led to the development of ISO 14000. The second section discusses conceptual shifts in the environmental regulatory system and business operations after the 1980s and the rise of voluntary environmental initiatives. The last section outlines the characteristics and functions of ISO 14001-EMS compared to other EMS, BS 7750 and EMAS.

1.1 Convergence of environmentalism and global economic integration in Rio

Public concern for the environment and human health grew internationally during the 1960s and the 1970s. At the same time, the economy grew and also became increasingly integrated transnationally. These two forces came together at the United Nations Conference for Environment and Development (UNCED) held in Rio in 1992, in the realization that the concern for the former in light of the latter would necessitate a new notion of economic development for the present and the future. The 'new' concept became known as "sustainable development"[2].

1.1.1 Environmentalism

Rapid economic growth fuelled by unprecedented population growth and rising levels of consumption since the 1960s has prompted a popular concern about a link between economic development and environmental degradation. Jordan and

[2] The concept of sustainable development involves the integration of three spheres (social, environmental and economic) not just the last two.

O'Riordan (1995: 136) refer to the popular concern about the environment as environmentalism, and define it as "a social movement which reflects a growing public demand for a better environment, untainted by pollution and resource extraction". According to Hart (1997), the rise of environmentalism in the 1960s was triggered by a series of large-scale ecological disasters, such as the destruction of life in Lake Erie in the US, fire on the Rhine in Europe, and water contamination by mercury in Japan.

Government and industry responded differently to environmentalism. While governments were quick to respond to public concern over the environment, the private sector remained unaware of their responsibility in environmental degradation. Governments, particularly in the developed nations, responded to the growing environmental concern by implementing environmental laws to force industries to limit their levels of pollution. Most notably we saw the rise of national environmental agencies such as the US Environmental Protection Agency (EPA) as strong and independent regulatory arms of government. Oblivious to the public concern, industry considered such laws annoyance or hindrances to doing businesses (Hart, 1997; Walley and Whitehead, 2000). Companies often tried to deny their impact on the environment or avoid regulations.

The increasing transboundary or supranational nature of environmental problems (e.g. acid rain, species extinction, deforestation, and marine pollution) induced governments to co-operate internationally. The first international conference on the environment, the United Nations (UN) Conference of the Human Environment (the Stockholm Conference) took place in 1972. The Stockholm Conference was

held to harness international cooperation for environmental protection and legitimize environmental policy as a universal public concern among countries (Economy and Schreurs, 1997). Since the 1970s, more cooperation and more coordination among nations in the formulation and implementation of policies have taken place, resulting in hundreds of bilateral and multilateral agreements. The number of such international environmental agreements reached 900 by the 1990s (*Ibid*, 1997).

1.1.2 Global economic integration

At the same time, spurred by economic growth and free trade, the economy has become increasingly integrated. Between the 1970s and 1990s, flows of foreign investment have grown by about 13% per annum, and the number of transnational corporations (TNCs) has also kept increasing, reaching 37,000 by the early 1990s (Johnston *et al.*, 1995). While economies became progressively linked around the world, the flows of foreign capital tended to concentrate geographically, affecting social as well as environmental sustainability. Europe, Japan, and US controlls seventy percent of foreign direct investment, and 90% of TNCs are headquartered in the developed nations (Johnston *et al.*, 1995; Paterson, 2000). The impact of economic integration on social sustainability is a product of the 'New International Division of Labour' (Roberts, 1998). The division emerged when wealthier countries started to specialize in designing, high-tech products, and services while poorer countries were left with an increasing share of low-skilled assembly and manufacturing jobs. Much of the expansion of production in the poorer "peripheral" countries has been triggered by investments from TNCs (Roberts, 1998).

From the perspective of international development, it is widely argued that international trade is antithetical to social equity and environmental protection (see, for instance, Johnston *et al.*, 1995; Paterson, 2000). While developed countries were increasing their economic wealth as measured by Gross National Product (GNP) at some cost to the environment; developing nations faced unfair conditions of labour, negative balance of payments and major degradation of the natural environment (Roberts, 1998). Overall, the global economic activity resulted in negative outcomes on social and environmental sustainability, especially in the less developed countries. TNCs from more developed countries have come to exploit low cost human and natural resources in developing countries, often with little regard for their environmental impact.

1.1.3 Rio and sustainable development

In 1992, the fourth UN Conference on Environment and Development (UNCED) in Rio de Janeiro addressed the issue of the global implications of the inescapable link between economic growth and environmental degradation. The purpose of the UNCED was to nurture global awareness and cooperation in addressing environmental degradation and "sustainable" consumption. Following the publication of *Our Common Future* by the World Commission on the Environment and Development (WCED) in 1987, the conference put a tremendous emphasis on the

concept of sustainable development[3].

The UNCED provided an opportunity for government officials, civil society, Non-Governmental Organizations (NGOs), and economic players to share an understanding of the complexity and international scope of environmental concerns. The WCED's report emphasized that resource degradation and environmental stress are the consequences of disparities in economic and political power, and specifically called upon industries to operate more "efficiently" with respect to their environmental impact:

> industries and industrial operations should be encouraged that are more efficient in terms of resource use, that generate less pollution and waste, that are based on the use of renewable rather than non-renewable resources, and that minimize irreversible adverse impacts on human health and the environment (WCED 1987: 213).

International institutions like the World Business Council for Sustainable Development (WBCSD) and the UN Environmental Programme (UNEP) have emerged as leading players in strengthening global environmental awareness and promoting sustainable development. Together, these institutions attempt "to underpin globalization and free, open markets with stable societies and a fair distribution of benefits" (Stigson, 2000: 36).

[3] According to *Our Common Future*, also known as the "Brundtland Report", sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987: 43). "The need" in the definition is further emphasized as the basic needs of the world's poor, and the idea of having limitations is posed for present and future needs.

1.2 Conceptual shift in environmental regulatory system and in business operations

During the 1980s and 1990s, parallel to a paradigm shift occurring in the environmental regulatory system, a shift has taken place in business operations. These shifts were important elements in the eventual creation of the first international environmental standard, ISO 14000.

1.2.1 Shift in environmental regulatory system

Until recently, legislation and regulations have been the principal, and often sole, environmental policy tools. Since the 1980s, there has been a major shift in thinking at several levels concerning effective environmental regulation. Traditional command-and-control methods of environmental regulation involve governments enacting laws limiting emissions to which industry is forced to respond often by requiring expensive technological change or paying fines. It is now argued by many that such regulatory outcomes are inefficient, due to the way the traditional regulatory system operates:

> polluters release pollutants into the environment; there is public outcry and resentment that such pollution is possible; legislatures enact environmental pollution control laws; and regulators penalize polluters for their environmental-related expenditure increases (Reiley, 1997; 535-36, quoted by Taylor, 1998: 510).

Policy analysts have come to argue that the conventional command-and-control system is inefficient for three reasons. First, it tends to form a negative adversarial relationship between regulatory agencies and industry. As evidenced in the US elections in 1994 when industry strongly expressed its preference for deregulation,

and there was a clear anti-regulation backlash. Second, it is rigid by nature and does not therefore permit common sense to play a role in environmental protection (Taylor, 1998). Third, it tends to establish "costly, complex, and time-consuming" operations for the improvement of the environment (Speer, 1997: 227, quoted by Taylor, 1998: 510).

During the 1980s, the environmental policymaking discourse began to shift from command-and-control to voluntary measures of pollution prevention. Faced with increasingly complex environmental problems and seeing the economic payoffs of good environmental management, many organizations have begun to develop other tools. The development of Environmental Management Systems (EMS) was a product of this conceptual shift, but they are only one voluntary and non-regulatory initiative (VNRIs). A VNRI characterizes "a commitment not required by legislation, agreed to by one or more organizations and applied in a consistent manner to influence or benchmark behaviour" (Kerr *et al*, 1998: xv). Types of VNRIs available as environmental measures include:

- Voluntary challenges (e.g. Canada's Voluntary Challenge and Registry Program)
- Standards (e.g. ISO 14001 environmental management system)
- Codes of practice (e.g. Responsible Care)
- Environmental labeling (e.g. Environmental Choice Program)
- Negotiated agreements (e.g. Dutch covenants).

EMS, in particular, has been seen by many as a revolutionary way of controlling environmental impact. In contrast to traditional "command-and-control" measures, EMS is "concerned with establishing 'how to' achieve a goal, not 'what'

the goal should be" (IISD, 1996: 2). Both government and industry have come to view EMS as the preferred framework and method for industry to improve its environmental performance. In contrast to the command-and-control system, EMS regulations are based on voluntary, market-based and incentive-driven measures to minimize waste and prevent pollution (Lamprecht, 1997; Taylor, 1998). EMS is also a cost reduction measure for regulators: in place of government inspectors paid for by the public, EMS assures its conformity by means of certification by third party auditing paid for by industry. Furthermore, the flexible nature of EMS often forces industry to become proactive rather than reactive in its approach to environmental impact.

1.2.2 Shift in business

By the early 1990s, rising environmentalism had brought a conceptual shift in the way industry operated with respect to the environment. Businesses increasingly developed proactive business strategies such as eco-efficiency, industrial ecology, and product stewardship. *Eco-efficiency* involves "environmental and economic performance to create more value – for business itself and also, crucially, for the whole community – with less impact" (Stigson, 2000: 36), while *Industrial Ecology* takes "a multidisciplinary approach to the harmonization of industrial systems and economic activities and to the links with fundamental natural systems" (Aigner, 1999:2). Proactive environmental business management typically looks at waste minimization and prevention, product stewardship, and the use of clean technology (Berry and Rondinelli, 1998). In addition to the focus on pollution minimization in

the manufacturing processes, businesses began to consider the total lifecycle of a product to reduce, reuse, or recycle of materials. Particularly in the developed countries, there are a growing number of businesses convinced that playing a proactive role in solving environmental and social problems is a means to demonstrate to the public that their businesses do take their environmental and social responsibility into consideration (Kerr *et al*, 1998). A recent report by the Conference Board of Canada even claims that there is demonstrable evidence of a positive link between corporate sustainable development practices and price performance (Feltmate, *et al*, 2001).

Industry began to prefer voluntary initiatives rather than having more regulations, forming various private standards and measures. Examples of industrial environmental standards include the Chemical Manufacturer's Association's Responsible Care Program in North America, Forestry Stewardship, and the International Chamber of Commerce's Business Charter for Sustainable Development. Many of these programs were developed in response to industry-specific needs, and are introduced to provide common sets of guidelines to industry members. These initiatives give regulatory control to industry, compared to the command-and-control measures that impose external regulatory control. Since industry tends to see government regulatory control as a threat to its control in running its business activities, the voluntary initiatives ameliorate industry-regulator relations by giving more self control. The proliferation of such standards throughout the late 1980s and early 1990s was certainly one driver behind the rapid development of the ISO 14000 series.

The new environmental initiatives in business are increasingly seen as catalysts for constant innovation, new market opportunity, and wealth creation (Berry and Rondinelli, 1998; Kerr *et al*, 1998; Roberts, 1998; Walley and Whitehead, 2000). Industries no longer view environmental management as a cost of doing business but recognize that proactive measures can reduce the regulatory burden, lower impacts on the environment, and yield economic benefits in the long run. Stakeholders often give credits to companies for having environmental initiatives. Nevertheless, environmental groups tend to insist on a continual need for strong government regulation and enforcement upon industry. The use of environmental initiatives, therefore, still leaves a challenge for industries to demonstrate its environmental responsibility in 'how much' improvement they are making. This raises a question of transparency of performance of industry to gain public accountability.

1.3 Emergence of ISO 14000

The convergence of economic trends, the rise of environmentalism, and changes in policy making are all-important in understanding why ISO 14000 emerged in the 1990s. Growing environmentalism and global economic integration have resulted in the re-organization of players in the international environmental policymaking arena in the 1990s (Clapp, 1998; Paterson, 2000). While states see their "shrinking" legitimacy and authority, there is growing acceptance of a much broader group of stakeholders involved in the environmental policy formation (Sassen, 2001). The stakeholders now include international organizations, TNCs, international environmental groups, multilateral banks, and governmental and non-

governmental organizations (Economy and Schreurs, 1997). The reorganization has had a tremendous effect on the environmental regulatory system. The boundary between the public and the private has become blurred as "a growing number of regimes in which the balance of influence in decision making is tilted not toward the state but toward private actors" (Clapp, 1998: 297).

As the number of labels, codes, and standards has increased worldwide, industry has confronted increasing barriers to trade (Roberts, 1998; TC 207, 2001). Industries in various countries and regions have developed their own green labelling, standards, and codes of practices, to respond to public demands and with it their own certification bodies and systems (Roberts, 1998). Overwhelmed with the various environmental tools, industry around the world has demanded harmonization of environmental measures that could allow both consumers and traders to be able to recognize the environmental sustainability of the product and that could "head off regulations and more ecolabeling schemes or stricter regulations" (Roberts, 1998: 151) in any countries of the world.

By the early 1990s, the International Organization for Standardization (ISO) was already a major player in the area of international industry standards and acknowledged the demand of industry around the world as well as the call from the UNCED to create a universally recognized standard for industry to achieve environmental sustainability. ISO had already gone through a similar process of developing a universal quality management standard, ISO 9000, for world businesses. The acceptance of ISO 9000 was growing rapidly worldwide, and ISO formed the Strategic Advisory Group in the Environment (SAGE) in 1991 to assess the need for

international environmental management standards. SAGE was in charge of determining whether such standards could serve to promote a generic approach to enhance organizations' ability to measure improvements in environmental performance as well as to facilitate trade by cutting costs and trade barriers imposed by foreign national standards and regulatory bodies. In 1992, SAGE's recommendations created a committee, TC 207, for the development of international environmental management standards at ISO. In the fall of 1996, ISO officially introduced the first international environmental standard, named ISO 14000 series. Based on the flexible and generic nature of Environmental Management Systems (EMS), ISO 14000 provides an operational framework to control actual and potential environmental impacts of any involved resource for any size and type of organization of the world (Cascio, *et al*, 1996; ANSI, 1999; ISO, 1999).

1.3.1 ISO 14000 Environmental Management Systems

ISO 14000 is a series of voluntary standards. The central element is an EMS, explained in ISO 14001 and 14004. Only ISO 14001 contains an EMS certification process. ISO 14001 is a systematic approach to control the impact of activities, products, or services on the environment (ISO/TC 207, 1999). The ISO 14001 EMS process can be briefly described by its six main elements or stages, including environmental policy, planning, implementation and operation, checking and corrective action, management review, and continual improvement.

1. **Environmental policy**
   - The environmental policy and the requirements to pursue this policy via objectives, targets, and environmental programs

2. **Planning**
   - The analysis of the environmental aspects of the organization (including its processes, products and services as and well as the goods and services used by the organization)
     - 2.1 Environmental Aspects
     - 2.2 Legal and other requirements
     - 2.3 Objectives and targets
     - 2.4 Environmental management program(s)

3. **Implementation and operation**
   - Implementation and organization of processes to control and improve operational activities that are critical from an environmental perspective (including both products and services of an organization)
     - 3.1 Structure and responsibility
     - 3.2 Training, awareness and competence
     - 3.3 Communication
     - 3.4 Environmental management system documentation
     - 3.5 Document control
     - 3.6 Operational control
     - 3.7 Emergency preparedness and response

4. **Checking and corrective action**
   - Checking and corrective action including the monitoring, measurement, and recording of the characteristics and activities that can have a significant impact on the environment
     - 4.1 Monitoring and measurement
     - 4.2 Non-conformance and corrective and preventive action
     - 4.3 Records
     - 4.4 Environmental management system audit

5. **Management review**
   - Review of the EMS by the organization's top management to ensure its continuing suitability, adequacy and effectiveness

6. **Continual improvement**
   - The concept of continual improvement is a key component of the environmental management system; it completes the cyclical process of plan, implement, check, review and continually improve

(Source: Adapted from Fredericks and McCallum, 1999; ISO/TC 207, 1999.)

The elements of ISO 14001 are to be implemented in a cyclical manner to achieve long-term improvements of operational impacts, particularly through identification of

what operational aspects need improvement (ISO 14001, clause 2.1 and 2.3), making commitments to concerned regulations (ISO 14001, clause 2.2), and periodic monitoring and reviewing of impacts on the environment. By providing a framework to give a focus to legal regulations related to business operations, ISO 14000 promotes conformance with governmental regulations.

Compliance is based on the implementation of an ISO 14001 environmental management system (EMS). Organizations can either declare that their EMS meets the requirements of ISO 14001 as self-declaration or have their EMS registered by an independent third party, known as a "registrar", who assesses and audits the organization's EMS to make sure that it complies with the requirements of ISO 14001 (SCC, 2002). The registrars are recognized by national accreditation bodies (e.g. in Canada, the Standards Council of Canada is the ISO 14001 accreditation body that runs programs for EMS registrars, auditor certifiers, and auditor trainers).

ISO 14000 shows many similarities with but also differences from the European EMS called Eco-Management Audit Scheme (EMAS) and British Standard, BS 7750 (Brkic and Douglas, 1997; World Bank, 1997; Cascio and Shideler, 1998). EMS is a type of environmental control aimed at achieving pollution prevention by giving focus on potential and actual environmental impact of activities. The BS 7750 is the oldest EMS, established in the United Kingdom (UK) in 1992. Both ISO 14001 and EMAS were based on BS7750. While ISO 14000 was developed by a private, international organization (ISO), EMAS was developed by the European Union (EU) as a government regulation. Table 1 compares these three EMS.

Table 1: Comparison of ISO 14001, BS 7750, and EMAS

	ISO 14001	EMAS	BS 7750
Type of standard	international, voluntary, consensus, industry standard	an EU regulation	national, voluntary
Applicability	site specific to activities, products, and services in any sector; also to non-industrial organizations, like governmental agencies	site specific to individual facilities	to the whole organization to all activities and sectors; to non-industrial organizations
Focus	on EMS; Indirect link to environmental Improvements	on performance improvements at a site; on improved communication to the public	on EMS, with improvements
Initial environmental review	suggested in annex, but not required in standard	required in regulation	suggested but not specified
Policy commitment	to continuous improvement of EMS and prevention of pollution; to applicable environmental legislation and voluntary commitments	to continual improvement of performance; to applicable environmental legislation	to continual improvement of performance
Audits	audits required to the EMS; monitoring and measuring of key environmental characteristics are required; frequency of audits not specified	audits required to the EMS, processes, data, and performance; audits required at least every three years	audits required to the EMS; audits not specified for compliance/performance; frequency of audits not specified
Public communication	only environmental policy must be made public; other external communications must be considered, but not specified	environmental policy, program, and management system must be available; public environmental statement and factual data are required	only environmental policy; other external communication

Source: Adapted from Cascio *et al*, 1996. Table 1-2; Ritchie and Hayes, 1998. Figure 1-2.

Although the three EMSs cover different geographical jurisdictions, all are based on the principle of continual improvement and all contain similar components: The components include 1) commitment, 2) establishment of environmental policy, planning and implementation, 3) measurement and evaluation, 4) audits and review, and 5) environmental communication (Brkic and Douglas, 1997; World Bank, 1997).

All three EMS require an organization to establish an environmental policy with the involvement of its senior management that commits of the management to continual improvement. Such improvement is monitored through auditing and reviewing operations. In the case of BS 7750 and EMAS, there are further requirements on the communication of environmental policy and performance to the public and the maintenance of comprehensive environmental records (Cascio *et al*, 1996).

The operation of the three EMS standards is different. EMAS is regarded as the most stringent (Brkic and Douglas, 1997). Since it requires organizations to produce a report annually on its environmental performance, it demands site-specific registration and a periodically updated environmental statement for the public based on the review of present, future, and past activities (Brkic and Douglas, 1997). ISO 14001, on the other hand, focuses on present operations and does not demand the production of performance reports for the public. ISO 14000 also differs from the other EMS in its membership. Unlike the other EMS standards, ISO 14000 involves transnational business players and technical experts as the main members involved in developing the standards and procedures (ISO, 1999).

What makes ISO 14001 EMS unique is its truly international nature and its origins in the UNCED in 1992 (Cascio *et al*, 1996; Nash and Ehrenfeld, 1996; ANSI, 1999; ISO, 1999). The main purpose of the UNCED was to address global environmental issues and recommend solutions based on the concept of sustainable

development. Agenda 21[4] and ISO 14000 are seen as significant outcomes of the international effort at the conference (Haklik, 1998).

1.4 Conclusion

The emergence of ISO 14000 was a result of two parallel forces: global economic integration and the rise of environmentalism. In particular, the increasingly widespread recognition that global economic integration had tremendous negative impacts on the environment and international equity was a major force leading to the creation of ISO 14000 as an outcome of Rio. ISO 14000 is a voluntary environmental standard that purports to assist organizations of any size and any type to continuously reduce its environmental impact. ISO 14000 attempts to resolve the regulatory dilemma that exists between the shrinking power of States to control increasingly transnational and global environmental problems on the one hand and international organizations that lack legitimized power to enforce the standard on the other hand. Is ISO 14000 an effective policy instrument to improve environmental performance and reduce non-tariff barriers to trade and ultimately serve as an instrument of sustainable development? This is an important question but one that is very difficult to answer. The regime is still young and it is impossible to measure if it has had any direct effect in reducing environmental impacts. This thesis analyzes the effectiveness of ISO 14000 by examining the political and organizational structure of the ISO 14000 regime and by looking at the most tangible and immediate indicator of

[4] Agenda 21 is a comprehensive guideline for achieving global sustainability.

its success in these respect: who has adopted ISO 14001 EMS around the world and why or why not. Based on the concept of regime theory and a framework of tracing causal mechanisms, the thesis analyses what and how ISO 14000 aims to achieve, and how effective the mechanisms could be. In addition to analyzing the available literature the study relies upon (1) interviews with key actors directly involved in the development process, (2) a questionnaire survey of ISO 14000-registered companies in Canada, and (3) a statistical analysis of the number of ISO14001 registrations and how they are correlated with certain socio-economic factors. To inform the results the study relies heavily on the literature on the implications of ISO 14000. Using these data and method, the study aims to identify how ISO 14000 can be an effective policy instrument. The next chapter reviews the literature on the strengths and weaknesses of ISO 14000 and on ways to measure the effectiveness of an international environmental regime, such as ISO 14000.

Chapter Two:

Measuring the Effectiveness of International Environmental Regimes: the Case of ISO 14000

The objectives of this chapter are to review what has been written on the reasons why and how widely ISO 14000 is being adopted as a basis for judging the effectiveness of ISO 14000 and to show how this thesis is going to assess the effectiveness. I argue that despite the extensive discussion in the literature of adoption trends, as well as the advantages and disadvantages of ISO 14000, most studies lack a rigorous methodology that would allow them to do anything more than speculate on the factors behind the world and industry-wide adoption trend. Moreover the discussion of the advantages and disadvantages has been rather narrowly confined to a business disciplinary perspective. There has been little attempt to develop, let alone apply, a sound basis for examining the effectiveness of ISO 14000. For this we turn to the newly emerging field of Regime Studies to provide a useful framework for measuring the institutional and environmental effectiveness of international institutions such as ISO 14000 that form as a regime.

In the first section, I will briefly review the literature on ISO 14000. ISO 14000 has been examined from different perspectives, most notably those of business management, engineering, environmental sustainability, and international development. While a number of studies do discuss the speed and pattern of ISO

14001 adoptions as well as reasons behind the adoption, overall these discussions all concentrate on a quasi cost and/or benefit type of analysis. The second section looks, in particular, at why the field of Regime Studies has emerged and how it treats the whole area of evaluating the effectiveness of international environmental regimes. This section discusses how the impacts of regimes can be measured and what approaches are available to examine the effectiveness of those impacts. The section looks at the framework of tracing causal mechanisms largely developed by Oran Young and Michael Levy (1999). Their framework involves three stages and six mechanisms in assessing the effectiveness of international environmental regimes, and the section uses the case of marine oil pollution to show how the method of tracing causal mechanisms can be applied. In the last section, I show how this thesis applies the framework of tracing causal mechanisms to examine the effectiveness of the ISO 14000 regime.

2.1 Literature review

The literature on ISO 14000 is vast and wide-ranging, despite the recency of the introduction of the standard. At the outset, most interest was in the application of ISO 14000 to business management. But, more recently, social scientists have become more interested in looking at ISO 14000 from the point of view of law and public policy analysis as well as international development. The literature can also be divided by the approach taken between empirical and theoretical studies. Most business management and engineering studies are empirical in nature focusing on the

actual implementation of ISO 14000, while theoretical studies tend to discuss ISO 14000 in terms of international environmental policy.

The literature commonly indicates that universal acceptance is a crucial issue for ISO 14000 to be effective as a truly international set of standards. Questions frequently discussed in the literature are who is adopting ISO 14001 so far, what are the incentives for businesses to adopt the standard, and the reasons why the standard is being adopted unevenly around the world. These are important questions in examining the potential of ISO 14000 to become an international environmental management tool, applicable, as it purports to be, to any type or size of businesses in any country. In particular, an underlying assumption of theoretical studies is that if ISO 14000 is to achieve its objective of eliminating non-tariff barriers to trade and improving environmental performance around the world, it must be universally acceptable. Identifying obstacles to the ultimate global acceptance of ISO 14000 by organizations around the world is an essential first step to making policy recommendations that might increase the possibility of the standard becoming a universally acceptable environmental management tool for any organization in the developed and developing world.

Many studies have looked at the number of registrations to examine who is adopting ISO 14000. While a few focuses on adoption trends around the world, by region, country, and type of industry, most studies look at one particular geographical context. These empirical studies of adoption trends and patterns all confirm that adoption is far from universal and that there are major geographical differences in the level of adoption. Japan is the leading country in the number of registrations, while it

is widely believed that, at the regional level, Western Europe and East Asia are very active and North America has a low level of adoption compared to these regions with similarly developed economies. The empirical studies tend to base their analysis of adoption levels and trends on raw data of gross numbers of registrations irrespective of the size or level of economic activity, assuming that gross registrations is a valid measure of the level of adoption of ISO 14000 in a country or sector. This raises serious questions as to the validity of their results.

Since ISO 14000 is supposed to be a global environmental management tool, it is useful to consider national or regional differences in the way ISO 14000 is perceived and being adopted. Bridgen (1997) and Corbett and Kirsch (2001) examine responses to ISO 14000 from countries around the world and discuss how differently ISO 14000 is recognized and adopted. Bridgen (1997) concludes that while recognition of ISO 14000 by government does not necessarily affect its national industries to adopt the standard, general familiarity with environmental regulations does. This raises a cross-national consideration to make ISO 14000 be equally accessible. Likewise, Corbett and Kirsch (2001) argue that the level of adoption of ISO 9000, and a country's involvement in ratifying international environmental agreements, as well as dependence on exports tend to be positively associated with the higher adoption of ISO 14000 in a country. Moreover, at the regional level, Anderson (2000) argues that a lack of compelling reason to adopt international standards is a major factor behind the lower number of ISO 14000 registrations in North America.

2.1.1 Advantages and disadvantages of ISO 14000

To understand these adoption patterns and trends, most empirical studies tend to evaluate the relative advantages (benefits) and disadvantages (costs) of ISO 14000 based on the implementation experience. Studies commonly discuss obstacles, difficulties, and challenges to the implementation of ISO 14001 from a business perspective. Based on survey response from certified facilities of a large corporation in Quebec, Canada, Boiral and Sala (1998) find a variety of drawbacks stemming primarily from the cost and infrastructural constraints in the implementation processes. The ISO 14000 system generates costs in the auditors' work, time for documentation, and efforts to meet specifications such as training and communication (Boiral and Sala, 1998). Certification by third-party auditors costs between 24,000$ and 128,000$ plus consulting fees of 5,000$ and more, preventing many from certification (Atkinson-Grosjean, 1998). Many are skeptical about the use of ISO 14000 due to the required costs. Furthermore, some business operators claim that these expenses do not necessarily imply less pollution, a better corporate image, or new contracts (Boiral and Sala, 1998). Similarly, studies in Hong Kong and South Korea have also shown that industries there tend to see the implementation procedure as excessive and this has meant they adopt less (Culley, 1998).

As a result of the cost, many, such as IISD (1996), Roberts (1998), Zuckerman (1999), and Morrison *et al.* (2000) criticize that the high cost of implementation of ISO 14000, along with a lack of expertise and infrastructure, are responsible for bringing unnecessary discrimination between businesses and countries. Culley (1998) describes that while Latin American countries do recognize

the benefit of the ISO 14000 adoption, the level of acceptance is slow due to the lack of expertise and infrastructure. Wells and Galbraith (1999) identify the lack of low-cost certification services for SMEs as major obstacles to the adoption of ISO 14000 in Mexico. Overall, there is widespread agreement that the costs and infrastructural requirements for implementing ISO 14000 are major obstacles for SMEs in any country and especially for companies in developing nations.

The literature often emphasizes, nevertheless, that businesses commonly identify substantial benefits stemming from ISO 14000 certification process. ISO 14001-EMS implementation ensures improved environmental responsibility throughout an organization. One advantage is improved relations between industry and stakeholders. Tack (1999) finds that implementation of ISO 14000 in the electricity sector in Belgium has helped to improve relationships with stakeholders, particularly for its management of nuclear sites. EMS opens opportunities for employers, employees, and stakeholders to be involved together in environmental management. Burstrom (2000) uses a case of the municipality of Vasteras in Sweden and concludes that municipality-wide implementation of EMS can help to bridge professional culture and language gaps between municipal authorities and companies. Implementation causes the firms to consider the role of the local people and the government and, as a result, involve their local people in the firms' environmental activities. Therefore, the implementation helps to enhance the employees' environmental awareness and capacity, as well as relations with civil society and government (Boilal and Sala, 1998; Matouq, 2000; Mohammed, 2000).

Most studies, however, stress economic incentives associated with adopting ISO 14000 [see for example, Belgian electricity sector (Tack, 1999), Central Japan (Mohammed, 2000), printed circuit board in Hong Kong (Chin and Pun, 1999), and American business practices (Hogarth, 1999; Darnall *et al.*, 2000)]. First and foremost are benefits accruing to improved efficiency. Based on the commitment to continuous improvement within the EMS implementation, studies show that there is performance improvement on the environment, particularly through reducing resource use and saving energy consumption. Such performances lead to reduced economic expense in daily business operations. The certified companies also gain better environmental image, which leads to expansion of their market share. Therefore, ISO 14000 is also a marketing tool to demonstrate environmental awareness of organizations. Assessing the overall costs and benefits for SMEs, Ammenberg *et al.* (1999) argues that the considerable benefits in performance improvement and cost-savings can outweigh the economic and infrastuctural obstacles. This can even be time of smaller enterprises, as demonstrated in the case of joint implementation among SMEs in an industrial park in Sweden. SMEs can reduce the anticipated cost and maximize the benefits if they jointly implement ISO 14001 EMS.

In addition, there can be legal, insurance, and financial benefits to the certified companies. Rosenbaum (1997) reveals that ISO 14000 leads to improved terms for business loans and insurance with lower premiums and even legal discretion on conformance to ISO 14000 as an alternative regulatory program. ISO 14001 certification has also been found to speed approvals for permits and licenses

(Herremans and Welsh, 1999). Ritchie and Hayes (1998) found opportunities at the international level: in multilateral trade agreements, ISO 14000 may become a factor in establishing whether governments are actually making an attempt to improve the environmental situation within their countries. The use of ISO 14000 can also increase access to international aid and loans from financial institutions such as the World Bank.

The empirical studies suggest that there are factors influential to the level of adoption at a micro-level with respect to organizations. ISO 14000 helps businesses take on environmental responsibility and become more efficient economically and environmentally. Nevertheless, the cost of implementation impinges on the level of adoption by SMEs that do not have the appropriate infrastructure and expertise to implement the standard. The same impediment exists for organizations in developing countries to adopt ISO 14001.

2.1.2 ISO 14000 as an international policy

Overall empirical studies show that an increasing number of companies are finding the benefits as sufficient incentive to adopt ISO 14000. Nevertheless, many studies suggest that for some organizations, particularly SMEs and those in developing countries, the costs and lack of infrastructure and expertise are major obstacles to becoming ISO 14000 certified. This raises serious questions as to the ability of ISO 14000 to serve organizations of any type and size in any country. On

the other hand, theoretical studies tend to look at the regulatory state and capacity of ISO 14000 to be an effective environmental policy tool.

Many of the theoretical studies see ISO 14000 as a catalyst for an environmental regulatory enforcement paradigm and remark that the benefit is too large to be missed (Nash and Ehrenfeld, 1996; Rosenbaum, 1997; Lally, 1998; Murray, 1999; Prakash, 1999). Several studies suggest the strength of ISO 14000 is to internalize environmental practice directly into business operations. Morrison *et al.* outline how EMS "could be integrated into existing commercial practices, regulatory structures, and trade regimes in a socially equitable and environmental beneficial manner" to achieve sustainable development (Morrison *et al*, 2000:2). Nash and Ehrenfeld (1996) conclude that private codes (i.e. Responsible Care; CERES principles; ICC charter; as well as ISO 14001) can foster long-term changes in the ways firms integrate environmental goals with business objectives.

Several studies have suggested that, in particular, ISO 14000 could be a useful tool for countries with little internal experience with environmental regulation and general standard development. Mohamed (2001) and Wilson (1998) argue for the usefulness of ISO 14000 for developing countries. China, for instance, adopted the ISO 14000 series as a part of its official environmental policy in 1997 (Clapp, 1998), and Mexico has been examining the standard as a basis of national environmental policy (Culley, 1998). Likewise, Trinidad and Tobago is considering a 10-year environmental plan incorporating ISO 14000 (Culley, 1998). In India, its environmental protection agency has granted ISO 14000 as an instrument of its regulation control (Wilson, 1998). However, Culley (1998) also argues that ISO

14000 is not useful to all developing countries. Countries, like Argentina, where there is no governmental infrastructure to enforce any kind of environmental program, have very little recognition and acceptance of ISO 14000 (Culley, 1998). Therefore, participation of developing countries is an important issue to the international usability of ISO 14000 and helps build their capacity in environmental protection.

To serve developing countries better, Clapp (1998) argues that ISO 14000 should improve its consistency with international sustainable development objectives. The author compares the goals outlined in the Agenda 21 and the implication of ISO 14000 and argues that the original purpose of ISO 14000 for global sustainability has faded or not been pursued appropriately. While Agenda 21 emphasizes the importance of the reduction of hazardous waste generation and the promotion of clean production and environmental technological transfer to developing countries, ISO 14000 does not necessarily help in achieving these goals: There is no mandatory procedures to reduce the generation of hazardous wastes and the standard does not specifically promote the use of clean production technology transfer to developing countries, nor does it attempt to integrate international environmental objectives as a part of its procedures (Clapp, 1998; Parto, 1999).

From an environmental perspective, studies argue that ISO 14000 lacks public accountability in reducing environmental impacts. McCloskey (1996) and Morrison *et al.* (2000) look at a feature of ISO 14000 that allows self-declaration of the certification and argue that, by allowing self-declaration, ISO 14000 certification could be misleading to the public by imposing an environmental image that is not

uniform (McCloskey, 1996; Morrison *et al.*, 2000). Compared to the certification issued by a third party, self-declaration may have little accountability of their performance. In addition, Roberts (1998) and Murray (1999) point out that, unlike other EMSs, ISO 14000 lacks accountability by not demanding the users to publish performance reports to the public.

The implications of ISO 14000 for sustainable development are a common issue in the theoretical studies (see IISD, 1996; McCloskey, 1996; Taylor, 1998; Morrison *et al.*, 2000). The concept of sustainable development played a significant role in the establishment of ISO 14000 series. While it is widely argued that ISO 14000 is or has the potential to be a significant positive instrument for sustainable development, there remains skepticism about whether environmental improvement, let alone sustainable development, necessarily results from the use of ISO 14000. While IISD focus on the benefits of the flexible nature of ISO 14001-EMS and how it works differently from the traditional type of environmental regulations, claiming that it has the potential to become a proactive business force for sustainable development, McCloskey (1996) suggests environmentalists, including environmental NGOs, be skeptical about whether improvement of environmental performance automatically occurs from its implementation. ISO 14000 allows users to implement EMS in either an environmentally proactive or reactive way, and for this reason Taylor (1998) and Parto (1999) emphasize that the level of effectiveness of ISO 14000 becomes relative to how an organization applies the standard. Taylor (1998) also argues that sustainable development means more than developing eco-

efficiency and clean technology; it is also about equity, justice, redistribution of opportunity, and alleviation of poverty.

> ISO 14001 will undoubtedly have a significant influence on sustainable development if utilized by organizations committed to sustainable development. However, ISO 14001 has certain deficiencies which may not make it as effective a regulatory concept as it has been proposed to be (Taylor, 1998: 544).

By setting its own objectives and targets, ISO 14001 allows an organization to pursue sustainable practices, but sustainability is not a necessary outcome of ISO 14001-EMS.

The literature as a whole depicts that the relative costs and benefits of ISO 14000 registration has resulted in uneven adoption around the world, nevertheless, suggests that ISO 14000 can serve as a revolutionary tool to reduce environmental impacts, improve economic performance, and even promote sustainable development but does not necessarily ensure the latter. While the literature examines the adoption trend based on the number of registrations, there is no comprehensive study of the trend that effectively controls for such factors as the size of population or economy and looks at who really is and is not adopting ISO 14000 and why. In addition, although much has been written and argued about the incentives and disincentives for an organization to become ISO 14000 certified, there has been little systematic attempt to assess why there are national or international level obstacles to the adoption and how to alleviate the obstacles. To examine these issues in relation to ISO 14000, we need a more rigorous analytical methodology. The following section looks at Regime Studies that can provide a systematic framework to assess the institutional effectiveness from both economic and environmental points of views.

2.2 The study of international environmental regimes

The study of international environmental regimes is relatively new, reflecting the changing forms of international environmental organizations and regimes during the past decades. While the overall number of international treaties, organization, and agreements in general has grown at a modest rate, the number of international environmental organizations and treaties has almost doubled since 1975 (Zürn, 1998). Since governments have very limited power to control and regulate outside of their sovereign territory, international forms of governance have emerged to attempt to regulate the global commons, such as the atmosphere, the oceans, Antarctica, and outer space that do not fall under the jurisdiction of any state. However, such international organizations lack the power and authority of sovereign States to enforce such agreements. It is this dilemma between jurisdiction and power that has prompted social scientists, particularly political scientists, to study international regimes and examine under what conditions international environmental regimes form and function and how they can or fail to be effective.

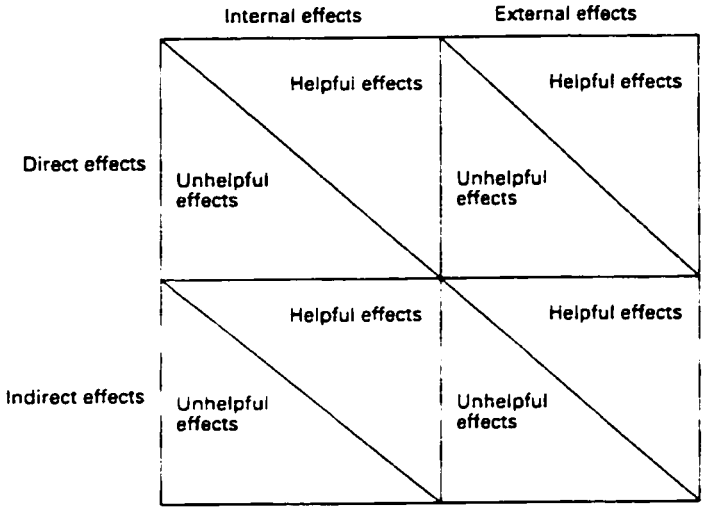
Governance is a central issue in the study of environmental as well as non-environmental regimes (Vogler, 2000). Regimes are social institutions based on the cooperative arrangement of actors who share interests in a particular issue area and who attempt to constrain the behavior of actors. Regimes are more than international organizations or even formal legal arrangements between states. They comprise the whole range of understandings of rules and procedures that exist in relation to common resources.

For purposes of explanation, I will use the Montreal Protocol regime as an example of an international environmental regime. The formation of this regime has its origin in scientific speculation that stratospheric ozone was being depleted by anthropogenic gases with serious implications for the health of humans and ecosystems (Green, 1998; Victor, 1998). The atmosphere has come to be regarded as essential to human survival. The gases themselves do not fall under national jurisdiction, but the production and emission of anthropogenic sources of ozone depleting gases (i.e. Chlorofluorocarbons – CFCs, Halons, Carbon Dioxide, Nitrous Oxide, and Methane) are under the control of national governments, resulting in a need for international cooperation around the globe. Set up by the 1972 Stockholm Conference, the United Nations Environment Programme (UNEP) has been the leading organization in this regime, demonstrating its coordinating role in the knowledge exchange and negotiations of the issue. The regime involves national governments, international scientific institutions, the chemical industry, and environmental non-governmental organizations (ENGOs) and possesses a dynamic institutional process where there is a continuous interaction of scientific findings, public concern, and policy.

Over time the focus of the study of regimes has turned from why and how regimes form to the consequences or outcomes of regimes (Zürn, 1998; Sprinz, 2000; Vogler, 2000). Political Scientists began to look at the interaction of power, interest, and/or knowledge within regimes, particularly concerned with security, trade, and gradually the environment. Assuming that regimes do make a difference, researchers have tried to evaluate the effects and effectiveness of regimes. Unlike sovereign

States, regimes do not have the power to impose binding legal force, hence the ability of regimes to change behavior and ameliorate a situation are crucial research questions. The study of regime effects attempts to examine how or why a regime is or can become effective in producing its intended results.

Figure 1: Dimensions of Regime Effects



Source: Young and Levy, 1999. Figure 1.1.

Young and Levy (1999) argue that given the web of interdependencies operating in international society we should expect international environmental regimes to have far reaching effects both over time and space. To recognize these they define three domains of effects of international environmental regimes (Figure 1): internal and external impacts, direct and indirect impacts, and good and bad impacts. Within the first domain of internal and external effects, we may ask how the regime influences the management of the problem that motivated its establishment by inducing changes in the behavior of actors directly involved. This domain of impacts also recognizes that regimes have impacts, often unintended, outside the concerned

areas largely because of the interrelated nature of environmental issues to other economic and/or social activities at the international level. The second domain, distinguishes between direct and indirect impacts according to the length of the causal chain connecting the regime to the behavior in question. Direct impacts have short causal chains while indirect impacts result from longer causal chains. This domain of impacts often refers to compliance records that exhibit behavioral responses linked either directly to the operation of a regime or indirectly to large-scale environmental politics. The third domain of good and bad impacts distinguishes between impacts that make a problem easier to manage from those that make it harder. These domains of impacts intersect with one another, and each domain contributes to how effective the regime is (Young and Levy, 1999).

The effectiveness of international environmental regimes involves two distinct components that are not always distinguished: political or institutional effectiveness and environmental effectiveness. Regime studies tend to look at the institutional design, such as the function of the secretariat and compliance mechanism of regimes to evaluate the institutional effectiveness (for example, see Keohane *et al*, 1993). However, to measure the environmental effectiveness of international regimes, scientific data become important in measuring environmental quality of the global environment based on long-term observation. In the case of the Montreal Protocol regime, the best measure of environmental effectiveness would be measuring levels of stratospheric ozone, however, due to a long chemical process of CFCs in the atmosphere, the regime's environmental effectiveness was scientifically measured by the level of production or consumption of ozone-depleting substances. A decline in

the emissions (production) of the substances observed since the Montreal Protocol was signed in the mid-1970's was used to 'prove' that the Montreal Protocol regime was successful in bringing about changes in behavior to solve its targeted environmental problem (for details, see Green, 1998; Victor, 1998).

When there is no available long-term data on environmental impact, either because of the shortness of the time frame or the failure to collect the necessary information, studies must focus on the formation and operation of environmental institutions in order to examine the effectiveness (Keohane *et al*, 1993; Young, 1996; Young and Levy, 1999). Measuring the institutional effectiveness of regimes and demonstrating the performance of regimes are essential steps in understanding the role of institutional arrangements and how exactly international environmental institutions operate to influence the behavior of actors involved as well as to examine how a regime can effectively solve problems, especially given the dilemma of governance.

Despite the lack of environmental data, Cioppa and Bruyninckx (2000) argue that ecological considerations can be integrated into the examination of the institutional performance of regimes. For instance, they look at whether there are guidelines to fulfill environmental provisions of the international environmental regime in question. Such provisions need to be comprehensive and ideally accompanied by a timetable. Involving timely considerations may bring adequate environmental solution for the present and reduced environmental impacts for the future. In terms of compliance mechanisms, the authors discuss the importance of ecologically informed compliance mechanisms. A compliance mechanism requiring

environmental reports and/or giving concern to other environmental accords can strengthen environmental effectiveness (Cioppa and Bruyninckx, 2000). Ultimately, the regime will fail to be effective if it cannot ensure all parties that it is demonstrably achieving environmental goals.

Young and Levy (1999) identify five approaches that can be used to determine the effectiveness of international environmental regimes. These approaches require normative, scientific, and/or historical judgements about regime effectiveness. 1) A problem-solving approach centers on to what extent or in what ways a regime eliminates or alleviates the problem that prompted its creation. Examining how the regime would result in the improvement of environmental quality is a typical example of this approach. This approach tends to suffer from the lack of availabile data and the complexity of system interactions, which is one of the major reasons why it is often difficult to ascribe changes in social or natural systems to the operation of international regimes. 2) A legal or process approach measures the effectiveness of a regime by looking at the degree to which contractual obligations are met. Unlike the problem-solving approach, the legal approach provides for relatively simple measurement since effectiveness is defined in terms of obligations written into agreement language. Analysis of conditions of rules, policies, and programs would be an example of this approach as well as conformity assessment by their respective national organizations. 3) An economic approach looks at economic efficiency. This approach questions whether a regime generates the right outcome and if it does so at the least monetary cost, from the point of view of expenditure of time, energy and resources of organizations. 4) A normative approach examines whether the regime

produces results that are fair, just, sustainable, democratic and participatory. Few analysts use normative constructs at the center of their definitions of effectiveness but many incorporate them loosely. 5) A political approach looks at regimes as directed at particular international problems and envisages these problems as functions of specific constellation (so-called behavioral complex) of actors, interests, and institutions. The political approach is often used with the problem-solving, legal, and/or normative approaches. Effective regimes bring changes in the behavior of actors, in the interests of actors, or in the policies and performance of institutions in ways that contribute to positive management of the targeted problem (Young and Levy, 1999). Levy and Young have been criticized for being somewhat ambiguous about their meaning of sustainability and rather limited in their treatment of effectiveness to how the actors involved choose to tackle the problem (Cioppa and Bruyninckx, 2000). Nevertheless by combining these approaches and ensuring the inclusion of specific environmental considerations into the analysis it should be possible to assess the institutional and environmental effectiveness of regime outcomes in a more rigorous way.

2.3 Research Framework: Tracing causal mechanisms

These five approaches provide us with different ways of identifying and measuring regime effectiveness, but they do not provide us with a framework to examine the pathways by which regime mechanisms lead to behavioral changes among actors. One such framework to identify the source of an environmental

regime's institutional effectiveness is called tracing causal mechanisms. Based on a theoretical understanding of the working of international institutions, researchers, such as Keohane, Haas, and Levy (1993) and Young and Levy (1999), identify observable mechanisms of institutional effects and then gather information to assess whether these mechanisms are working or not. The mechanisms represent principal attributes that make institutions alter the behaviour of actors for solving or alleviating a variety of problems shared within the regime. The mechanisms are principle institutional functions through which a regime may become effective. By tracing the functions, studies attempt to shed light on the conditions under which specific causal mechanisms are likely to come into play as well as the interplay among causal mechanisms within the regime operation (Keohane, *et al*,1993; Zürn, 1998; Young and Levy, 1999; Sprinz, 2000).

Young and Levy (1999) identify six causal mechanisms. The first and most familiar way looks at a regime as *utility modifier*. This role is based on the assumption that "[a]ctors possessing well-defined utility functions alter their behaviour if and when social practices make it worth theirs while to do so" (Young and Levy, 1999: 22). Actors are self-interested utility maximizers whose behaviour will be guided by institutional arrangements to the extent that they alter the costs and benefits individuals attach to well defined options. How well a regime is performing this function can be seen from how specific rules and regime activities influence the costs and benefits that the actors count into their utilitarian calculus.

The second mechanism distinguishes a regime as *enhancer of cooperation*. This mechanism focuses on the idea that most international agreements require

collective action which is often a major obstacle to the achievement of sustained co-operation. The classic example would be the Kyoto Protocol or the Law of the Sea, where if individuals (or individual states) continue to operate out of self interest in a global commons they will ultimate invite ruin for all. The ultimate success of such regimes lies in their ability to ensure compliance through such mechanisms as sanctions or mutual benefits, increasing transparency of behavior of actors thereby reducing the incentives to opt out, and reducing transaction fees.

The third mechanism is called *bestower of authority*. This role looks at regime's legitimacy or authority that may guide individual actors to behave as a collective entity. The power of this role comes into play when the actors recognize the authority of the regime's rules and activities. For the most part, people are likely to comply when they believe it is the right thing to do and they will do this when they think the prescriptions are backed by social norms that deserve their respect. When this happens, behavioral responses from the actors come along regardless of anticipated benefits and costs.

The fourth looks at the role of a regime as a *learning facilitator*. To be effective the regime must be able to provide changing factual information, discourses and values and to alter the motives that cause the behavior of individual actors and collective entities. Learning can generate new facts that reduce uncertainty and gain a more accurate picture of the concerned issue area. Involving scientific knowledge and research in the regime would be an example of this role.

The fifth mechanism is called *role definer*. This mechanism looks at ways in which institutions operate to define roles to actors as sources of behavior and shape

their identities within the regime. This causal mechanism looks at sources of behavior that lie behind the utilitarian factors. Redefinition of old roles or the creation of new roles may reflect the evolution of underlying ideas concerning environmental issues. In the case of the Barents Sea fisheries conflicts, appointing a role to coastal authorities to restrict fishing parties has resulted in phasing out third-party fishing and establishing fishery conservation zones. This recognizes the fact that actors typically take on new roles under the terms of institutional arrangements, even when their basic identities are well established prior to the emergence of the roles in question.

The sixth mechanism is called *agent of internal realignments*. This mechanism looks at how the regime participants form collective entities themselves with their distinctive conceptions of the collective interests. By playing this role, regimes may well reshape the constellation of domestic interests and alter the existing political alignments toward the regimes' collective interests. For example, the establishment of the marine petroleum pollution regime could give animal rights groups, as stakeholders, a more effective way to pressure the petroleum industry to take environmental measures for sea animals in the case of petroleum leakage in the ocean.

Young and Levy (1999) trace causal mechanisms by using three detailed case studies. There are three stages to the analysis (Table 2). The first stage is to describe the regime's features such as 1) account of the problem to be solved; 2) the stakeholders and their interests and resources; and 3) the principal attributes of the

regime established to deal with these matters. The second stage is causal narrative that details the effects produced by the regime in question and seeks to identify causal connections between the relevant behavior and the operation of the regime. The last stage involves systematic assessment of the inferences to be drawn from the identified behavioral mechanisms. At this last stage, the researchers explore questions such as which or which combination of causal mechanisms is at work; what features or conditions of the case account for the roles played by the various causal mechanisms; or in what ways do the operation of individual causal mechanisms appear to depend on interactions with other mechanisms.

Table 2: Research Framework for Regime Effectiveness

Framework by Young and Levy (1999)	
Stage 1 Fact Articulation	Account of problem; The stakeholders and their interests and resources; and principal attributes of the regime established to deal with these matters.
Stage 2 Causal Narratives	Causal connections between the relevant behavior and the operation of the regime
Stage 3 Causal Mechanisms	Examine which causal mechanisms are at work and what conditions account for the roles played by the mechanisms

2.3.1 Case study

Based on the Young and Levy's framework of tracing causal mechanisms, Mitchell *et al* (1999) use it to examine the case of *International vessel-source oil pollution* (Table 3). In the first section, they illustrate the behavioral complex of the

environmental problem, the actors involved, and the regime. The second section evaluates whether the major changes in the behavioral complex were caused by the regime or by exogenous factors. The last section concludes by clarifying which of the regime's causal mechanisms best fit the process by which the regime effected such changes.

Table 3: Application of Tracing Causal Mechanism Framework

Framework by Young and Levy		Application to Oil Pollution by Michell *et al.*	
Stage 1 Fact Articulation	Account of problem to be solved; the stakeholders and their interests and resources; and principal attributes of the regime established to deal with these matters.	**Stage 1** Establish Behavioral Complex	Describe the environmental problem; the actors involved; and the regime
Stage 2 Causal Narratives	Causal connections between the relevant behavior and the operation of the regime	**Stage 2** Assessment of Behavioral Changes	Identify what changes were brought by the regime and what changes were brought by exogenous factors
Stage 3 Causal Mechanisms	Examine which causal mechanisms are at work and what conditions account for the roles played by the mechanisms	**Stage 3** Causal Mechanisms	Clarify which of the causal mechanisms is in the process that the regime effected the behavioral changes

The case study illustrates pollution control over 45 years based on the identification of the regime member and structure and records of regulations, responses of actors, marine oil pollution data, and so on. In 1954, concern that oil discharged intentionally from ships was causing environmental harm led thirty-two sea-facing nations to negotiate the International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL). As the first treaty to tackle marine pollution, the treaty required tanker operators to discharge waste oil far from shore or into the

port reception facilities which governments became responsible for operating. Nevertheless, it was recognized that few governments made efforts to conform to the treaty. In an effort, led by the United States, a revised convention, known as MARPOL, was established in 1978. The new convention brought drastic changes in the operation and behavior of the oil pollution regime. Port and coastal states now possess authority to police oil discharges, and, instead of OILPOL's discharge standard, MARPOL bans all oil discharges and requires all tankers to carry standardized pollution-reduction equipment. In addition to governments, non-state actors such as insurance companies and shipbuilders set extensive programs to monitor and prevent tankers from operating without the equipment. The International Maritime Organization (IMO) now provides administrative support in vessel oil pollution control. Through the equipment standards, the regime improved the level of compliance as well as the level of vessel-source marine pollution.

Through the overall assessment of the causal mechanisms, Mitchell *et al* (1999) reveal the interplay of the mechanisms within the regime. The vessel-source oil pollution regime enhanced cooperation by providing a forum that publicized the regulations to combat pollution more easily and faster. Although the regime did not exactly bestow authority, it did use the legitimacy and authority of states and non-state actors by developing international regulations. While the initial discharge standards failed to influence tanker operators directly, the implementation of the equipment standards increased the costs of non-compliance to tanker owners and tanker operators. The regime showed some learning in devising new regulations and

strategies for implementation, but the pathways of learning facilitation, role defining, and internal realignment contribute far less to the understanding of the success of the oil pollution regime than those involving utility, authority, and roles.

2.4 Application of tracing causal mechanisms framework to the ISO 14000 Regime

ISO 14000 involves a new form of governance in which non-governmental actors play a major role in the establishment and operation of the environmental standards and give limited roles to government authorities. It can, nevertheless, be considered an environmental regime. The ISO 14000 regime has the authority to promote environmental business practices based on a supra-national and voluntary regulatory system.

Although the causal mechanisms frameworks are used for long-existing regimes to trace how they improved their effectiveness, the use of causal links may provide insights for how a young regime, such as ISO 14000, could be more effective in achieving its goals. It is important to speculate how the activities of ISO 14000 regime affect the behaviour of players around the world to achieve its environmental goals. The literature suggests that the prime motivation for becoming ISO 14001 certified is driven more by economic incentives than environmental ones. The literature also argues that ISO 14001 tends to be less favorable to small and medium enterprises (SMEs) and those in less developed countries. What may have brought about these consequences? And, how could the regime be more effective? By using the framework of tracing causal mechanisms, I

will articulate how effective the regime is by looking at the regime's principles, decision-making process, and structure; what are the important issues in achieving the effectiveness by looking at who is adopting ISO 14000 and who is not; and how the regime could be altered to become more effective.

Table 4: Research Framework for Regime Effectiveness

Framework by Young and Levy		Application to the ISO 14000 Regime	
Stage 1 Fact Articulation	Account of problem to be solved; the stakeholders and their interests and resources; and principal attributes of the regime established to deal with these matters	**Stage 1** Fact Articulation	Account of the problem and rules, principles, decision-making and mechanism of the regime, actors involved, their interests, and collective goals of the regime.
		Data	ISO documents and interviews with the actors involved
Stage 2 Causal Narratives	Causal connections between the relevant behavior and the operation of the regime	**Stage 2** Description of Behavioral Outcomes	Examine who is adopting and who is not and determine factors influencing the adoption trend
		Data	Adoption trend, survey of the registered companies, and arguments from the literature
Stage 3 Causal Mechanisms	Examine which causal mechanisms are at work and what conditions account for the roles played by the mechanisms	**Stage 3** Causal Mechanisms	Illustrate the regime's current outcomes and future prospects in achieving the effectiveness; and discuss which functions of causal mechanisms could help the regime enhance the effectiveness

Based on the research framework by Young and Levy, there are three stages for the analysis of causal mechanisms and the effectiveness of the ISO 14000 regime (Table 4). Unlike the Montreal Protocol regime or the MARPOL regime, the ISO 14000 regime involves multifaceted problems and goals. Therefore, at the first stages, Chapter Three, employs a political approach to illustrate what the ISO 14000

regime is and who are involved. Based on an understanding of the actors' interests and stated goals for the regime, I determine the criteria to assess the effectiveness of the outcomes. How are the actors involved and represented in the regime? What are the collective goals and principles for the regime? How would it be possible to measure the effectiveness in relation to the specified goals? This stage takes a close look at the structure, organization and procedures of the standard development body, ISO/TC 207 to identify who is involved in the development of ISO 14000 and therefore whose interests the regime as a whole reflect. Since ISO 14000 targets any organization around the world, there is a concern of fair or equal representation of players involved from the international community: the chapter discusses the importance of 'universality' as the regime's principle goal. This chapter depends primarily on published documents from regime members as well as interviews conducted with key actors.

At the second stage, Chapter Four examines the intervening factors controlling the number of registrations in order to determine more accurately the level of adoption around the world as an indicator of the regime's effectiveness in achieving its prime objective of universality. Based on the adoption level, I attempt to identify what factors influence the adoption of ISO 14000. Who are or are not adopting the standard and why? How does the decision-making structure affect the level of adoption? These are important issues to examine how the regime should manage achieving universal adoption of ISO 14000 at the global scale. This chapter uses statistical data on registrations gathered from ISO itself along with other statistical data on population, GNP, exports, value of trade, and environmental

expenditure. It also employs a questionnaire survey of Canadian ISO 14000 registered companies to determine their reasons for adopting ISO 14000.

Finally, at the third stage, in Chapter Five, I summarize the overall impacts of the ISO 14000 regime and how different issues become important for the regime's effectiveness in the course of time depending on how universally ISO 14000 has been adopted around the world. The causal mechanisms are the ways the regime functions to encourage any organization of any size and type to adopt ISO 14000. I examine which of Young and Levy's six causal mechanisms (i.e. utility modifier, enhancer of cooperation, bestower of authority, learning facilitator, role definer, agent of internal realignments) are crucial to making ISO 14000 effective and how they could be modified to improve its effectiveness.

2.5 Conclusion

This chapter has shown the need for a systematic approach to examine the effectiveness of ISO 14000 and how the methods of international environmental regime studies in general and the framework of tracing causal mechanisms in particular is useful in measuring the effectiveness of ISO 14000. The ISO 14000 regime is a new form of governance, differing from other international environmental regimes (e.g. the Montreal Protocol regime, the Kyoto Protocol regime) in which national governments are the central stakeholders involved in co-operation and negotiation. Non-governmental organizations and private actors are central to the operation of the ISO 14000 regime. While the Montreal Protocol regime looks at the prevention of ozone depletion, the objective of the ISO 14000 regime is broad

ranging from smoothing international trade barriers to reducing environmental impacts. Nevertheless, the challenge of regimes to produce effective outcomes remains at the strength of organizational structure. The next chapter will attempt to address the objectives of the ISO 14000 regime by looking at who is involved in the regime and where their interests lie as essential to determining the criteria by which to assess the regime's effectiveness.

Chapter 3:

Assessment of effectiveness criteria of the ISO 14000 regime

ISO 14000 is a private-oriented, industry-based regime. The International Organization for Standardization (ISO) is an industry body set up to produce technical standards and is the body legally empowered to create ISO 14000. The development of ISO 14000 standards is directed by ISO members, largely industry-based national standards bodies plus some developing country organization. ISO purports to involve various types of actors, such as regulators, national standard bodies, industries, consumers, consultants, and non-governmental organizations. The regime involves actors based on ISO's principles and membership mechanism. ISO 14000 standards, like all ISO standards, are developed by technical committee (TC), in this case TC 207. Grasping the structure and composition of the actors within the regime is a key to examining whom the regime involves and how representative it is. Representation is always an issue in the negotiation of international agreements, and the ISO 14000 regime has been criticized for its lack of representation of developing countries and SMEs on its committees. Understanding the interests and concerns of the actors involved in the regime is essential to identifying the shortcomings of the regime as well as the criteria by which to assess the effectiveness of the regime. The objective of this chapter is two-fold: one is to identify the regime, its rules, principles,

decision-making mechanism and membership of its committees to evaluate the representativeness of the regime and its potential as the environmental management tool; and the other is to determine the criteria to assess the effectiveness of the ISO 14000 regime based on the expressed interests of the actors involved.

The first section describes how ISO 14000 standards are developed. It identifies how the actors and stakeholders are involved based on principles and sets of procedures. The section takes a close look at the actors involved from Canada, including the Standards Council of Canada (SCC) and the International Institute for Sustainable Development (IISD), to understand how industry, governmental and non-governmental organizations are involved. It also examine the structures and procedures of ISO and ISO's Technical Committee 207 who are responsible for the development and adjustments to ISO 14000. ISO is an industry body legally empowered to assist industries to form consensus and set voluntary international standards. ISO standard-setting is directed by ISO members, largely industry based national standards bodies (SCC in Canada's case) plus some developing country organizations. ISO has established TC 207 to specifically deal with the development of environmental management standards ISO 14000. As we will see, TC 207 is made up of representatives from ISO country members and observers from international organizations. Most of the actual negotiation of specifics is often dominated by technical experts from TNC and international business consulting houses. As a research-based Non-Governmental Organization (NGO), IISD participates to provide its input in the policy side of the ISO 14000 development at the international level. However, non-governmental organizations have been invited only as non-voting

participants in the latter stages of ISO 14000 development, and their input can and for the most part has been largely absent from final drafts (Parto, 1998). While SCC plays a role as a secretariat for TC 207, SCC is a national standard body that, together with the Canadian Standards Association (CSA), coordinates interested parties to have their voices heard, represented as the national interest, in the international development process. By understanding how the actors are involved and their levels of participation, the section discusses how the ISO 14000 regime deals with the issue of fair representation for its institutional effectiveness. The section looks at the balance of participation between more developed countries and less developed countries, as well as NGOs in TC 207. Due to the nature of ISO as a private, industry-oriented organization, the regime has increasingly taken extra measures to involve actors from developing countries and NGOs, but the challenge still remains. The second section outlines criteria to examine the effectiveness of the ISO 14000 regime. There is a variety of interests expressed by the actors involved in the regime, and the overall goals of the regime are multifaceted. With its own set of values and objectives, each actor contributes its inputs in the development of ISO 14000. The articulation of the interests leads to a determination of what the regime needs to achieve and then the approaches (i.e. problem-solving, political, economic, legal, and normative approaches) to assess the effectiveness of the regime. The chapter discusses the structure of the regime and interests of the actors involved, based on the information through interviews with SCC and secretary of TC 207 (based in CSA), questionnaire response from IISD, and published literature of the involved organizations as well as the structure and procedures.

3.1 The development of ISO 14000: function and structure of ISO and TC 207

As mentioned earlier in Chapter One, discussions regarding the establishment of ISO 14000 first took place in June 1992, when the United Nations Conference on Environmental Development (UNCED) was held in Rio. At the conference, ISO was asked to make a commitment to create environmental standards to support the concept of sustainable business development.

The main reason for the ISO 14000 regime for being a private-oriented regime comes from the involvement of ISO. Unlike the Montreal Protocol regime or the Kyoto Protocol regime, the ISO 14000 regime does not involve national government as the primary actor. Established in 1947, ISO is an industry-based non-governmental organization composed of a worldwide federation of national standards bodies from some 140 nations, with one body from each nation (ISO, 1999). There are many actors involved from private industry-based organizations since most standards bodies in more developed countries are private organizations while those in less developed countries tend to public agencies.

The mission of standards activity at ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services as well as to develop co-operation in the spheres of scientific, technological, and economic activity (Parto, 1998; ISO, 1999). The existence of non-harmonized standards for similar technologies in different countries or regions can contribute to so-called "technical barriers to trade". The activities of ISO aims at smoothing non-tariff trade barriers to facilitate exchange of

goods and services internationally. By definition, standards are documented agreements that contain technical specifications or criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose (ISO, 1999). ISO contributes to the formation of international agreements on standards, which are to be published as international standards.

After the UNCED, given the strong international desire to improve environmental performance in the business community, ISO initiated discussions with its members and sought external international assistance from the Strategic Advisory Group on the Environment (SAGE). SAGE determined that diverse national and regional environmental standards might result in unintended technical barriers to international trade and commerce, and recommended ISO develop international environmental standards, with the objective of achieving sustainable development. The outcome was the creation of a new technical committee, later named Technical Committee (TC) 207, who developed the ISO 14000 suite of environmental management standards.

The focus of ISO is to facilitate the trade and it serves industries as a main. ISO was established in 1946 by the International Electrotechnical Commission (IEC) to help export-oriented electronics industries in need for harmonized standards in their goods and services to trade internationally (ISO, 1999). Beginning in the electronics sector, ISO gradually developed its capability to support all sectors of industrial activities by its standard making. Some examples of ISO standards that have been extensively adopted include the format of telephone and banking cards,

standard paper sizes (ISO 216), international codes for country names, currencies, and languages, a framework for quality management and quality assurance (ISO 9000), and a framework for environmental management (ISO 14000). ISO's international standardization partnerships include the World Trade Organization (WTO). WTO shares the common goal of promoting the global trading system with ISO.

3.1.1 Participants and their structure at ISO

The technical work of ISO is highly decentralized, carried out in a hierarchy of technical committees, sub-committee, and working groups. Each technical committee and sub-committee has a secretariat assigned to an ISO member body, while working groups have an individual convenor appointed by the parent committee. The work of these committees is carried out by expert-based participants and membership-based participants, and their involvement is voluntary in nature. The expert-based participants often represent industry, research institutes, government authorities, consumer bodies, and international organizations from various countries. The technical committee responsible for ISO 14000 is TC 207 and SCC is the national body responsible for administering the standard. In TC 207, there are currently five active subcommittees and 2 active working groups (see appendix B for the TC 207 committee structure).

The ISO 14000 regime does recognize the importance of NGOs' involvement. NGOs, in general, became involved in international affairs after World War I, performing functions such as providing independent information and data as well as

verifying and evaluating regime performance (Chayes *et al*, 1998). Particularly for the industry-oriented ISO 14000 regime, NGOs provide non-business interests and play an important role of generating a continuous stream of political bargaining between the actors involved, maintaining the context of civil society. TC 207 does recognize that NGOs' involvement can strengthen TC 207's objectives to meet the equitable needs for achieving sustainable development, to establish balanced representation of consumers as well as of other social forces, and to increase public awareness (TC 207 NGO Contact Group, 2000). So far, NGOs have shown their interests in participating in the ISO 14000 regime as being concerned with improvement of environmental performance of enterprises, enhancement of corporate transparency and accountability, and reconciliation of economic and environmental goals (Ibid.).

An example of the expert-based participants at ISO 14000 is the International Institute for Sustainable Development (IISD). IISD is a member organization in ISO/TC 207 (ISO, 2002). Based in Winnipeg, IISD is a research-based NGO in the area of sustainable development. Funded by the Government of Canada through the Canadian International Development Agency, and Environment Canada, and by the Province of Manitoba, IISD provides knowledge networks to build the capacity of civil society and assist interested organizations in both developed and developing countries (IISD, 2002). IISD participates in policy-related committees and working groups in TC 207.

For the membership-based participants, memberships are usually given to national standards bodies, through which any interested party in the country can get

involved in the development of particular international standards in which they are interested. Therefore, there is national-level participation and international-level participation. Through the member organization, parties can join any technical committee that they have an interest in as a part of national representation and thereby become stakeholders in the international standard development process.

ISO consists of three types of membership: member bodies; correspondent memberships; and subscriber members (see Appendix C for the list of member organizations). The member body is the national body regarded as the most representative of standardization, having one body per country. For instance, the Standards Council of Canada (SCC) is the national member body of Canada at ISO. The member bodies participate in and exercise full voting rights on any technical committee and policy committee of ISO. Every member body is to take the responsibility for:

- informing potentially interested parties in their country of relevant international standardization opportunities and initiatives;
- ensuring that a concerted view of the country's interests is presented during international negotiations leading to standards agreements; and
- providing their country's share of financial support for the central operations of ISO, through payment of membership dues (ISO, 1999).

Countries that do not yet have a fully developed national standards bodies are considered correspondent members. They do not take an active part in the technical and policy development work, but do receive entire information about such work. Subscriber membership is given to countries with very small economies (ISO, 1999).

In practice, while large industry and developed country bodies are well represented, only a minority of developing countries has been involved, hampered by

lack of funds and specialist technical experts. As an organization open to the international community, ISO is concerned with the under-involvement of actors from developing countries and recognizes the need for capacity-building in standards activity. As a result, the Committee on Developing Country Matters, known as DEVCO, was created by ISO in 1961 as a policy committee to address the needs of developing countries. DEVCO comprises members from some 100 national standards institutes from industrialized as well as developing countries, and the programs are financed through ISO trust funds or from the DIN/ISO Endowment, which comprise contributions by ISO members. Input into ISO programs for developing countries is provided by seven regional liaisons presenting Africa, South America, the Caribbean and Central Americas, South and Central Asia, East and South East Asia, Arab, and Mediterranean region. DEVCO has initiated a program for TC 207 in 1998, and the funding for TC 207 comes from Sweden (42%), the Netherlands (31%), Finland (15%), and Norway (12%) (El-Tawil, 2001).

Recognizing the need of developing countries for acquiring world-class technological competence and achieving a good understanding of the technical requirements underlying global trade, DEVCO attempts to assist developing countries focus on identification of standardization needs, preparation of development manuals, training, documentation and information systems, and promotion.

The objectives of the committee include three issues:

- to identify the needs of developing countries in the fields of standardization and related areas such as quality control, metrology and certification, and. if necessary, to help individual countries identify their specific needs;
- to recommend measures to assist countries in meeting their needs; and

- to provide a forum for discussion and the exchange of experience on all aspects of standardization and related activities in developing countries.

Of particular concern are the effects of the cost of ISO 14000 certification and representation as well as lack of technical capacity that results in encountering barriers to trade and restriction of market access for less developed countries. Since 2001, DEVCO has been actively working to increase the participation of developing countries in ISO's technical work. They have proposed several modifications to working procedures. Increasing the number of TC and SC secretariats held by developing counties and twinning the sharing of technical committee secretariats and chairmanships between developed and developing countries.

3.1.2 Process of Developing International Standards

According to ISO, development of standards follows a set of principles. The principles attempt to facilitate exchange of views of interested parties and satisfy those involved in economic activities. The principles are:

- *Consensus*[5]: The views of all interests are taken into account, such as manufacturers, vendors and users, consumer groups, testing laboratories, governments, engineering professions and research organizations.
- *Industry-wide*: Global solutions to satisfy industries and customers worldwide.
- *Voluntary*: International standardization is market-driven and therefore based on voluntary involvement of all interests in the market place (ISO, 1999).

Being an NGO, ISO does not have the power to enforce compliance of its standards but calls for voluntary action to form consensus among users.

[5] At ISO, consensus is based on 75 percent majority votes (ISO, 1999).

Based on these principles, ISO technical committees (TC) and subcommittees (SC) develop International Standards following a six-step process: Proposal stage; Preparatory stage; Committee stage; Inquiry stage; Approval stage; and Publication stage (Cascio *et al*, 1996; ISO 1999). The Stage 1, 'Proposal stage', begins when the need for a standard is expressed by a sector, such as an industry, to its national member body and the national body then proposes the new work item for vote in ISO committees. When the majority of the relevant members of TC/SC agree that there is a need for the proposed standard, the committee moves to the Stage 2.

At the second stage, called 'Preparatory stage', working groups, which consist of technical experts from countries interested in the subject, attempt to define the technical scope of the future standard in working drafts. The working group outlines the best technical solution to the problem in the drafts and forwards the draft to the parent committee for consensus building (Cascio *et al*, 1996).

In Stage 3, 'Committee stage', the ISO Central Secretariat (CS)[6] registers the first committee draft. The committees examine the degree of consensus on the technical content and create the final text for the committees' consensus. This stage involves negotiations for detailed specifications for the standard (Cascio *et al.*, 1996; ISO, 1999).

[6] ISO's Central Secretariat (CS) is in Geneva, undertaking four main functions: first, to ensure the flow of documentation in all direction; second, to clarify technical points with secretariats and chairpersons; third, to ensure that the agreements that technical committees have approved are edited, printed, and submitted as draft International Standards to ISO member bodies for voting and publication; and lastly, to coordinate setting the date and place for the meetings of technical committees and subcommittees (ISO, 1999).

Then, at the fourth step, known as 'Inquiry stage', the text is submitted as a draft International Standard (DIS), and the ISO-CS circulates the DIS to the ISO member bodies for voting and comment within a period of five months. The draft attains approval for submission as a final draft International Standard (FDIS) when a two-thirds majority of the TC/SC are on favour of it and not more than one-quarter of the total number of votes are negative. If the approval criteria are not reached, the text is returned to the originating TC/SC for further study to create a revised document (Cascio *et al.*, 1996).

In Stage 5, 'Approval stage', the ISO-CS circulates the FDIS to the ISO member bodies for a final Yes/No vote within a period of two months. Using the same approval criteria (as in Stage 4), the text can obtain approval to become an International Standard. Any disapproval at this stage will be referred back to the originating committees for reconsideration (Cascio *et al.*, 1996).

Once a FDIS has been approved, minor editorial changes are added to the final text. Then, in the final Stage, called 'Publication stage', the ISO/CS receives the final text and publishes it as a new International Standard. Following publication, the responsible TC/SC committees review their International Standards more than once every five years for confirmation, revision, and/or withdrawal (Cascio *et al.*, 1996).

3.1.3 The function and structure of TC 207

TC 207 is the committee in charge of environmental management and developing ISO 14000. TC 207 is the largest technical committee of ISO and is composed of national standard bodies, international governmental organizations, non-

governmental organizations, and private associations. While international organizations participate with their expert-based membership as 'External Liaison Organizations[7]', any other organizations participate in the developmental process at TC 207 through their national standard body. Canada, the Standards Council of Canada (SCC) was chosen as the Secretariat of TC 207 because of its intermediary position between the United States and Europe (Cascio *et al.*, 1996). SCC takes responsibilities for overall organization of the group, document distribution, and other administrative duties of the working plans and procedure, but the Canadian Standards Association (CSA) takes over the actual management of the SCC's duties as the secretariat proving the secretary.

Like any other country member body, SCC carries several duties. One of them is to provide interested parties in the country with information related to ISO 14000 and assist the parties to be involved in the development of ISO 14000. SCC provides opportunities to the participants to exchange views and vote for what Canadian member body as a whole represents at the TC 207 at the international level. SCC attempts to establish balanced representation in voting: ideally, the negotiation involves equal representation of four types of participants, including industry, regulator, general interest, and service and professional. For instance, consumers and environmental groups participate as general interest, and governments like the Department of Foreign Affairs and International Trade (DFAIT) and Environment Canada represent as regulators. However, the level of representation of the

[7] There is participating 'Internal Liaison Organizations', which refers to other TCs.

stakeholders at the national level in other countries varies from the case of Canada. Often, where there is no official set-up for balanced representation, the national presentation largely involves industry and consultants due to their strong interests in international standards activity. Moreover, since ISO 14000 involves certification system, the national standards bodies carry the responsibility to certify the external auditors for ISO 14001. Based on the external ("third-party") auditing, the auditors give certifications to companies and organizations that successfully meet the requirements of ISO 14001 EMS.

TC 207 has a particular focus to develop ISO 14000 as a process-oriented standard in contrast to a performance or target-oriented standard. According to TC 207's scope of responsibilities, TC 207's activities are based on a "philosophy that improving management practices is the best way to improve the management performance of organizations and their products" (ISO/TC 207, 2002). Therefore, TC 207 does not regard its responsibility to set quantitative environmental performance values for the quality of air, water, soil, and noise, or the quality of product (Cascio *et al.*, 1996; ISO/TC 207, 2002). Its is this aspect of ISO 14000 that has prompted considerable criticism from environmentalists. The ability of ISO 14000 to achieve demonstrable environmental performance objectives is entirely dependent on two things: the willingness of national governments to combine government regulations and induce self-regulation where performance targets are determined through consultations that include govern, industry, and representation from the public; the willingness of industries themselves to voluntarily establish performance targets as part of their EMS.

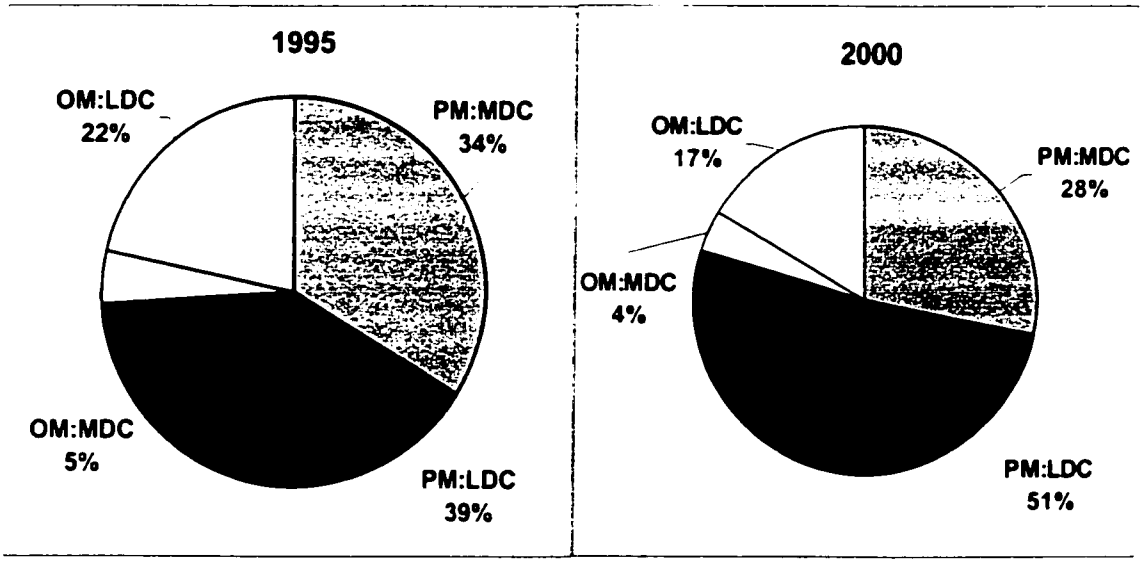
3.1.4 Balance of representation at TC 207

The membership of TC 207 changes over time. At the beginning when the ISO 14000 was being developed in 1995, 49 countries were involved as Participating Members and there were 17 Observing Members (see Appendix E for the list of participants at the initial stage). The number of the countries increased over time both for the Participating members and Observing members. Currently, there are 67 Participating Member countries and 18 Observing Member countries (see Appendix F for the list of participants as of 2000).

Clapp (1998) and McCloskey (1998) argue that there is unequal representation and more players from the world should be involved in the process. At the first meeting of TC207, 75% of the attending members were from OECD countries (Clapp, 1998). Representation is criticized as undemocratic, allowing the developed nations to form a rather exclusive 'old boys' club' against potential players from developing nations. In order to produce fair outcomes, balanced membership and participation of developed countries and developing countries is crucial for the effectiveness of international regimes (Sand, 1992; Susskind, 1995). However, the study shows that the balance of representation of countries in the ISO 14000 regime is improving (Figure 2). In 1995, developing countries represented more than 61 percent of the total members. Today, they represent to 63.9. The increasing participation of developing countries has been particularly marked among participating members, to 66 percent in 2000 up from 53 percent in 1995, while developed nations decreased their level to 36 percent in 2000 from 47 percent in

1995. However, it should be remembered that for all intents and purposes ISO 14000 was developed by 1996.

Figure 2: Participating Developed Countries (MDC) and Developing Countries (LDC), based on the Type of Memberships (Participating member, PM; Observing member, OM)



Source: Cascio *et al.*, 1996; TC 207, 2001.

The proportion of developing countries has increased, and the literature often remarks that the initial proportion did not result is the production of ISO 14000 that is usable in developing countries. Due to the growing recognition of ISO 14000, the number of interested parties in the developing countries has risen: the effort of DEVCO may be assisting the less developed countries to participate. Nevertheless, the proportion of developed and developing countries at the global level can be estimated as 25 percent and 75 percent. As seen in the process of international standard development at ISO, industries need to articulate their needs for international standards to their national standards bodies and get involved in ISO. For instance, particularly in developing countries where there is no national standards

body, industries lack the opportunity to be represented at TC 207. Therefore, less developed countries are still under-represented.

The ISO 14000 regime also has representation from NGOs and other international organizations as Liaison Organizations at the TC 207. Since 1995, the number of participating liaison organizations has more than doubled. Participation of NGOs and other external parties is important in ensuring more effective outcomes by bringing a balance in having different considerations and needs (Wuori, 1997; Wattestad, 1999). The increase in the number of these organizations may result from the regime's effort in providing participation assistance. In 1998, reflecting the low level of NGO participation, TC 207 began its assessment of the extent of and the barriers to effective participation of NGOs in the process (ISO/TC 207 N418, 2000). The assessment found that NGOs tend to find the costs of participating outweighs the benefits, hence TC 207 initiated a funding program to support NGO participation in the TC 207's activities (Morrison, 2002). Nevertheless NGOs are non-voting participants, and their involvement only in the later stages of ISO 14000 development has meant that their input is little in the final drafts (Parto, 1998).

To conclude this section, the ISO 14000 regime operates in accordance with the principles and procedures in the making of ISO. ISO has a close relation with large industries from developed countries, but does involve a variety of private, national, international, governmental, non-governmental actors. The level of representation of the actors is crucial to the nature, applicability, and effectiveness of ISO 14000. The representation at the national level tends to predominantly involve participation of industries and particularly large-scale companies in many countries,

however, the representation at the international level contains increasing proportion of developing countries, and their enhanced involvement is essential fr the production of internationally applicable standards. The final following section looks at the overall goals that the regime attempts to achieve, based on the interests expressed by the actors involved.

3.2 Expressed goals and objectives of the ISO 14000 regime

The ISO 14000 regime is initially founded on the key goals to eliminate non-tariff or technical trade barriers and continuously improve environmental performance of organizations around the world. Nevertheless, the actors involved voice different opinions or take different positions within the regime. Rooted in their own institutional goals and responsibilities, interests and values of the actors are important elements to determine the goals and hence evaluate the effectiveness of the regime. In order to determine the goals and objectives of the regime, this section looked at interests expressed by ISO, TC 207, SCC, and IISD.

Table 5: Effectiveness Criteria for the ISO 14000 regime

Economic	Environmental	Social	Policy
Eliminate trade barriers	Reduce pollution	Equal representation	Be compatible to existing agreements and regulations
Increase market share	Reduce waste	Worldwide acceptance	
Enhance competitiveness	Resource conservation	Capacity building for developing countries	
Low costs to trade			

Table 5 illustrates the overall goals of the regime based on the explicit interests of the actors involved. The goals involve four aspects, including economic;

environmental; social; and policy needs. As a market-driven, consensus based organization, ISO's primary objectives are economic: to facilitate exchange of goods and services by eliminating barriers to trade. Economic benefits of the use of ISO 14000 particularly serve the interests of businesses. TC 207 (2002) and SCC (2002), as well, further articulates the economic goals as reducing costs to trade internationally, cost-saving through energy and resource conservation as well as reducing the costs of compliance to environmental regulations, enhancing competitiveness, and increasing market share. Given the strong economic interests, TC 207 does not deal with setting targets in environmental performance (Parto, 1999). The economic goals drive from corporate and trade interests, and it arguably contradicts the initial intention of SAGE to promote sustainable development through ISO 14000.

Serving economic goal is yet an important objective for ISO 14000 to attract industries to become more environmental in their operations. By using internationally compatible environmental standards, an organization can avoid the costs of having to comply to and register for multiple national or regional environmental regulations overseas. Since ISO 14000 requires setting out commitment to any related regulation, the compliance leads to enhanced competitiveness to trade internationally and expand market share. It also eliminates the cost of penalty from regulatory agencies. As the EMS framework puts energy conservation and waste reduction into practice, ISO 14000 attempts to reduce organizations' expense in business operations.

As an EMS-based standard, ISO 14000 assists organizations to continuously improve their environmental performance and to comply with regulations. According to TC 207, a key principle of the development of the series of ISO 14000 aims at producing improved results through environmental management. While specific aspects of environmental performance varies to the type of activities involved in the EMS, all certified organization reduce pollution and waste as well as conserve resources in a continual manner.

Encouraging industries to take voluntary environmental action is another important goal. Kerr *et al.* (1998) argues that the use of voluntary initiative like ISO 14000 alters the traditional image of industries to be 'green' to perform their responsibility for their impact on the environment. ISO 14000 promotes voluntary environmental action to any organizational activity. However, while performance improvements are an anticipated result, ISO 14001 is not aimed directly at performance improvement. Instead, the focus is on procedural improvements in the organization. Assessment of an organizations operational efficiency and target-driven performance is not recognized for conformance to the standard. This minimal intervention does appeal to industries to become more environmental (Parto, 1999). Indeed, while ISO 14001 encourages companies to make regulatory compliance as policy objective, a company may break the laws and retain certification as long as it is making continual improvements towards regulatory compliance.

The social goals emphasize that, being an 'international' standard, ISO 14000 needs to involve a wide range of actors and obtain worldwide acceptance. TC 207 has strong interests in developing ISO 14000 as a flexible and useful environmental

tool, applicable to any size or type of organization in any country. TC 207's key principle emphasizes that ISO 14000 "ought to be practical, useful, and useable" (TC 207, 2002). With its root in the Rio Summit, ISO 14000 ought to be a tool to promote sustainable development. IISD has a particular interest in establishing better dialogue between North and South and building capacity in less developed countries (IISD, 2002). Therefore, equal representation of international actors is an important goal in achieving sustainable development.

Regulators involved express the interests that ISO 14000 needs to be compatible with other existing agreements and regulations. TC 207 emphasizes the need for ISO 14000 documents to work with issues like climate change, external environmental communications, and sustainability (TC 207, 2000). Therefore, ISO 14000 must work in harmony to achieve board targets in public health, environmental protection, and economic well-being. TC 207 has recently established a working group on climate change. Currently, however, ISO 14001 fails to make the crucial linkages to existing international environmental agreements such as the Montreal Protocol or the Basel Convention on cross-boundary movement of hazardous wastes. The absence of such linkages undermines recent government and corporate moves toward best environmental practices, public participation and transparency. The lack of such linkages also undermines the moves by major international bodies such as the World Bank to take account of the social or cultural costs of industrial activity. Therefore, it is important to keep in mind that ISO 14000 carries a grand objective for the international community rather than for private industries.

3.3 Conclusion: Measuring the effectiveness of the ISO 14000 regime

At this point, it is not possible to assess the effectiveness in the economic and environmental goals, due to a lack of data and shortness of time for the assessment. For example, since ISO 14001 does not explicitly encourage the users to reduce the environmental impacts to certain levels, it would be essential to examine how ISO 14001 is environmental effective in results. Nevertheless, it is feasible to employ the political and normative approach to determine goals and objective of the regime and how effectively the ISO 14000 regime has performed to meet the criteria. From the overall examination of effectiveness criteria, achieving universal adoption of ISO 14000 stands as a crucial principle for the ISO 14000 regime over the long run. The ultimate goal of ISO 14000 is to be universally practical, useable, and useful to any type and size of organization around the world. Achieving such goals as increasing economic competitiveness and market share, and reducing costs to trade are short-term goals, but the goal to involve equal representation and co-ordination with other international agreements need to be established at the early stage to ensure long-term objectives are achieved. Only with widespread adoption with the goals to reduce trade barriers and reduce environmental impacts even potentially fulfil the goal of worldwide acceptance. To be universal, the regime needs to involve players from the international community, promote ISO 14000 as a global norm to establish environmental and social sustainability, and gain worldwide acceptance of the standard as providing both organizational-level and global-level benefits. In order to examine the issues important in gaining universal adoption, the next chapter will look at who is adopting ISO 14001-EMS. ISO 14001 is a voluntary and non-binding

standard and attempts to assist "any organizations of any type and size" to participate in sustainable development. At the moment, the adoption is taking place unevenly around the world. Examining who are adopting, in other words, who are sensitive to the regime's influence at this point is a tangible way to assess how the ISO 14000 could be more effective in achieving universality. Do polluters tend to adopt the standard? Do economic actors tend to adopt the standard? The chapter attempts to find out what factors have been influential in encouraging certain sectors, sizes, and nations to adopt ISO 14000, while others have not. This may help identify some of the challenges in achieving universal adoption.

Chapter 4:

Analysis of the factors influencing the level of ISO 14001 adoption

The most accessible measure of the effectiveness of ISO 14000 is how widely it is being adopted around the world. One of the key objectives of SCC and TC 207 is to promote the universal adoption of the ISO 14000 series of standards. The number and distribution of registrations is one indication of how well ISO 14000 is perceived around the world. Its widespread adoption is clearly essential if ISO 14000 is to serve as an internationally accepted environmental management tool and thereby reduce or eliminate barriers to trade imposed by conflicts between regional interpretations of good environmental practices. Many studies have worked at the distribution of registrations. All show an uneven pattern, which indicates that there are challenges for the ISO 14000 regime in achieving universal adoption. An examination of who is adopting ISO 14000 and who is not, and the reasons behind this should shed light on how the regime can be more effective. This chapter analyses the changing geographical pattern of registrations since it was introduced in 1996 and looks at the factors influencing the adoption pattern of ISO 14001 by examining who is adopting and who is not.

The chapter first examines whether the total registration number, which is the most frequently used indicator of the level of adoption of ISO 14000, appropriately

represents the level of adoption around the world. It illustrates how the geography of registrations changes, depending on whether we look at the gross number of registrations, registrations per capita, and registrations per Gross National Product (GNP). Do bigger countries tend to have more registrations? Do economically active countries tend to have higher levels of adoption? By comparing the geography based on these different control factors, it is possible to identify the most suitable indicator of the level of the adoption ISO 14001 around the world. Using a more sophisticated measure of adoption levels, the second half of the chapter discusses the factors which in there are sectoral and geographic patterns of adoption by looking at the distributions by country, region, and industry. This analysis is based on registrations issued by ISO and SCC; data on the size of registered companies in Canada; as well as the survey results expressed by the registered companies in Canada as reasons for their implementation. Overall, such factors as the cost of implementation, level of representation in the standards process, familiarity with EMS and domestic environmental regulatory development experience, trade activity, and degree of environmental awareness have had considerable impacts on the pattern of adoption both internationally and within Canada. As a whole, this chapter provides an understanding of the current impacts of the ISO 14000 regime, leading to the assessment, in the next chapter, of how the regime is or could be more effective based on an analysis of causal mechanisms.

4.1 The geography of ISO 14001 registrations

4.1.1 Data and methodology

The number of ISO 14001 registrations was derived from *The ISO survey of ISO 9000 and ISO 14000 certificates*, published annually by International Organization for Standardization (ISO, 2000; 2001; 2002). Through the accreditation bodies known as registrars around the world, ISO collects and publishes a list of ISO 14000 registered companies by country and industry type at the global level, each year. Since it takes a minimum of six months for a company to implement an EMS and become ISO 14000-certified, annual statistics of certifications give an appropriate review of the distribution trend. Despite the large number of countries with no registrations, the study only looks at the countries with more than one certification.

There are some issues regarding the limit of use of the data. Firstly, the certification is site-specific, meaning that one organization like a large-scale company could have more than one certification: one for each of its branches in a country or even in more than one country. For example, there were 258 certifications over 115 companies in Canada in May 2000. Since the published data from ISO does not specify the dual or multiple certificates, the data clearly overstate the number of organizations that are certified in each country and hence the level of ISO 14000 adoptions in a country and worldwide.

Secondly, ISO provides regional data on numbers of registrations by classifying six regions: Europe; West Asia and Africa; East Asia; Australia and New Zealand; North America; and Central and South Americas. Although each region

seems to contain similar amount of land surface, it is not certain whether this classification of regions is useful to study regional differences in the distribution of registrations. This study looks at the distributions in seven regions: that is the six regions identified by ISO, with Europe broken down between Western and Eastern Europe.

Thirdly, ISO 14000 provides data on the number of certifications by industry sector at the global level, but they do not provide this breakdown at the national level. It is impossible to examine which industries in any country are more likely to become ISO 14000-certified. For this reason, data was collected by industry type for Canada using data from another party, Worldpreferred.com, as well as SCC's survey in order to examine which industries in Canada were adopting ISO 14000 and how these compared to the pattern globally.

In examining control factors behind the gross registration numbers, the study looks at registrations per capita and registrations per unit of Gross National Products (GNP). The data for these two control variables were taken from *World Development Indicators* (World Bank, 2000). The per-capita figures refer to the gross registration number deflated by a unit of one million populations in each country in the year of 1998. For the GNP figures, a unit of one billion dollars GNP in each country in 1998 was used to deflate the gross national registration counts. To examine the association of the data with other independent variables, the data on registrations was normalized using a log transformation, and then the Pearson correlation was used to determine whether there was a significant correlation between the registration count and each

independent variable. The analysis excludes countries with one registration and those with no corresponding statistical figures.

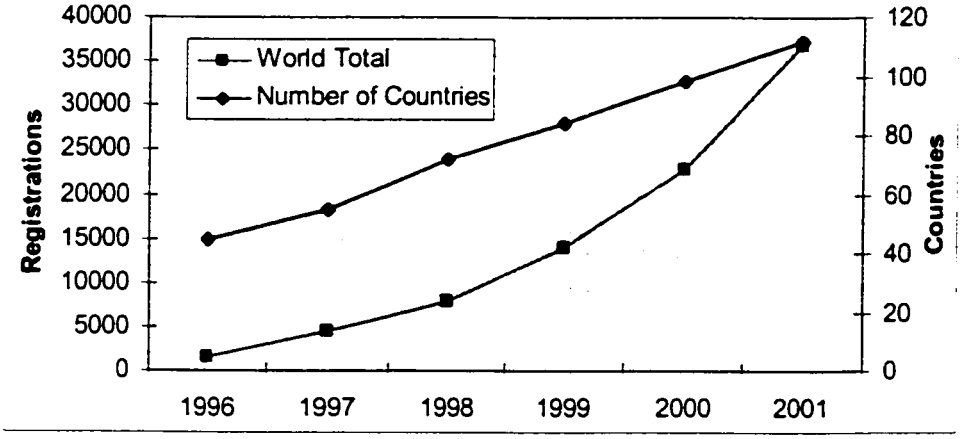
4.1.2 Gross ISO 14001 registrations

Based on the total number of gross registrations around the world, ISO 14001 is spreading at a rapid rate (Table 6; Figure 3). Since its introduction in 1996, the number of registrations had grown more than 15 times by the end of 2000, and organizations registered for ISO 14001 are now found in 98 countries: twice as many countries as were involved in 1996 (ISO, 2001). Between 2000 and 2001, the number of registrations increased by 60 percent, and the number of countries grew to 112. The number of certifications is increasing more rapidly than the number of countries.

Table 6: Total ISO 14001 Registrations Worldwide

	1996	1997	1998	1999	2000	2001
World Total	1491	4433	7887	14106	22897	36765
Number of Countries	45	55	72	84	98	112

Figure 3: Total ISO 14001 Registrations Worldwide

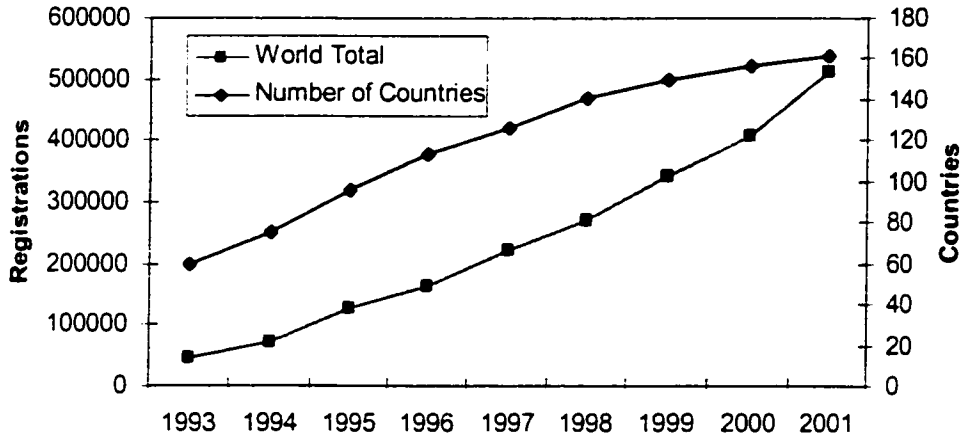


In comparison to the case of a similar type of standard, ISO 9000[8] (Table 7 and Figure 4), ISO 14000 has experienced a more rapid growth. ISO 14000 registrations are growing faster at the average annual growth of 195 percent, while ISO 9000 grows 136 percent annually. Nevertheless, the number of countries where the ISO 14000 registrations are found is less than that for ISO 9000 registrations. During the first five years, ISO 9000 spread to an average of 16 countries every year, while ISO 14000 annually spread to 13 new countries. In short, ISO 14000 is growing rapidly but is concentrated in geography.

Table 7: Total ISO 9000 Registrations Worldwide

	1993	1994	1995	1996	1997	1998	1999	2000	2001
World Total	46571	70364	127349	162701	223299	271847	343643	408631	510616
Number of Countries	60	75	96	113	126	141	150	157	161

Figure 4: Total ISO 9000 Registrations Worldwide



[8] ISO 9000 is a voluntary international standard, produced in 1987. It is a series of guideline for 'Quality' Management Systems (QMS).

Most of the literature looking at the level of adoption of ISO 14000 around the world uses gross number of registrations as a measure of the geographical pattern of adoption. This may result from the fact that this is the only registration data by ISO. These data shows that the country with the highest number of certifications by far is Japan (5556), followed by the United Kingdom (2534), Sweden (1370), and Germany (1260) (Figure 5 and Table 8). Overall the median number of registrations in those countries with more than one registration is 19, while the average is 236. This shows that there is a great difference among the country's registration numbers and that the majority of countries have relatively few registrations. Countries in the Pacific

Figure 5: The Distribution of ISO 14001 Registrations

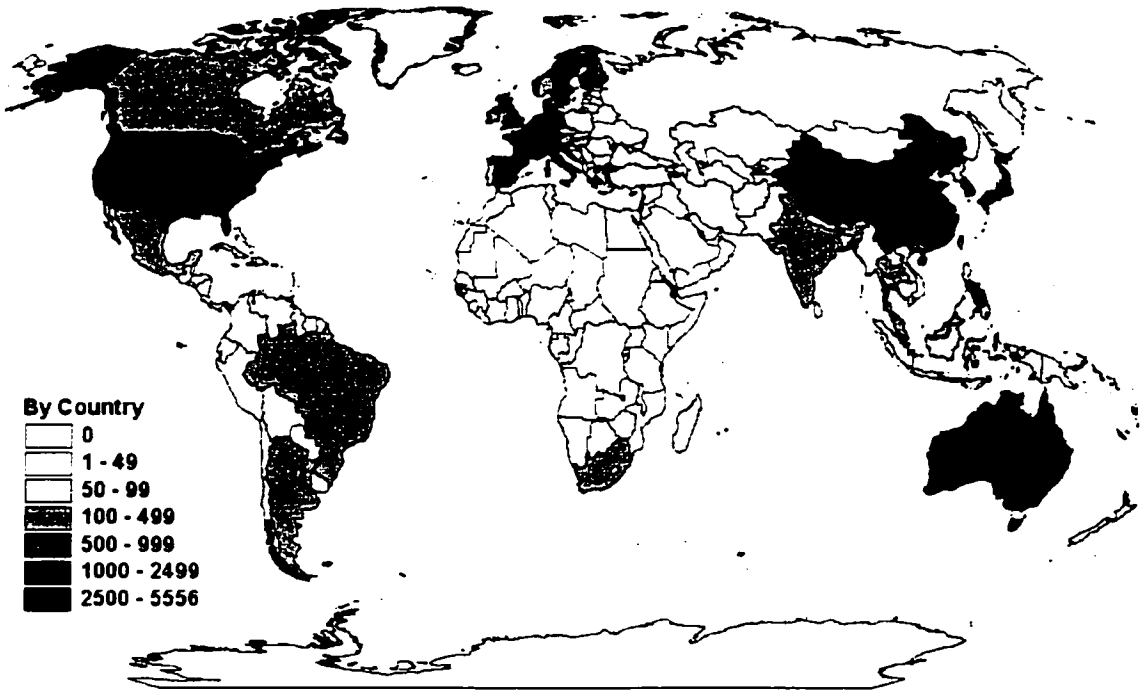


Table 8: Total ISO 14001 Registrations, by Country

Japan	5556	Norway	227	Portugal	47	Lebanon	5	Honduras	2
UK	2534	Austria	203	Philippines	46	Romania	5	Iceland	2
Sweden	1370	Malaysia	174	Greece	42	Afghanistan	4	Kenya	2
Germany	1260	Hungary	164	Slovakia	36	Cyprus	4	Malta	2
Australia	1049	Ireland	163	North Korea	26	Latvia	4	Oman	2
USA	1042	Mexico	159	Uruguay	22	Mauritius	4	Saint Lucia	2
Netherlands	784	Belgium	130	Colombia	21	Morocco	4	Sri Lanka	2
France	710	South Africa	126	Costa Rica	20	Namibia	4	Yugoslavia	2
Switzerland	690	Czech Rep	116	Liechtenstein	19	Pakistan	4	Zambia	2
Spain	600	Argentina	114	Estonia	18	Puerto Rico	4	Bolivia	1
Denmark	580	Hong Kong	105	Jordan	16	Zimbabwe	4	Dominican Rep	1
South Korea	544	Singapore	100	Peru	13	Barbados	3	Ecuador	1
Italy	521	Turkey	91	Iran	12	Monaco	3	Macau	1
China	510	Slovenia	88	Chile	11	Russia	3	Nigeria	1
Finland	508	Egypt	78	Lithuania	10	Syrian Arab	3	Palestine	1
Canada	475	Indonesia	77	Luxembourg	9	Tunisia	3	Paraguay	1
Taipei	421	Poland	66	Vietnam	9	Andorra	2	Qatar	1
Brazil	330	New Zealand	63	Croatia	8	Bahrain	2	Trinidad & Tobago	1
Thailand	310	Israel	60	Venezuela	7	Brunei	2		
India	257	UAE	48	Saudi Arabia	6	Guatemala	2		

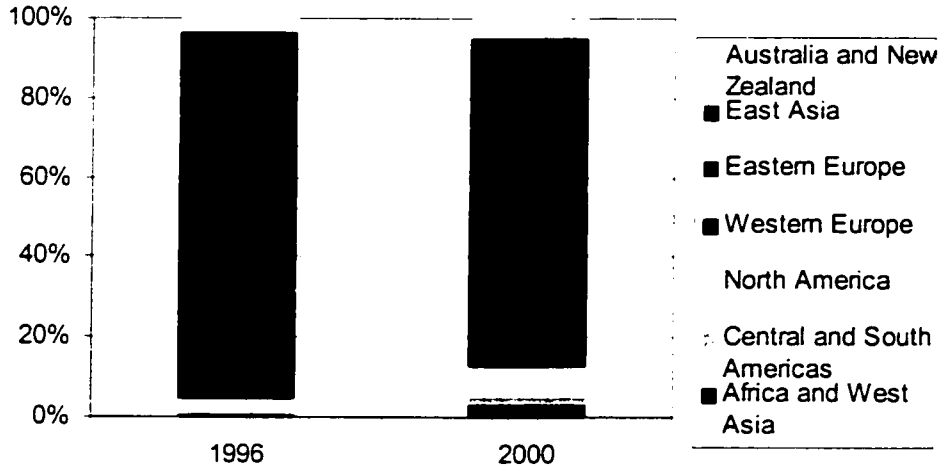
Source: ISO, 2001

region and Western Europe tend to have more than 100 registrations, but a few countries from other regions also have a relatively large number of registrations such as Brazil (330), India (257), Hungary (164), and South Africa (126).

When looking at the distribution by regions (Figure 6), there are notable differences. Western Europe and Eastern Asia have by far the highest level of registration, and their dominance has been apparent since 1996. Although East Asia increased its number of registrations over the past four years, Western Europe has remained as the most dominant. Compared to these regions, registrations have lagged behind in more developed regions like North America, Australia and New Zealand: although the registrations more than doubled in North America from 1996 to 2000,

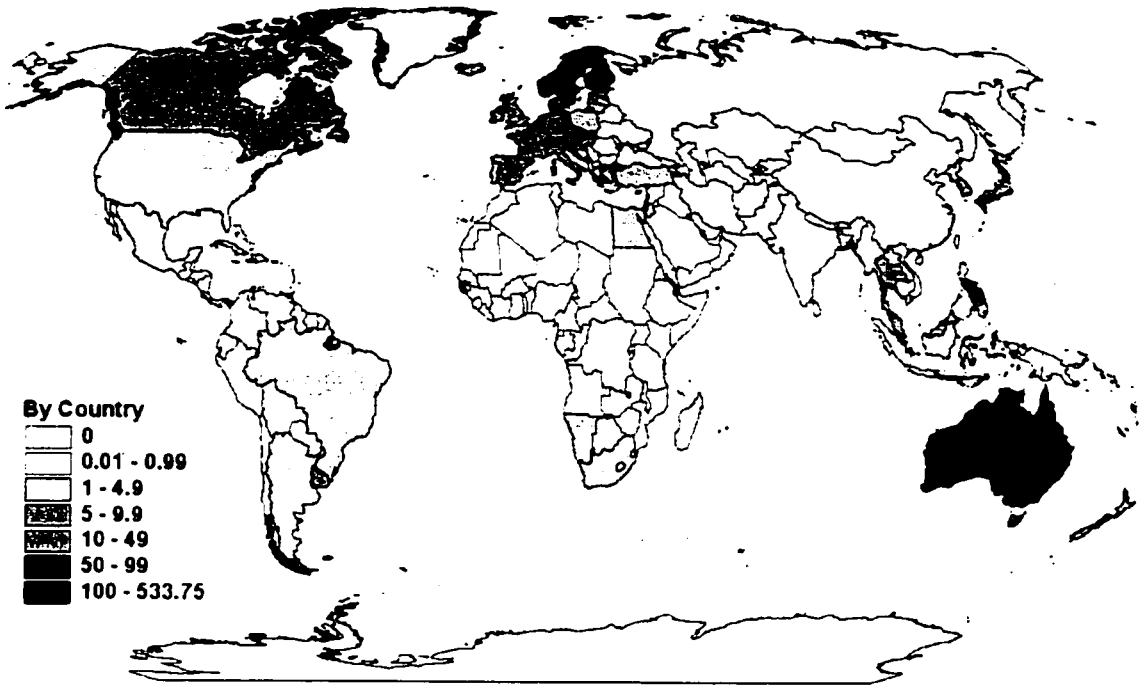
the total of the numbers in these regions is much smaller than that of Western Europe or the Far East. ISO 14000 registrations are also growing in the transition economies of Eastern Europe, as well as in the less developed regions of Africa, West Asia, and Central and South Americas, but together, they represent less than 10 percent of the global registrations.

Figure 6: Regional Distribution of ISO 14001 Registrations, 1996-2000



4.1.3 Registration per capita

Figure 7: The Global Distribution of ISO 14001 Registrations per Capita



Does the gross number of registrations, however, appropriately indicate the level of adoption? Are the gross number of registrations partly a reflection of the size of population of the country? We might expect large countries to have more registrations. When we count the number of ISO 14000 registrations per million people, the geopraphical pattern of ISO 14000 adoption around the world changes (Figure 7 and Table 9). The countries with the leading number of registrations per million population are Liechtenstein, followed by Sweden, Denmark, Finland (98.58), and Switzerland (see Table 9). Cmpared to the ranking based on the gross

registrations ,while Sweden ranks second compared to third by gross restrations and Australia, the Netherlands, and Switzerland also remained among top 10 rankings, Japan and the UK, which ranked first and second respectively by gross registrations, droppted to twelveth and thirteenth place, and US, France, and Spain likewise fell from the top ranking. In their places, Liechtenstein, Denmark, Finland, Monaco, Norway, and Slovenia all move into the top ten. The median registration per capita is 3.92, and the average is 21.58: the difference in the adoption levels is still large.

Table 9: Total ISO 14001 Registrations per Million Capita

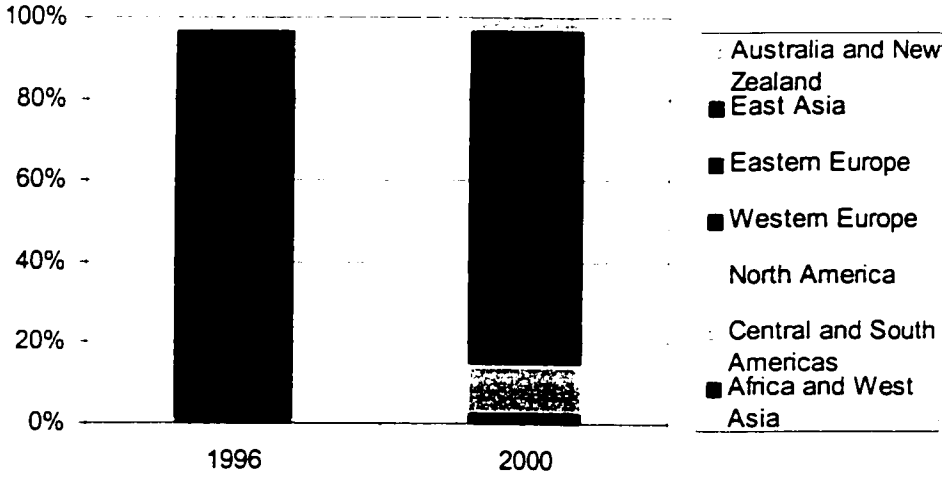
Liechtenstein	593.75	Hong Kong	15.70	Malta	5.31	North Korea	1.12	Guatemala	0.19
Sweden	154.77	Canada	15.68	Thailand	5.07	Puerto Rico	1.04	Afghanistan	0.16
Denmark	109.41	Germany	15.36	Portugal	4.72	Oman	0.87	Morocco	0.14
Finland	98.58	Spain	15.24	Greece	3.99	Chile	0.74	Vietnam	0.12
Switzerland	97.10	Saint Lucia	13.16	USA	3.85	Philippines	0.61	Sri Lanka	0.11
Monaco	93.75	Belgium	12.74	Jordan	3.51	Peru	0.52	Kenya	0.07
Australia	55.94	Estonia	12.41	Mauritius	3.45	Colombia	0.51	Pakistan	0.03
Norway	51.22	France	12.07	Argentina	3.16	China	0.41	Russia	0.02
Netherlands	49.94	South Korea	11.72	Bahrain	3.11	Indonesia	0.38		
Slovenia	44.40	Barbados	11.28	South Africa	3.04	Zimbabwe	0.34		
Ireland	43.99	Czech Rep.	11.27	Lithuania	2.70	Honduras	0.32		
Japan	43.95	Israel	10.06	Namibia	2.41	Tunisia	0.32		
UK	42.91	Italy	9.05	Brazil	1.99	Venezuela	0.30		
Singapore	31.61	Malaysia	7.84	Croatia	1.78	Saudi Arabia	0.29		
Andorra	30.77	Iceland	7.10	Poland	1.71	India	0.26		
Austria	25.13	Uruguay	6.69	Mexico	1.66	Romania	0.22		
Luxembourg	21.08	Slovakia	6.68	Latvia	1.63	Zambia	0.21		
UAE	17.62	Brunei	6.35	Turkey	1.43	Syrian Arab Rep	0.20		
New Zealand	16.61	Costa Rica	5.67	Egypt	1.27	Iran	0.19		
Hungary	16.22	Cyprus	5.31	Lebanon	1.19	Yugoslavia	0.19		

Source: ISO, 2001; World Bank, 2000.
Excluding countries one registration and those with insufficient data

The regional distribution per capita also changes significantly (Figure 8). While the distribution shows an even larger dominance of Western Europe(almost 70 percent), East Asia shrinks its ratio (approximately 10 percent). The smaller

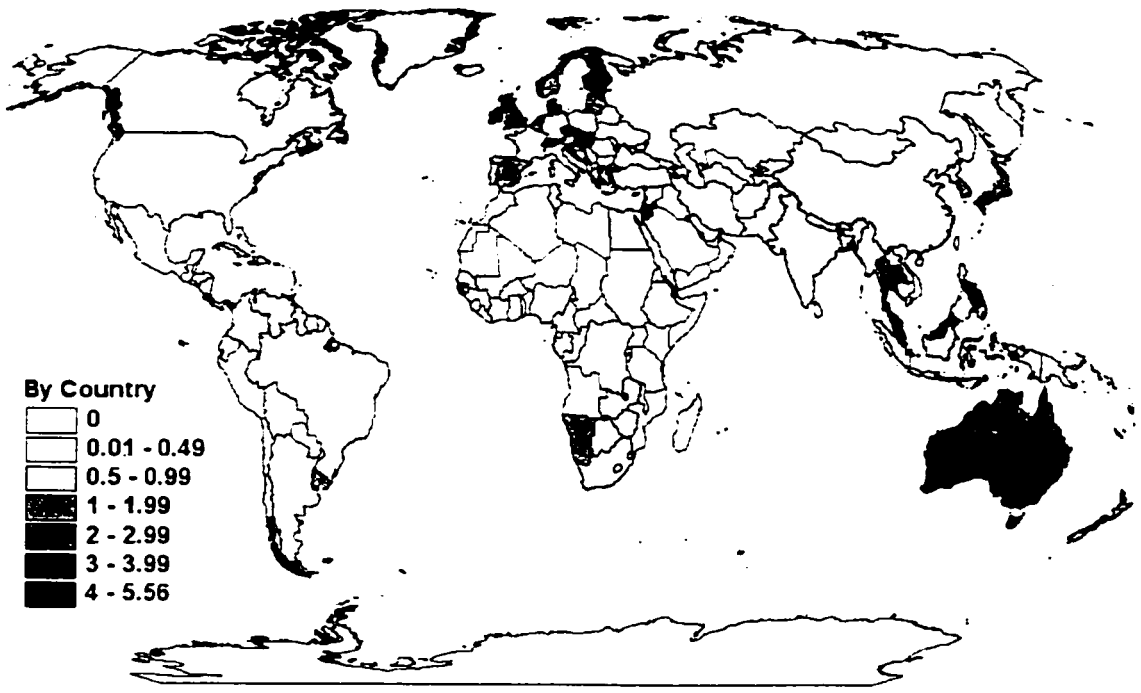
distribution in Eastern Asia may result from particularly the large population size in China. While the ratio for Eastern Europe, Africa, West Asia, Australia and New Zealand remain at the similar level, the ratios of North America and Latin America change. Latin America now has a bigger percentage, but North America has a much smaller percentage. This suggests that the level of ISO 14000 adoption in Western Europe is relatively high for the size of its population, while the registration levels are low for their sizes in East Asia and North America. The latter is particularly important, highlighting that North America lags far behind equally highly developed Europe in its acceptance of ISO 14000.

Figure 8: Regional Distribution of ISO 14001 Registrations per capita, 1996-2000



4.1.4 Registration per unit of GNP

Figure 9: The Global Distribution of ISO 14001 Registrations per $Billion of GNP



Since ISO 14000 registrations related to industry, it might also be useful to control the registrations for the size of the economy in each country. When we look at the number of registrations per billion dollars of GNP, we see a rather different pattern (Figure 9 and Table 10). The registration level is led by Sweden (6.05), Slovenia (4.54), Finland (4.06), and Estonia (3.69). Japan is now at 20th with 1.36 registrations per billion dollars of GNP. Compared to the ranking with the gross registrations, Sweden, Australia, and the Switzerland remain in the top 10 ranking,

while Slovenia, Finland, Estonia, Saint Lucia, Hungary, Denmark, and Jordan also appear as among the top ten countries. The median number of registrations per unit of GNP is 0.63, while the average is at 1.12: the difference is smaller than the previous two cases, suggesting perhaps that this is indeed the best measure of registration levels, since registrations are so clearly influenced by the size of the economy.

Table 10: Total ISO 14000 Registration per Billion Dollars of GNP, by Country

Sweden	6.05	South Korea	1.36	Philippines	0.58	Lebanon	0.33
Slovenia	4.54	Namibia	1.24	China	0.55	Iceland	0.26
Finland	4.06	New Zealand	1.14	Zimbabwe	0.55	Colombia	0.21
Estonia	3.69	Uruguay	1.10	Malta	0.53	Peru	0.21
Saint Lucia	3.60	Spain	1.08	Belgium	0.50	Kenya	0.20
Hungary	3.59	Lithuania	1.06	France	0.48	Syrian Arab	0.19
Denmark	3.31	Singapore	1.05	Luxembourg	0.47	Romania	0.16
Jordan	3.05	Egypt	0.99	Italy	0.45	Tunisia	0.16
Australia	2.71	UAE	0.99	Turkey	0.45	Chile	0.15
Switzerland	2.43	Austria	0.94	Cyprus	0.45	Sri Lanka	0.13
Thailand	2.35	South Africa	0.92	Poland	0.44	USA	0.13
Ireland	2.35	Mauritius	0.92	Portugal	0.44	Iran	0.12
Czech Rep	2.19	Canada	0.82	Honduras	0.44	Morocco	0.12
Malaysia	2.14	Latvia	0.68	Brazil	0.43	Guatemala	0.11
Costa Rica	2.05	Hong Kong	0.66	Mexico	0.43	Venezuela	0.09
Netherland	2.02	Israel	0.62	Bahrain	0.41	Pakistan	0.07
UK	2.00	Zambia	0.62	Argentina	0.39	Saudi Arabia	0.04
Slovakia	1.81	India	0.60	Croatia	0.38	Russia	0.01
Norway	1.49	Indonesia	0.59	Greece	0.34		
Japan	1.36	Germany	0.58	Vietnam	0.34		

Excluding countries that have only one registration and those with insufficient data.
Source: ISO, 2001, World Bank, 2000.

In terms of registrations per unit of GNP, Western Europe is still the leading region, but the difference of distributions among the regions is not as extreme as before (Figure 10). The exception would be North America, which now holds the

lowest level of adoption. Compared to the previous measures, Eastern Europe, Central and South Americas, Africa and West Asia are at their highest level of adoption relative to other countries: these regions have relatively middle to low level of economic activity and this may well account for their low levels of ISO 14000 registration. The low level of economic activity in these regions skews the actual level of adoption if measured by the gross registration number. In 1996, Western Europe has been the most dominant, followed by East Asia. However, by 2000, the growing levels of adoption in Eastern Europe, Latin America, Africa and West Asia become apparent, reducing the dominance of Western Europe and East Asia.

Figure 10: Regional Growth of ISO 14001 Registrations per GNP, 1996-2000

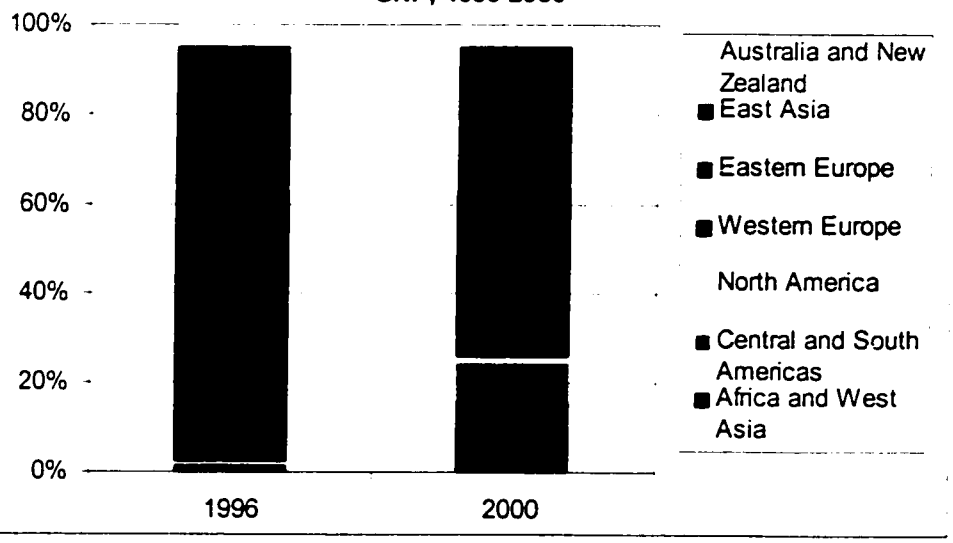


Table 11 summarizes the comparison of the adoption levels by country. Regardless of the control factors, Sweden, Australia, Switzerland, Denmark, and

Finland are among the top ten countries in terms of their level of ISO 14000 adoption. However, the control factors have a major affect on the rankings of many countries. A difference of 20 places in the ranking shows a large influence of one or other of the controlling factors. If we control for population size 12 countries (Slovenia, United Arab Empire, Liechtenstein, Estonia, Luxembourg, Cyprus, Monaco, Barbados, Andorra, Saint Lucia, Iceland, and Brunei) move up the raking by more than 20 places, while 11 countries (US, France, Italy, China, Brazil, Thailand, India, Mexico, South Africa, Turkey, Egypt, Indonesia, Philippines, Columbia, Iran, Vietnam, Morocco, and Pakistan) move down the ranking by more than 20 places. If we control for the level of economic activity 11 countries move up more than 20 places in the ranking (Hungary, Slovenia, Estonia, Jordan, Nambia, Latvia, Saint Lucia, Malta, Bahrain, Honduras, and Zambia) and 9 countries move down the ranking more than 20 places (Japan, Germany, US, France, Italy, China, Brazil, Mexico, and Argentina).

The regional trends commonly show the dominance of Western Europe over years and the low level of adoption in North America. The distribution based on the registrations per unit of GNP shows the least skewing in the data and the least differences among regions, while registration per capita shows the greatest gaps among the regions.

Table 11: Comparison of Total Rankings in Gross Registrations, Registrations per Capita, and Registrations per unit of GNP, by Country

Country	Rank	Reg	Rank	R/Mcap	Rank	R/BGNP	Country	Rank	Reg	Rank	R/Mcap	Rank	R/BGNP
Japan	1	5556	12	43.95	20	1.36	Jordan	51	16	46	3.51	8	3.05
UK	2	2534	13	42.91	17	2.00	Peru	52	13	66	0.52	61	0.21
Sweden	3	1370	2	154.77	1	6.05	Iran	53	12	79	0.19	69	0.12
Germany	4	1260	23	15.36	39	0.58	Chile	54	11	64	0.74	67	0.15
Australia	5	1049	7	55.94	9	2.71	Lithuania	55	10	51	2.70	26	1.06
USA	6	1042	45	3.85	68	0.13	Luxembourg	56	9	17	21.08	45	0.47
Netherlands	7	784	9	49.94	16	2.02	Vietnam	56	9	84	0.12	57	0.34
France	8	710	28	12.07	44	0.48	Croatia	58	8	54	1.78	56	0.38
Switzerland	9	690	5	97.10	10	2.43	Venezuela	59	7	73	0.30	72	0.09
Spain	10	600	24	15.24	25	1.08	Soudi Arabia	60	6	74	0.29	74	0.04
Denmark	11	580	3	109.41	7	3.31	Lebanon	61	5	60	1.19	59	0.33
South Korea	12	544	29	11.72	20	1.36	Romania	61	5	76	0.22	65	0.16
Italy	13	521	33	9.05	46	0.45	Cyprus	63	4	40	5.31	46	0.45
China	14	510	68	0.41	40	0.55	Mauritius	63	4	47	3.45	31	0.92
Finland	15	508	4	98.58	3	4.06	Namibia	63	4	52	2.41	22	1.24
Canada	16	475	22	15.68	33	0.82	Latvia	63	4	57	1.63	34	0.68
Taipei	17	421	NA	NA	NA	NA	Puerto Rico	63	4	62	1.04	NA	NA
Brazil	18	330	53	1.99	52	0.43	Zimbabwe	63	4	70	0.34	40	0.55
Thailand	19	310	42	5.07	11	2.35	Afganistan	63	4	82	0.16	NA	NA
India	20	257	75	0.26	37	0.60	Morocco	63	4	83	0.14	69	0.12
Norway	21	227	8	51.22	19	1.49	Pakistan	63	4	87	0.03	73	0.07
Austria	22	203	16	25.13	30	0.94	Monaco	72	3	6	93.75	NA	NA
Malaysia	23	174	34	7.84	14	2.14	Barbados	72	3	30	11.28	NA	NA
Hungary	24	164	20	16.22	6	3.59	Tunisia	72	3	71	0.32	65	0.16
Ireland	25	163	11	43.99	11	2.35	Syrian Arab	72	3	78	0.20	64	0.19
Mexico	26	159	56	1.66	52	0.43	Russia	72	3	88	0.02	75	0.01
Belgium	27	130	26	12.74	43	0.50	Andorra	77	2	15	30.77	NA	NA
South Africa	28	126	50	3.04	31	0.92	Saint Lucia	77	2	25	13.16	5	3.60
Czech Republic	29	116	31	11.27	13	2.19	Iceland	77	2	35	7.30	60	0.26
Argentina	30	114	48	3.16	55	0.39	Brunei	77	2	38	6.35	NA	NA
Hong Kong	31	105	21	15.70	35	0.66	Malta	77	2	40	5.31	42	0.53
Singapore	32	100	14	31.61	27	1.05	Bahrain	77	2	49	3.11	54	0.41
Turkey	33	91	58	1.43	46	0.45	Oman	77	2	63	0.87	NA	NA
Slovenia	34	88	10	44.40	2	4.54	Honduras	77	2	71	0.32	49	0.44
Egypt	35	78	59	1.27	28	0.99	Zambia	77	2	77	0.21	36	0.62
Indonesia	36	77	69	0.38	38	0.59	Yugoslavia	77	2	79	0.19	NA	NA
Poland	37	66	55	1.71	49	0.44	Guatemala	77	2	79	0.19	71	0.11
New Zealand	38	63	19	16.61	23	1.14	Sri Lanka	77	2	85	0.11	68	0.13
Israel	39	60	32	10.06	36	0.62	Kenya	77	2	86	0.07	63	0.20
UAE	40	48	18	17.62	28	0.99	Ecuador	90	1	NA	NA	NA	NA
Portugal	41	47	43	4.72	49	0.44	Macau	90	1	NA	NA	NA	NA
Philippines	42	46	65	0.61	39	0.58	Qatar	90	1	NA	NA	NA	NA
Greece	43	42	44	3.99	57	0.34	Trinidad-Tobago	90	1	NA	NA	NA	NA
Slovakia	44	36	37	6.68	18	1.81	Bolivia	90	1	NA	NA	NA	NA
North Korea	45	26	61	1.12	NA	NA	Dominican Rep	90	1	NA	NA	NA	NA
Uruguay	46	22	36	6.69	24	1.10	Nigeria	90	1	NA	NA	NA	NA
Colombia	47	21	67	0.51	61	0.21	Palestine	90	1	NA	NA	NA	NA
Costa Rica	48	20	39	5.67	15	2.05	Paraguay	90	1	NA	NA	NA	NA
Liechtenstein	49	19	1	593.75	NA	NA							
Estonia	50	18	27	12.41	4	3.69							

Source: see text.

4.1.5 Determination of the indicator of global ISO 14000 adoption

As we might expect, the size of population has a significant association with the level of ISO 14000 adoption ($r = 0.447$), but the level of economic activity has the stronger positive correlation ($r = 0.835$). As we might expect the larger the size of a country's economy, the more ISO 14000 registrations the country is likely to have.

Table 12: Correlations among Gross Registrations, Population, and GNP

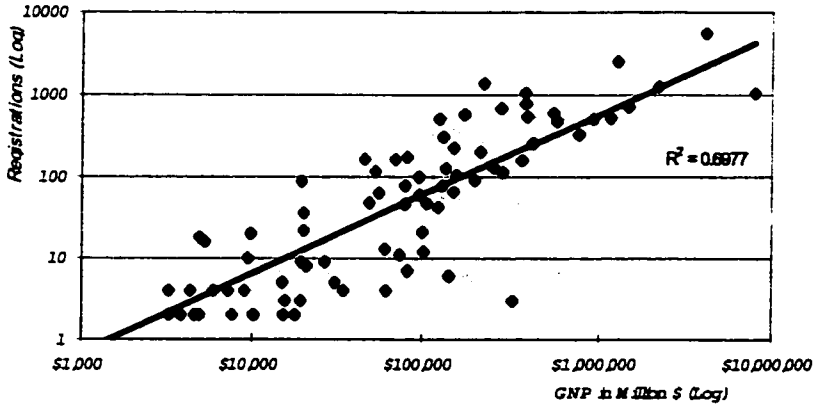
Correlations[a]

		LG2000	LOGPOP	LOGGNP
LG2000	Pearson Correlation	1	.447**	.835**
	Sig. (2-tailed)	.	.000	.000
LOGPOP	Pearson Correlation	.447**	1	.721**
	Sig. (2-tailed)	.000	.	.000
LOGGNP	Pearson Correlation	.835**	.721**	1
	Sig. (2-tailed)	.000	.000	.

**. Correlation is significant at the 0.01 level (2-tailed).

a. Listwise N=78

Figure 11: ISO 14000 Registration and GNP



There is a clear association between GNP and the gross number of ISO 14000 registrations (See Table 12 and Figure 11). The strong association between the two

shows that the level of GNP skews the level of adoption and therefore the gross number of the ISO 14000 registration indicates as much about the size of the economy as it does the level of ISO 14000 registration. Registrations per unit of GNP, therefore, best represents the adoption trend of ISO 14001 around the world and should be used to assess why some countries tend to adopt more and some less. In the study, therefore, the registrations per unit of GNP are used as the indicator of a country's level of adoption of ISO 14001 hence as the dependent variable for statistical analysis.

4.2 Factors influencing the adoption patterns

The previous section has revealed that the number of registrations per billion dollars of GNP is the best indicator of the level of adoption of ISO 14000 around the world. What factors might influence this adoption level? Is it possible to demonstrate that the factors raised by the literature do influence the level of adoption level of ISO 14000 as seen in the registrations per unit of GNP? This section focuses on five factors: implementation costs, level of participation at the decision-making, familiarity with EMS and domestic regulatory development process, involvement in trade, and degree of environmental awareness. The results of the statistical analysis are described in relation to the literature in considering influence behind the adoption pattern.

4.2.1 Data and methodology

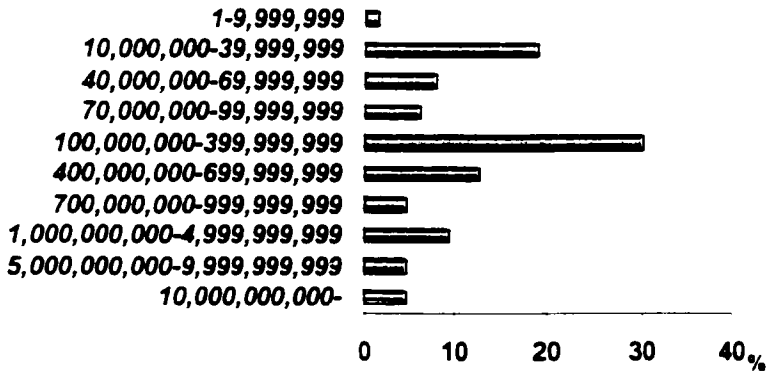
As noted earlier, the registration data from ISO lacks registration figures by industry types for each country and region. In order to examine the impact on industrial sectors, industry-specific data for Canada was obtained from Mr. Steward Anderson at Worldpreferred.com. Worldpreffered.com is a non-governmental organization that maintains a database of registered organizations. I have used the Canadian Key Business Directory (2000; 2001) to examine the general characteristics of these organizations such as the number of employees and value of sales of the ISO 14001-registered companies. For an examination of the reasons for the registration, I conducted a survey of 79 companies in the top six leading industrial sectors (automobile manufacturing, utilities, chemicals, pulp and paper, rubber, and electronics) among those who are ISO 14001-registered in Canada. The survey was based on 69 percent sample of all ISO 14001-certified companies in Canada. Of these, 27 percent responded to the survey. The survey result was compared to a similar survey conducted by the Standards Council of Canada (2000b).

4.2.2 Implementation costs

Many studies have identified that one of the major barriers to adoption is the high level of infrastructure and expertise required for the implementation of ISO 14000. IISD (1996), Bridgen (1997), and Morrison *et al.* (2000) argue that Small-and-Medium Enterprises (SMEs) around the world as well as organizations and

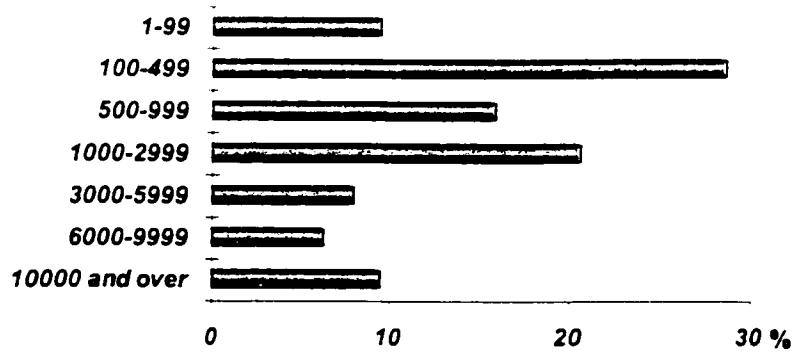
companies in developing countries tend to find it much more difficult to become ISO 14000 registered as they lack the infrastructure and expertise in EMS. The required levels of expertise, physical infrastructure, and finance, are often excessive for many organizations.

Figure 12: Annual Sales ($)



Source: Dun & Bradstreet of Canada, 2000; 2001; Worldpreferred.com, 2001.

Figure 13: The Number of Employees



Source: Dun & Bradstreet of Canada, 2000; 2001; Worldpreferred.com, 2001.

Based on the analysis of the annual sales and the number of employees of those companies who are ISO 14000-certified in Canada, the study supports the

argument that SMEs do face obstacles to implementing ISO 14000. Given the large number of SMEs in general in the Canadian economy, the registered companies tend to be medium to large companies, both in terms of the value of sales and number of employees (Figure 12 and 13). On average ISO 14001-registered companies have annual sales of $1.26 million and employ over 3,500 people. The finding corroborates SCC's survey (2000b), which found that more than 75 percent of the registered companies are large multi-national firms with over 501 employees while non-registered companies in Canada tend to be small firms. In addition, SCC's (2000b) survey reveals that SMEs find difficulty in understanding what ISO 14000 is and what implementation involves. Boiral and Sala (1998) also found that the costs and time involved in implementing an EMS and becoming ISO 14000-registered result in a great deal of skepticism in Canadian businesses about the usefulness of ISO 14000. This may well imply that organizations in developing countries are also having difficulty, due to the required cost in adopting ISO 14000.

In order to increase the adoption by SMEs and those in less developed countries, the ISO 14000 regime needs to consider two issues: reducing the costs and providing information and assistance. Forbes (1999) and Kirkland and Thompson (1999) find that ISO documentation is so complex that it has resulted in the need for and growth of consulting services. Such costs for consultants create even greater financial barriers. The regime needs to find ways of providing cost-effective expertise to SMEs and to developing countries and to develop capacity-building if it is to promote ISO 14000 and make it universally accessible. As we saw in Chapter Three, ISO is not oblivious to this since it established DEVCO to facilitate

developing countries to adopt ISO standards, and there is a project team to gather information on the needs of SMEs in TC 207 (TC 207, 2001). Nevertheless, the impact of DEVCO's activities is not apparent. There is wide agreement in the literature that while businesses recognize the value of ISO 14000 not all businesses can afford financially or have the technical capacity to adopt the standard. The economic interests found in the ISO 14000 regime so far has worked only in a favour of the actors with access to the expertise and finance: since non-ISO 14000 registered companies may find it increasingly difficult to do business this will only exacerbate economic disparity. Therefore, providing technical and financial assistance is important and necessary for ISO 14000 to be truly useful to any size and type of organizations in any country.

4.2.3 Level of participation in the development of ISO 14000 standards

In light of the high implementation costs as well as the ignorance, confusion and complexity surrounding ISO 14000 itself and especially ISO 14001 implementation procedures, it is important to examine whether a lack of representation of the less developed countries in the development of the standard is affecting the level and pattern of adoption. Clapp (1998) and McCloskey (1998) both criticize the unequal representation of developing countries in TC 207 and suggest it might be responsible for the low level of adoption by SMEs and companies in less developed countries. As we have seen in Chapter Three, ISO 14000 standards are largely developed by TC 207 and that committee needs greater active involvement of developing countries to achieve fair representation. To examine the impact of the

level of participation, the study looked at whether a country has a membership and what kind of membership (i.e. participation membership with voting rights; observing membership with no voting rights) a country has at ISO/TC 207. For a statistical examination of the association between the level of adoption and the level of participation, the study set up an ordinal scale for memberships, attributing 3 points for Participating Member; 2 point to Observing Member; and 1 point to those with no representation at ISO/TC 207.

The results suggest that the level of participation at ISO/TC 207 has no significant association with the level of adoption. While Participating Member countries have an average level of adoption of 1.17 (median: 0.62), Observing Members have an average level of 1.80 (median: 1.06). There are 31 countries that have no memberships but have registrations, with the average of 0.73 registrations per unit of GNP (median: 0.44). Since the Observing members tend to have more registrations, voting rights per se do not have a significant impact on the adoption level.

However, it is striking that, regardless of the level of participation, member developing countries tend to lag the adoption. Eleven percent of Participating Member countries and 40 percent of Observing Member countries have no registrations. Those countries are less developed countries: the Participating members include Algeria, Bangladesh, Cuba, Ghana, Jamaica, Mongolia, and Tanzania; and the Observing member countries are Armenia, Botswana, Ethiopia, Libyan Arab, Moldova, and Ukraine. Given the little significance of the impact of participation levels at the international level, there must be other reasons, such as the

implementation costs and/or unequal representation of less developed countries, being responsible for the low level of adoption in less developed countries. Moreover, representation at the national level is also often not balanced. Most participants are technical experts from large industries. SMEs do not have the financial assistance nor can they be spared from their daily activities to be involved with the standard activity at the national level or international level. It is also likely that the ISO 14000 registrations in and participants from less developed countries may well be branches of large TNCs. Therefore, the voices of the medium and large-scale companies tend to represent the voice of industry as a whole.

4.2.4 Familiarity with EMS and the nature of environmental regulation

The adoption pattern and trends may well be explained by the familiarity with EMS standards and by the nature of domestic environmental regulatory development, particularly for the case of North America and Western Europe. Figure 10 has shown earlier that ISO 14001 is most widely adopted in Western Europe and least adopted in North America. The figure also shows that Western Europe has been the dominant region in adopting ISO 14000 throughout the years. Western Europe is the only area around the world that has previous experience with similar environmental management standards BS 7750 and EMAS, and more than 50 percent of EMS practices in Sweden, Finland, Germany, Switzerland, Belgium, and France integrate ISO 14001 and EMAS (OECD, 2001). Therefore, familiarity with EMS is high in Western Europe, and may be a significant factor contributing to the high level of the ISO 14000 adoption.

As the literature argues that acceptance of ISO 14001 in Western Europe is due to the cooperative relation between industry and government in the development of environmental standards in their countries, this has relevance to the adoption levels based on the figure of registrations per unit of GNP. Although it is businesses who adopt the standard, the role and the attitude of the government may have an influence on how industry responds to ISO 14000. Kollman and Prakash (2001) compare national variations of response to EMS between US, UK, and Germany and suggest that the relation between regulator and business is crucial to the level of EMS adoption. Germany has consensual type of policy-making in which industry and labour associations are interwoven as social partners in the decision-making processes, while US regulators develop stringent environmental policies based on their anti-industry ideology by using the threat of judicial action (Kollman and Prakash, 2001). Culley (1998) also argues that good domestic industry-regulator relations tend to correlate with supportive attitudes of both industries and governments toward ISO 14001 in countries like Germany, Sweden, the Netherlands, and Norway, which have the high level of ISO 14000 adoption.

North America's low level of the ISO 14001 adoption seems to result from its low level of familiarity with EMS standards as well as its adversarial relationship between industry and regulator. Although Bridgen (1997) argues that there is a shift in preference from traditional command-and-control environmental regulations to flexible voluntary environmental regulation among environmental regulators in the US, industry lacks familiarity with EMS and tends to adopt ISO 14000 less. Due to the adversarial relation in the US, it is possible to speculate that industries in North

America favor to form industry-wide standards and conform only to them. Indeed, SCC reveals that the top reason for not being registered for ISO 14000 in Canada is that industries are already "using other standards", and, given the size of the North American market and its relative lower dependence on international trade, Anderson (2000) argues that there is little need for industries in North America to adopt international standards. More information is required to examine the impact of familiarity with EMS and the nature of domestic environmental regulation at the global scale. However, familiarity with EMS could be the factor behind the high level of adoption in Western Europe, while a lack of the familiarity and adversarial regulator-industrial relation may explain the low level of adoption in North America. Therefore, to reduce the gap among regions, the ISO 14000 regime could provide countries lacking the familiarity with more information on what ISO 14000 is and what registration can ultimately do in terms of trade, market share, and other economic incentives.

4.2.5 Involvement in trade

The prime objective of ISO 14000 is to reduce or eliminate the barriers to trade imposed by companies having to meet different national standards and procedures in each country with whom they trade. The literature frequently discusses that there is a close relation between ISO 14000 adoption and dependence on trade activities, particularly in light of the growing tendency of companies to insist doing business with ISO 14000–certified companies. Lamprecht (1997), Scott (1999), Darnall *et al.* (2000), and Zuckerman (2000) all claim that the European market gives

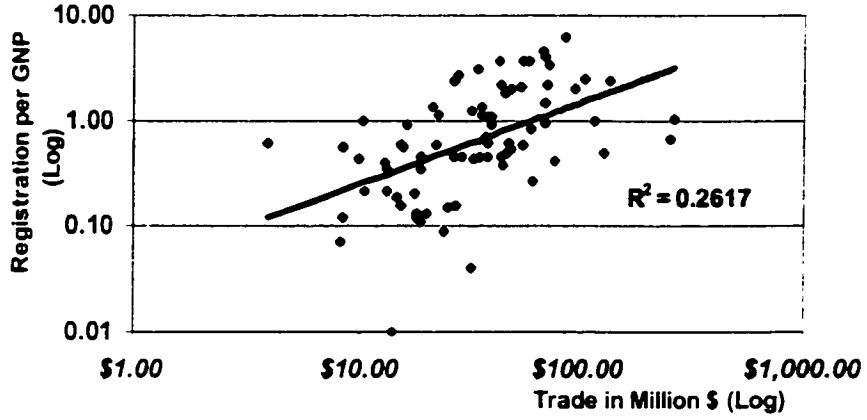
preferential treatment to ISO 14001 registered companies. This may explain the high level of adoption in Eastern European countries whose markets are primarily in the West. This preference of European companies for doing business with ISO 14000 registered companies is also affecting adoption in the US. Scott (1999) found that most of the ISO 14000 registrations in the US chemical industry are headquartered in Europe: These companies include Akzo Nobel, BOC, Ciba, Condu Vista, Elf Atochem, and Formosa Plastics.

Asia is another region that shows trade preference to ISO 14001 certified organizations. The Asia Pacific Economic Cooperation (APEC) promotes ISO 14000 series as a regional environmental standard, hence there is a supportive attitude to the standard implementation within the Asia-Pacific market (Clapp, 1998). This may be an important factor behind the adoption in Australia and New Zealand. A study by Christmann and Taylor (1999, referred to Corbett and Kirsch, 2001) reveals that in China, ISO 14000 certified companies tend to be those businesses with high levels of export to Japan. Similarly, Malaysia where the economy is mainly dominated by resource-based exporting industries, including palm oil, rubber, timber, and petroleum, has experienced a rapid growth in ISO 14001 certifications[9] , and Ibrahim (1998) sees this growth as a result of involvement of companies in international trade. Corbett and Kirsch (2001) also found that those countries with active export-based economies are more likely to adopt ISO 14000.

[9] Malaysia had 7 certificates (0.12 adoption level) in 1996, and it increased up to 174 (2.14 adoption level) by the end of 2000.

Statistical analysis confirms that the number of ISO 14000 registrations per billion dollars of GNP is significantly associated with the value of trade in goods. Countries with more registration per unit of GNP tend to have higher value of trade (r = 0.498) and this association is after the size of the economy itself has been controlled for. Figure 14 shows the positive association between the ISO 14000 adoption level and the total value of trade per country. This shows how strongly economic interests are driving businesses to implement ISO 14001.

Figure 14: Standardized ISO 14000 Registration and Trade



As a result, it could be argued that the cases of Europe and Asia-Pacific, ISO 14001 certification is becoming a trade necessity to increase or even maintain competitiveness in international markets.

Table 13: Top 10 Countries in terms of value of trade with whom Canada Trades

	Imports	Exports
1	United States	United States
2	Japan	Japan
3	United Kingdom	United Kingdom
4	Mexico	China
5	China	Germany
6	Germany	South Korea
7	Re-imports (Canada)	Belgium
8	South Korea	Mexico
9	Taiwan	France
10	Norway	Italy

Source: Industry Canada, 2001.

Table 13 illustrates Canadian trade relations and helps to clarify why the adoption in Canada is relatively low at 0.82 registrations per billion dollars of GNP. Canada actively trades with US, Japan, UK, Germany, China, Mexico, South Korea, out of these, only Japan, UK, South Korea, and Norway have higher levels of adoption than that of Canada. Especially given the extensive trade relation with the US that has 0.13 registrations per unit of GNP, this suggests that Canada faces relatively little pressure from trade preference and hence its level of adoption remains relatively low.

The preference of large TNCs, particularly in Europe and Asia-Pacific, to trade only with ISO 14001 certified companies has meant that ISO 14000 itself has come to create barriers to international trade for those who cannot easily become certified. IISD (1996), Roberts (1998), Zuckerman (1999), and Morrison *et al.* (2000) all criticize ISO 14000 for creating trade barriers between businesses and countries. Despite, the use of ISO 14000, preferential trade practices toward those who are certified has, in the short run, created barriers to trade for those not adopting

or not able to adopt the standard. The trade preference can seriously affect the market share of businesses. For instance, when ISO 9000 was introduced, not many Japanese business organizations adopted ISO 9000, as they considered it to be inferior to the existing Japanese quality management practices (Scott, 1999; Corbett and Kirsch, 2001). However, Japanese businesses soon found that not being ISO 9000 certified was a barrier to their involvement in international trade, negatively affecting its market share. Perhaps because of this experience, Japan was much more aggressive in adopting ISO 14001 to avoid losing market share with respect to trade preference to ISO 14000 registered companies (Corbett and Kirsch, 2000). Japan has incorporated ISO 14000 as a part of Japanese industrial standards, and implementation is therefore strongly encouraged by the Ministry of Trade and Industry (Bridgen, 1997; Culley, 1998). Registered companies include major multinational manufacturing and electronics firms such as Toyota, Matsushita Electronic Industrial, Sony, Honda, and Asahi chemical. All these TNCs are heavily involved in international trade, and they tend to require companies trading with them to be ISO 14000 registered.

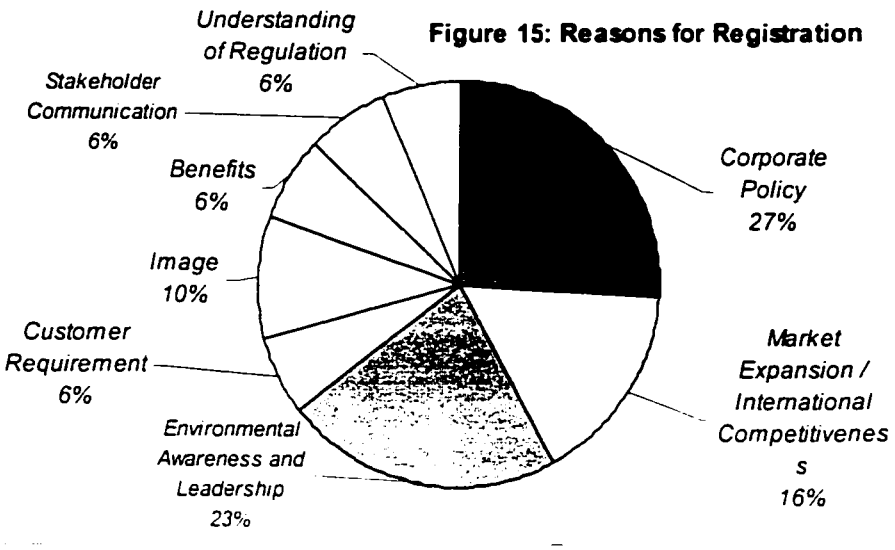


Figure 15: Reasons for Registration

Source: Personal survey, 2001.

In addition to trade preference, there is both external and internal pressure for companies to adopt ISO 14000 and enhance their levels of competitiveness in the international market. According to the survey report by SCC, the ISO 14000-certified organizations in Canada are mostly large firms that have branches in and outside of the country; and they are characterized as strongly export-oriented (SCC, 2000b). The survey response on reasons for implementing ISO 14000 also shows that there are internal pressure to conform to corporate policy (27%) and to increase international competitiveness (16%), as well as external pressure from customers (6%) and stakeholders (6%) influencing companies to become ISO 14000-certified (Figure 15). It is obvious that corporate and trade pressures seem stronger than customer pressures in encouraging Canadian companies to become ISO 14000-certified.

Table 14: Rank of Registered Industries Worldwide and Registered Industries in Canada, by industrial sector.

World		Canada		
Rank	Industry sector	Rank	Industry sector	Activity Description
1	Electrical and Optical Equipment	1	Electronics	Electric Services
2	Chemicals, Chemical Products & Fibers	2	Pulp&Paper	Forestry Services
3	Machinery and Equipment	2	P&P	Logging
4	Construction	2	P&P	Timber Tracts
5	Basic Metal & Fabricated Metal Products	2	P&P	Pulp Mills
6	Other Transport Equipment	2	P&P	Corrugated and Solid Fibre Boxes
7	Food Products, Beverages and Tobacco	2	P&P	Paper Mills
8	Rubber and Plastic Products	3	Automobiles	Motor Vehicle Parts and Accessories
9	Transport, Storage and Communication	3	Automobiles	Motor Vehicles and Car Bodies
10	Aerospace	4	Chemicals	Chemical Preparations

Source: ISO, 2000; Anderson, 2001.

If we look at which types of industries are ISO 14000-certified in Canada, registered companies tend to be export-oriented industries. Table 14 compares the ranking of certified industries in Canada, to certified businesses worldwide by industry sector. In Canada, metal manufacturing and pulp and paper are among the major domestic industries all heavily involved in trade, and these are also the leading sectors in the term of ISO 14000 registrations. The difference between the world leading registered industry and the Canadian registered industry may show that the types of registered industry are unique to the regional or national trade activities. Table 15 shows that leading types of industries to adopt ISO 14000 in Canada are the major exporting industries in Canada: the industries include Motor vehicle sector (rank: no.1 and no.8), pulp and paper industry (rank: no.3; no.6; and no.11), electronics (rank: no.10; no.12; and no.13), and chemicals (rank: no.20 and no.24). However, despite the relatively high level of trade, such sectors as oil and natural gas

industry (rank: no.2) and aluminium (rank: no.5) do not have levels of ISO 14000 registration even though their environmental impact is major. Therefore, given the strong influence of trade on the adoption pattern, it can be suggested that registration data by industrial activities is essential to assess the impact and the effectiveness of ISO 14000. After all, ISO 14000 initially targets business activities, and it is important to measure how and which industries are adopting ISO 14000. Perhaps, even more important, some businesses have a much greater environmental footprint then others.

Table 15: Top 20 Canadian Exports by Industry (SIC code)[10] between 1995 and 1999

Rank	SIC Code	Industrial Activity
1	3231	Motor Vehicle Industry
2	0711	Conventional Crude Oil and Natural Gas Industry
3	2512	Sawmill and Planing Mill Products Industry (Except Shingles and Shakes)
4	3211	Aircraft and Aircraft Parts Industry
5	2958*	Primary Production of Aluminum Industry
6	2712	Newsprint Industry
7	3251	Motor Vehicle Engine and Engine Parts Industry
8	3259	Other Motor Vehicle Accessories, Parts and Assemblies Industries
9	3199	Other Machinery and Equipment Industries n.e.c.
10	3361	Electronic Computing and Peripheral Equipment Industry
11	2711	Pulp Industry
12	3351	Telecommunication Equipment Industry
13	3352	Electronic Parts and Components Industry
14	3611	Refined Petroleum Products Industry (Except Lubricating Oil and Grease)
15	3731	Plastic and Synthetic Resin Industry
16	3192	Construction and Mining Machinery and Materials Handling Equipment Industry
17	1011	Meat and Meat Produts Industry (except Poultry)
18	3359	Other Communication and Electronic Equipment Industries
19	2919	Other Primary Steel Industries
20	3712	Industrial Organic Chemical Industries n.e.c.

* Including Other Primary Smelting and Refining of Non-Ferrous Metal
Source: Industry Canada, 2001.

[10] Appendix F provides detailed explanation of SIC codes.

4.2.6 Environmental awareness of an organization, industry, and country

At the industrial company level, the proactiveness of the organization is a crucial factor in determining whether a company add up to ISO 14000 and also how effect of ISO 14001 will be in reducing environmental impacts. Proactive environmental corporate policy can be so influential that any branch and supplier of the corporation also becomes environmentally proactive. In fact, OECD argues that private initiatives would be an instrument to bring "an effective 'fit' between business and the societies in which they operate" through the use of private initiatives (OECD, 2001: 1). The 'fit' between the two can foster an atmosphere of mutual trust and predictability that facilitates the conduct of businesses and enhances economic, social and environmental welfare (OECD, 2001).

The corporate policies based on the use of ISO 14000 may indeed cause a positive change, if it does impose unfair barriers among businesses, and such proactive, private environmental initiatives are influencing the level of ISO 14000 adoption. Marbek Resource Consultant (1999) found that ISO 14000 is used as an environmental tool for corporate business management in Canada and about half of the certifications can be found in Canadian subsidiaries of large transnational corporations that commonly produce recreational vehicles, automobiles and automotive parts, electronics, and packaging. In the automobile manufacturing industry, General Motors has required all its suppliers to adopt ISO 14001 by the end of 2002, while Ford Motors is setting a similar deadline of 2003 (Anderson, 2000; Darnall *et al.*, 2000; Zuckerman, 2000). This may explain the active adoption of ISO 14000 in metal manufacturing in Canada. Coca Cola Beverage Corporation is

another example of how proactive corporate policy can influence business partners to adopt environmental practices (Corbett and Kirsch, 2001). Furthermore, the survey reveals that environmental leadership (23%) and understanding environmental regulation (6%) are important reasons for registrations (Figure 15).

Table 16: Total Expenditures on Environmental Protection by Industry and Type of Activity, 1997 (Operating expenditures)[11]

	Industry	Million $
1	Primary Metals	485.4
2	Pulp and Paper	478.3
3	Other Manufacturing	291.2
4	Mining	271.6
5	Crude Petroleum and Natural Gas	248.8
6	Electric Power Systems	240.3
7	Refined Petroleum and Coal Products	235.3
8	Chemical Products	228.3
9	Transportation Equipment	139.5
10	Food	115.8
11	Logging	96.1
12	Wood	71.7
13	Non-Metallic Mineral Products	39.1
14	Pipeline Transport and Gas Distribution Systems	34.8
15	Beverage	22.2

Source: Statistics Canada, 1999.

An analysis of environmental expenditure by industry in Canada (Table 16), by Statistics Canada, suggests that industries concerned with environmental protection tend to adopt ISO 14000 more. The leading industrial sectors in expenditure on environmental protection include primary metal, pulp and paper,

[11] The expenditure includes types of activities such as environmental monitoring; environmental assessment and audits; reclamation and decommissioning; wildlife and habitat protection; pollution abatement control as end-of-pipe processes; pollution abatement control as integrated processes; fees, fines and licences; and others.

chemical products, electric power utilities, mining, petroleum and natural gas, logging, and transportation equipment. Due to the high level of environmental expenditure in primary metal and transportation equipment, motor vehicle manufacturing sector may be active to recognize and adopt ISO 14000 as an environmental tool. The adoption level of pulp and paper (including logging) and chemical sectors may also be related to their large environmental expenditure. However, there are exceptions including food and beverage industries and natural gas sectors. These sectors are not actively adopting ISO 14000, perhaps because they are less involved in international trade or because they find the implementation costs as excessive.

At the national level, would the level of commitment to multilateral environmental agreements affect the adoption level? While European countries have ratified the Kyoto Protocol or are very much in favour of ratifying it, the US and Canada are much more reluctant to ratify the Kyoto Protocol. It is possible to speculate that government's attitude toward international environmental agreements does affect the attitude of industries to adopt ISO 14001. If this is the case, it may suggest that government's involvement in international environmental issues has a crucial influence on businesses adopting ISO 14000.

4. 3 Conclusion

The study has revealed that the number of registrations in a country is significantly related to the level of economic activity and suggested therefore that registrations per unit of GNP is a much better indicator of the level of the ISO 14000

adoption than gross number of registrations alone. The current adoption trend shows that economic players who have financial and technical resources and are familiar with EMS tend to adopt more. Although such trade incentives as increasing competitiveness and expanding market share are the major motives for businesses to adopt ISO 14000, only medium and large corporations can afford to implement, resulting in the creation of trade barriers to SMEs and less developed countries. This may have been aggravated by the lack of representation for SMEs at TC 207. The cost indeed is a crucial challenge for the regime to achieve broad acceptance of the standard around the world. The European origins of ISO 14000 and the primary role of the Geneva-based ISO in the regime seem to have a strong influence on the adoption pattern. The adoption level is particularly high in Europe and among large TNCs: ISO 14000 originated in BS 7750 and EMAS from Europe, and the Geneva-based ISO runs private-oriented governance that involves large transnational exporting industries.

From the comparative case between Western Europe and North America, Governments may have influenced the level of adoption through the way they handle environmental issues. This implies that governments could play a vital role in promoting the ISO 14000 regime and in ensuring that compliance involves real environmental targets. In fact, the World Bank argues that government encouragement of EMS adoption "can really only be effective when there is cooperation at the government level between the relevant departments, including industry and trade, as well as environment" (World Bank Group, 1998:134).

The final chapter will examine how the ISO 14000 regime has so far influenced concerned actors in achieving its objectives and project how the regime could achieve more universal adoption of ISO 14000. Based on the understanding of how the ISO 14000 regime could behave to achieve the worldwide acceptance over the long run, the chapter will address which functions of causal mechanisms are important for the regime to perform effectively.

Chapter Five:

The Present and Future Regime Impacts of ISO 14000: Tracing the Ideal Causal Mechanisms

This thesis has attempted to measure the effectiveness of the ISO 14000 regime and consider specifically what the barriers to it achieving worldwide acceptance are. Chapter Three has shown that there are multifaceted goals expressed by the various actors involved, but its effectiveness implies that ISO 14000 ultimately can and will be adopted universally. Given a strong association between the number of ISO 14001 certifications and the level of economic activity of countries, Chapter Four used the number of certifications per billion dollars of GNP as an indicator of the level of adoption around the world to examine the factors influencing the adoption level of ISO 14000. The examination of the factors has lead to identifying what would be the challenges for the regime to overcome if it is to be "practical, useable, and useful" to all. While familiarity with EMS and environmental awareness both at the organizational and national level assist organizations to adopt the standard, the cost of implementation and lack of expertise are major barriers. These constraints to ISO 14000 registration will make it increasingly difficult for small and medium enterprises (SMEs) and firms in developing countries to do business with the developed world who more and more require ISO 14000 certification for anyone dealing with them. Ironically, therefore, far from reducing barriers to trade, ISO

14000 may in fact create trade barriers particularly for SMEs and organizations in less developed countries. This final chapter concludes the study by discussing what issues are important for the regime to achieve universal adoption, how these might change over time, and which regime functions, or causal mechanisms, are essential for the regime to be effective.

The first section summarizes the overall impacts of the ISO 14000 regime, based on "the domains of impact" introduced by Young and Levy (1999). The domains help identify how the regime has affected the actors concerned as well as those not initially concerned, over time. By identifying the positive (helpful) and negative (unhelpful) impacts, the section suggests the regime focus on increasing representation and accountability. The second section examines how ISO 14000 certifications have so far diffused spatially and structurally and, based on what we have learned about the factors facilitating and hampering its spread, projects how the regime may move towards universal adoption. The section illustrates how the theory of spatial diffusion is relevant to an understanding of the factors and mechanisms involved in adopting ISO 14000. I argue that the goals and challenges of the ISO 14000 regime change as the level of the adoption increases around the world. The third section looks at the mechanisms within the regime to see precisely how the regime is currently functioning with respect to its objectives by using Young and Levy's (1999) causal mechanisms framework. It goes on to suggest how these mechanisms could be altered to enhance the regime's effectiveness.

So far the ISO 14000 regime has been effectively largely by modifying the utility for firms of adopting ISO 14001-EMS, at least for large businesses in

developed countries. The key functions that need to be strengthened and modified are to enhance cooperation, facilitate learning, and define roles among the actors involved in order to overcome the challenges of equitable representation and public environmental accountability and allow ISO 14000 to diffuse to those who are currently unaware of, or unable or unwilling to adopt the standard.

5.1 Summary of regime goals and impacts

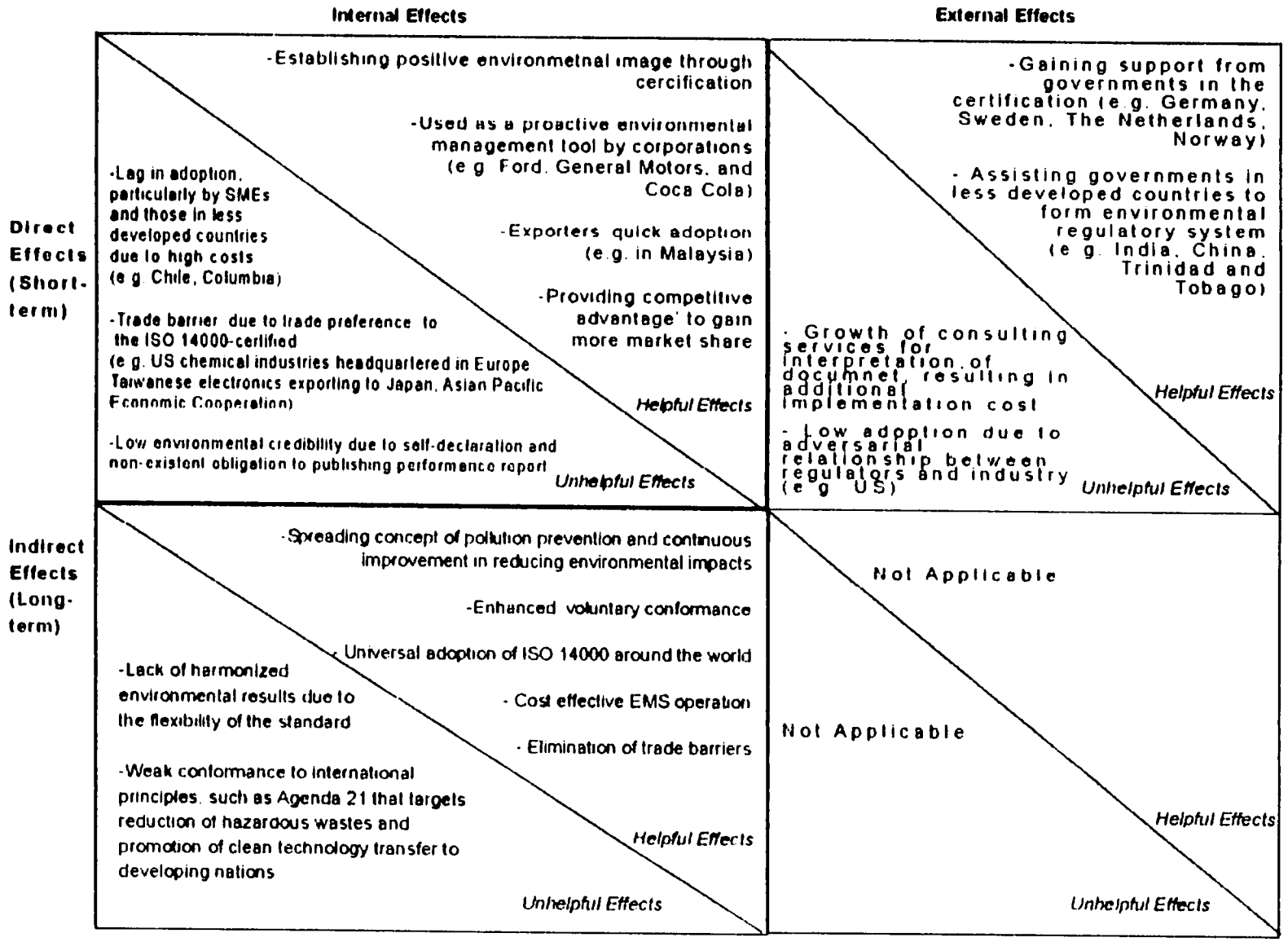
It is useful to use Young and Levy's (1999) eight domains of regime effects[12] to summarize the current effects of the ISO 14000 regime and to speculate on the expected effects based on how the regime operates. Internal domain implies effects in the area originally concerned with the regime, while external domain looks at effects outside of the concerned area. Direct impacts tend to take place in the short run, while indirect effects take more time to be recognized. In each case, we can distinguish helpful and unhelpful effects with regard to the goals of the regime. Table 17 summarizes the effects of the ISO 14000 regime.

5.1.1 Direct (short term) internal effects

At this stage, the implications of the ISO 14000 regime are most evident in the domain of direct and internal effects, implying that the effects are on the actors and interests directly involved in the regime. The regime has been most effective in persuading large exporting businesses that have a high degree of environmental

[12] See Chapter Two, section 2.3 for details.

Table 17: Domains of Regime Effects for the Case of the ISO 14000 Regime



awareness to adopt ISO 14000. There is a strong association between trade activity and ISO 14000 registrations worldwide and most companies that are ISO 14000-registered in Canada are large companies heavily dependent on exports (see Chapter Four for detail). In particular, many trans-national corporations (TNCs) are using the standard as a part of their environmental program and branches of these may account for many, if not most, of the registrations in many less developed countries. For the most part, ISO 14000 so far has been regarded as an economic tool to increase business efficiency, competitiveness, and image, with environmental performance objectives taking a distinctly second place. This is not surprising given the nature of ISO's industry-based, market driven concerns and consensus driven process. ISO 14000 allows businesses to recognize their responsibilities to environmental protection, and hence to their customers, without compromising, or even improving, business performance and market share, and to do so, in away, that organizations can control and hence avoid the need for external regulation.

The regime has had unhelpful and unintended impacts on other users. Even if the benefits of ISO 14000 are recognized, not all organizations are willing or able to adopt ISO 14000. In particular, the cost and lack of infrastructure and expertise required for the implementation are too high for most SMEs and organizations in developing countries. Since the TNCs and companies in Europe and Asia-Pacific often require their branches, retailers and/or suppliers to be ISO 14000 compliant, this has created trade barriers for whom compliance is not possible or practical. This is a major negative impact of the regime.

A second set of unhelpful impacts identified in the literature and criticized by environmental NGOs is that the ISO 14000 regime has a potentially serious environmental credibility problem due to the lack of public accountability and performance requirements of ISO 14001 EMS. First, the regime allows for self-declaration without any third-party auditing of performance and procedures. Second, ISO 14000 has significant weaknesses even in comparison to other, well-established voluntary environmental measures. Unlike the European Eco-Management and Audit Scheme (EMAS), ISO 14001 does not require external reporting of environmental performance; and unlike the Responsible Care programme, ISO 14001 does not require consultation with host communities or strict compliance with regulatory requirements. Indeed, although ISO 14001 encourages companies to make regulatory compliance a policy objective, a company may break the law and retain certification so long as it is conforming to the required set of procedures to make continual improvements in environmental performance. EMAS and BS 7750 promote continuous improvement with reference to environmental performance or impacts, while ISO 14001 encourages continual improvement of the environmental management system as a means to reduce environmental impacts. The procedural focus and general lack of performance requirements make for minimalist environmental objectives.

5.1.2 Direct (short term) external effects

The regime has also affected actors who are outside of the initially concerned area. There have been two main unhelpful effects here. The complexity of the

documents and procedures has resulted in the need for, and hence growth of consultants, who are wholly outside the ISO 14000 regime to provide interpretation of the documents and procedures. This adds more cost to SMEs and companies in developing countries who are most likely to require these services. Perhaps of greater concern is that these consultants are outside of the internal controls imposed by ISO 14000 on its third party auditors, and that they could potentially undermine the central philosophy of ISO 14000 that the infrastructure for ISO 14000 registration should be developed in and controlled by each individual country and not by high-priced consultants for hire in developed countries.

The second negative impact is the slow pace of recognition for the standard in countries where there is an adversarial relationship between regulator and industry. European countries have the highest level of adoption stemming in large part from their familiarity with EMS through their experience with BS 7750 and EMAS as well as their regulatory process that involves regulators and industries mutually. By contrast, in the US, regulators like the Environmental Protection Agency (EPA) have an adversarial relationship with industry, and therefore, industries have tended to create and use industry-based domestic voluntary standards. This has hindered acceptance of externally created, generic EMS such as ISO 14000. This resistance towards externally controlled, international standards is also reflected in the US reluctance to sign on to such international environmental accords as the Kyoto Protocol.

On the other hand, ISO 14000 has had a positive impact on some governments that lack domestic environmental regulatory systems. Governments in India, China,

and Trinidad and Tobago have been establishing their own environmental regulatory scheme incorporating ISO 14000. The regime did not initially intend to affect regulatory systems, however, the effects of TC 207 to assist developing countries build their capacity for EMS has successfully promoted ISO 14000 as well as provided a model framework for national environmental regulation.

5.1.3 Indirect (long term) internal effects

Over the longer term there is considerable potential for ISO 14000 to improve industry's impact on the environment largely through increasing preference for conformance with voluntary environmental standards and requiring continuous improvement[13]. While this rather weak environmental objective resulted from the need for consensus, particularly stemming from economic interests that fear intervention that may bring down productivity, it is likely that its continued acceptance will depend upon whether ISO 14000 can satisfy higher demands for environmental performance, accountability, and transparency.

The rapid growth and geographic spread in ISO 14000 registrations, faster than its older sister ISO 9000, suggests that it is gaining wide acceptance. If it does, it will presumably eliminate the trade barriers that are currently emerging from the preferential corporate and trade practices of TNCs, European and Japanese companies. The recognition by ISO of the barriers to SMEs and less developed countries though such efforts as DEVCO should help to ensure ISO 14000's wider

[13] Even if this in procedure rather than in performance.

acceptance. However, there are still several barriers that will be discussed in more detail in the last section.

There are two long-term internal effects that are critical. First is the inability of ISO 14000 to harmonize the actual environmental results between countries. These are inherent in the generic, process-oriented nature of ISO 14000, its flexibility to be used by any organization anywhere, and minimalist requirements that are site-specific requiring companies to comply only with "applicable" laws and regulations. Second, the failure of ISO 14000 to integrate into its procedure conformance to international environmental agreements such as the Montreal Protocol, the Basel Convention on transportation of hazardous wastes, and Agenda 21 that targets the reduction of hazardous wastes, and the promotion of clean technology transfer.

Overall, therefore, ISO 14000 provides a framework for businesses to internalize sound environmental practices into their business operations, and it is encouraging the idea that businesses have a responsibility to control their impact on the environment and to continuously improve how they perform. Whether this will ultimately lead to tangible reductions in environmental impacts remains to be seen. At the moment, it largely depends on the willingness of corporations to set their own environmental performance requirements. There are three main challenges presently for ISO 14000. First, it needs to broaden its focus from a narrow business, economic and trade purpose of the standard to incorporate direct attention to environmental performance. Second, it needs to widen its representation at both the national and international level to include equitable stakeholder participation. This must include representatives from SMEs, developing countries, environmental NGOs, and

consumer advocates; and it must increase public accountability and transparency. Third, it must continue to build up the capacity of and provide resources for less developed countries and SMEs to participate on an equal basis in ISO 14000.

5.2 ISO 14000 as the diffusion of an innovation

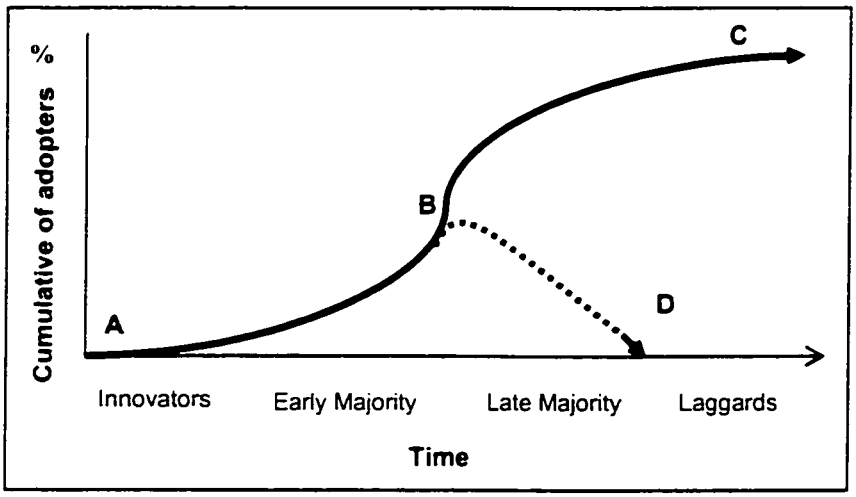
It is useful to consider the spread of ISO 14000 registrations as a diffusion process, since it focuses attention on three things: ISO 14000 is innovative behaviour and/or technology; that its spread has both a spatial and temporal dimension; and that the mechanisms by which ISO 14000 spreads are important. An innovation, in a sense, is a set of information that affects views and attitudes, and ultimately the behaviour of people. The attitudes and behaviour or technology must be sufficiently novel that it clearly has its origins in one place and time and is not simply an adaptation of existing patterns or technology to changing circumstances which could occur simultaneously in many places.

Diffusion theory has long been an important geographic concept, most associated as a spatial phenomenon with Torsten Hägerstrand (1952; 1967). Central to diffusion theory is the idea that the cumulative number of adopters of most innovations usually takes the form of an S-shaped logistic curve with an initial group of early innovators (A), followed by mass adoption over a relatively short period of time (B), and ending with only a small group of laggards or non-adopters (C) (Figure 16). Innovations also tend to diffuse down social hierarchies from class to class or from the more educated, who are the recipient of a greater range of innovative messages, to the less educated. Finally, innovations usually involve clear patterns of

geographic spread from one point of origin. How it spreads spatially is determined by the nature of the way information about the innovation is passed from one person to another.

Geographers usually recognize two patterns of 'expansion diffusion': 'contagious diffusion; where an innovations spreads from neighbour to neighbour according to the distance from the original adopter or pre-existing innovators rather like a contagious disease; and 'relocation diffusion' where an innovation starts in one place and then moves to another location, often from one metropolis to another, as the person or information moves. The places are usually closely linked by lines of communication (Gould, 1969; Haggett, 1983).

Figure 16: The Distribution of Innovation Acceptors



ISO 14000 is an example of an innovation, both behaviourally and technically, currently in the early stages of spreading around the world. ISO 14000 began in Western Europe modelled on existing EMS (BS 7750 and EMAS), and

where finance and expertise were readily available, and ISO itself is located in Geneva, Switzerland. In Chapter Four, we have seen how, over the first six years since it was introduced, the number of ISO 14000 registrations has increased logarithmically and spread from Western Europe, where it still remains dominant, to 112 countries. Since those involved in ISO and TC 207 as well as its various committees are primarily technical experts from developed country, large corporations, ISO 14000 spread rapidly to Japan. Having suffered from not being quick to adopt ISO 9000, Japan was very receptive and quick to participate in ISO 14000 as is reflected in its high level of registrations per unit of GNP. The latter is a clear example of relocation diffusion. Similarly, other highly developed countries like Australia have also readily adopted it, but a few, most notably the US, have been slower to adopt. Suffering from more adversarial regulator-industry relations, more highly developed industry based voluntary standards, and generally less receptive political culture with respect to industrial responsibility for environmental protection, these have served as barriers to adoption. From its point of origin in Western Europe, therefore, ISO 14000 intensified in its original location and jumped to other receptive developed countries through the mechanism of involvement in ISO in general and TC 207 in particular combined with the financial and technical capacity to implement ISO 14000. Even in these places, however, we see hierarchical diffusion in play. As yet only large, export-based industries have adopted. SMEs have largely been unable to adopt due to cost and technical constraints.

From these points of origin ISO 14000 has begun to spread. We have seen that Eastern Europe and Asia Pacific regions have much higher levels of registrations

than we might expert from their level of economic activity (GNP). Closest to the earliest centers of innovation in Western Europe and Japan, this is clear evidence of contagious diffusion. On the other hand, Latin America, more tied to North America, which has lagged far behind Europe and Japan, has far fewer registrations than we would expect from the size of their economy and involvement in trade. The spread throughout Europe and the Asia Pacific region has been precipitated by corporate policies and trade preference of Western European and Japanese companies, particularly TNCs, to do business only with companies who are ISO 14000 compliant. In addition, the recognition of the standard by the regional economic association, ASEAN, has contributed to the pattern of contagious diffusion in countries in the Asia Pacific.

Less developed countries that show the highest levels of adoption also tend to be those with more highly developed economies and greatest involvement in trade. Nor should we forget that in many cases, the ISO 14000 registrations that have occurred in the least developed countries are most likely branches of large European and Japanese headquartered TNCs: making a clear case of relocation diffusion. The rest are often those closest to and, therefore, more economically tied to Western Europe and Japan: a case of contagious diffusion. Most of the earliest certified companies in the US and to a lesser extent Canada were likewise branches of large European and Japanese based TNCs, notably European chemical and pharmaceutical companies and Japanese automobile and electronics companies.

Corporate policy and trade preference for ISO 14000-certified companies through the supplier-retailer relation are likely to be increasingly important in

pushing ISO 14000 towards mass adoption and forcing its adoption by medium and even small enterprises and enterprises in less developed countries, which have so far been hampered by financial and technical constraints. We have seen that in Sweden, joint implementation can facilitate sharing of costs among related SMEs, enabling them to reduce the costs of implementing ISO 14000. At this early stage, economic benefits of ISO 14000 are the driving force behind the diffusion of ISO 14000.

5.2.1 Barriers to the worldwide diffusion of ISO 14000

The advantage of the diffusion model includes that it focuses our attention on how an innovation is spread through trade links, communication, and so forth, and on what are the barriers to its spread. Moreover, since it is not a linear process but an S-curve we might expect that the mechanisms and constraints might change over the course of time.

At point A (Table 16), interests in gaining competitive advantage from ISO 14000 registrations is the driving force for the adoption, possibly only for large-and-medium-sized companies particularly in the more developed countries. At the same time, SMEs and those in developing countries face barriers such as lack of familiarity with EMS or standards in general, the high cost of implementation and lack of infrastructure and knowledge about how to adopt. This is the current stage of adoption, having taken off the point A toward point B.

When the proportion of adopters reaches point B, the competitive advantage of being ISO 14000-certified in terms of increasing market share disappears due to the increased number of competitors who are certified. This implies that

competitiveness is a short-term goal of ISO 14000. At this point, providing information on how to implement ISO 14000, in accessible language and in a cost effective manner, could be the key to encourage SMEs and those in less developed countries to adopt. Providing financial or technical assistance would help the adoption move toward the point B. This means that more involvement of SMEs and developing countries is important, in order to take their interests and conditions into consideration. Capacity-building implies that ISO 14000 collaborates with the agencies of international development. The adoption by more companies in turn will gradually lead to the regime eliminating trade barriers.

At this point, to ensure that the proportion of the adopters moves towards point C, rather than point D, will require that questions of environmental accountability be addressed. Unless users can be confident that all those certified are meeting somewhat similar levels or making similar efforts towards genuine improvement in levels of environmental performance and hence all are operating on a level playing field, the credibility of the standard will be undermined and the value of certification worthless. Conformity assessment will therefore be a key concern if ISO 14000 to gain broad acceptance around the world and not relapse to point D.

When the adoption trend reaches point C, the regime could expect the universal use of ISO 14000 as a tool to continuously improve the impact on the environment. Whether it will ever achieve the goal of a more broad definition of sustainability, which was its original objective, is perhaps much less certain.

5.3 Tracing the ideal mechanisms

The analyses of the regime impacts and the diffusion of ISO 14000 suggest that the major issues for ISO 14000 achieving universal adoption involve representation and accountability. By tracing causal mechanisms, we can identify the pathways by which the ISO 14000 regime has so far changed the behaviour of actors as well as how it can alter behaviour so that the regime is more representative and accountable. So far, the regime has primarily been successful by ensuring substantial economic advantages to ISO 14000 adoption through increasing market share, improving access to foreign markets, reducing barriers to trade, and improving cost efficiencies from the reduced use of resources. In other words, it has been successful by appealing to businesses, as self-interested utility maximizers, whose willingness to adopt ISO 14000 has been guided by changes that have altered the costs and benefits of incorporating ISO 14001-EMS into their business operations. Nevertheless, the regime has been successful in only changing the behaviour of medium-and-large-scale companies.

In this thesis, I have identified three major challenges to the ultimate universal adoption of ISO 14000: a fairer sharing of the costs and benefits of ISO 14000 certification, more equitable representation, and greater environmental accountability. As with almost any international environmental regime, the responsibilities for creating the problem and hence the costs and benefits of the solutions are rarely spread evenly among all actors. In this case, there is a need for a fairer distribution of the costs and benefits of ISO 14000 registration among less developed as well as more developed countries; and SMEs as well as large TNCs. ISO 14000 also needs

to broaden its representation, at both the national and international level, to include an equitable participation of multiple stakeholders, namely SMEs, less developed countries, environmental NGOs, consumer advocates, and scientists. Lastly, it needs to improve the ability of the standards to ensure improved environmental performance, and to increase the transparency and public accountability of a company's actual environmental performance. In order to become more fair, representative, and environmentally accountable, the regime must improve its functions of enhancer of cooperation, learning facilitator, and role definer. Focuses in these could force changes in the behaviour of actors that will enable ISO 14000 to become universally adopted.

5.3.1 Enhancer of cooperation

This mechanism focuses on the idea that most international agreements require collective action, which is often a major obstacle to the achievement of sustained cooperation. If individuals continue to operate out of self-interest, profit-maximizing goals in a global commons, they will ultimately invite ruin for all. Cooperation is tied to how the regime distributes the costs and benefits equally among the actors concerned. In the case of ISO 14000, we have seen that the costs and benefits are not equally shared among all actors. In particular, there are major barriers to entry for SMEs and organization in less developed countries. The regime needs to find a way to reduce the cost burden and provide technical assistance for them. This is more likely to happen if more SMEs, developing countries, and NGOs

are involved in the committees and structures of the regime. Having a greater voice might ensure that conditions and concerns of SMEs and businesses in less developed countries are increasingly recognized and that ISO 14000 is adjusted to meet them.

Assistance to SMEs and developing countries could be generated by setting up a 'participation fee' for participation in TC 207, which is prorated on the size of the organization. DEVCO has established financial and technical assistance for developing countries on a purely voluntary basis, but more reliable funding, such a participation fee, could enhance considerably the level of capacity building. The participation fee would go strictly to the funding program to support SMEs to participate and identify how to alleviate the costs for organizations in developing countries to implement the standard. The fee could be paid by money or in the form of technical assistance to an implementation project. Experience of the certified organizations contributes pricelessly to building capacity of those in need. Such physical cooperation between the organizations could replace the need and cost of hiring consultants, which carry with them the added risk of undermining the regime itself since they operate outside the regime's control and are centered in developed countries where the expertise and experience are.

A most effective way of improving cooperation and reducing barriers to trade imposed by the corporate policies and trade preferences of TNCs and firms in developed countries is for these companies to assist their non-certified suppliers and customers to become ISO 14000 compliant. This function, however, lies outside the domain of the regime. The ISO 14000 regime could, however, help by increasing the transparency of actors' behaviour by publishing which companies require ISO 14001

certification and how much assistance they are providing to those in need. This is to control moral with regard to the use of ISO 14000. The regime could go one step further by attempting to apply sanction. Although sanctioning is difficult for a non-regulatory regime like ISO 14000, it could employ sanctions upon those who attempt to create unnecessary trade barriers through its links with the World Trade Organization. The sanction could be based on contributing to the participation fees funding. Sanction is a two-edged sword that could backfire by reducing the positive advantages of such corporate policy and trade practices in increasing ISO 14000 acceptance.

In many ways, what is required is that the ISO 14000 regime broadens its mandate beyond the purely self-interested and industry-base, to acknowledging its broader responsibilities and original mandate of sustainable development. In particular, the regime needs to help build capacity in international development, if it is to achieve universal adoption. It is ultimately in the interests of the ISO 14000 regime to distribute the costs and benefits more evenly, since, without it, universal adoption is impossible. Ultimately, the full potential of ISO 14000 is more likely to be realized in systems of governance which are based upon open and equitable arrangements for stakeholder representation. While the current governance is open, it needs to be more equitable in practice. Moreover, the regime needs to co-operate with other international environmental regimes to ensure that its standards respect and require compliance with intergovernmental and international environmental regimes such as the Montreal Protocol, the Basel Convention, and Agenda 21. Such

cooperation is essential for ISO 14000 to work in accordance with the goals of sustainable development.

5.3.2 Learning facilitator

Two of the most serious criticisms of ISO 14000 from an environmental perspective are the absence of specific environmental performance targets in EMS and the lack of public accountability or disclosure of the environmental reports of the auditors on the actual environmental performance of a registered organization. Currently, target setting and disclosure are entirely at the discretion of the company. This is a step backward in the current trend of voluntary environmental regulation, given the fact that EMAS and other VNRI like Responsible Care require disclosure and targets.

Clarifying targets and specific measures to reduce environmental impacts and publishing the results of environmental performance allows for companies to learn from each other, to harmonize the results of environmental performance through the use of ISO 14000, and to build up a body of best practices that could be more readily applied by other companies. It would also permit greater input from scientists and others as to what is an acceptable target; which environmental impacts are most critical to environmental integrity and should be prioritized; and even how this might be achieved.

Identifying problems and improvements in quantifiable, observable, and measurable terms, would allow ISO and others to monitor the success of the regime in reducing environmental impact. It might also have positive economic advantages

in that regulators and governments would be more inclined to use ISO 14000 as a way of achieving and demonstrating compliance with national environmental goals, and insurance companies to reduce premiums because of the ability of the company to demonstrate good faith, due diligence and actual compliance. On the negative side, is the concern of companies that the public could actually use such disclosure of environmental performance against them in court. This could discourage companies from becoming certified.

5.3.3 Role definer

The full potential of ISO 14000 also depends upon the regime establishing clearly defined roles and responsibilities for the participants. Governments, in particular, need to be more active promoters. They could impose supportive pollution prevention taxes and tough environmental rules to raise the standard of required environmental performance and protect the well-being of ecosystems and their inhabitants. They also need to collaborate to ensure that, in the long run, performance mean the same things in any country, thereby securing a level playing held for business competitors.

For the funding program, suggested for enhancing cooperation, the regime needs to appoint roles to manage the funding, arrange technical assistance between organizations, and police the organizations that impose trade preferences. For generating activity-specific guidance and scientifically-based targets, the regime needs specialists. TC 207 could work with other TCs that are specialized in the

sectoral-specific environmental issues, such as TC specialized in quality of air, water, soil, and toxic substances. The regime also needs to define a role to monitoring the results of ISO 14000. it would assemble the data and analyze the level of improvements based on the results from performance reports.

5.4 Conclusion

This thesis examined how the ISO 14000 regime could effectively achieve universal adoption of ISO 14000, based on understanding of factors influencing the global adoption pattern. It has demonstrated that Regime studies provide a relevant framework to determine the current and future effectiveness of ISO 14000 that holds ambitious international objectives. Although ISO 14000 attempts to provide economic and environmental benefits, SMEs and organizations in less developed countries tend to lack the opportunity to gain such benefits. The study identified a causal link of this outcome to the export, industry orientation of ISO, the generic, process-based procedure, and the regime's lack of multi-stakeholder participation. In order to be effective in achieving universal adoption over time, the ISO 14000 regime needs to strengthen capacity building and ensure environmental accountability through increased transparency.

The thesis has looked primarily at universality as the immediate and most tangible goal and hence indication of the effectiveness of the ISO 14000 regime; however, there are several other issues that could determine the effectiveness of the ISO 14000 regime further. One economic issue would be to measure how effective

ISO 14000 is in eliminating barriers to trade and reducing the costs of international trade. Another environmental issue would be to measure how effective ISO 14000 has been in reducing environmental impacts. Both of these would require long-term data that is not yet available. A more immediate issue would be to look at the issues of compliance. How does the regime strengthen conformity in the compliance mechanism? How could the flexible, self-regulatory compliance mechanism ensure improved performance results and results harmonized with other certified actors'? Any regime and international agreement has a governance problem. The governance problem in international regimes, in general derives from their weak central coercive authority for monitoring and enforcement (Vogler, 2000). How the ISO 14000 regime could possibly enhance the compliance on its institutional and environmental performances is a challenge of future research.

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Appendix A

ISO 14000 Standards

ISO/TC 207 SPS	Strategic Policy Statement
ISO/TC 207 OM	Operational Manual
ISO/TC 207 Media	Implementation of the ISO Media Policy
ISO Guide 64	Guide for the Inclusion of Environmental Aspects of product Standards
ISO/TC 207/WG 2 TR	Informative reference material to assist forestry organizations
ISO 14050	Terms and Definitions

Environmental Management Systems

ISO 14001	Specification with guidance for use
ISO 14002	Guidelines on ISO 14001 for small and medium sized enterprises
ISO 14004	General guidelines on principles, systems, and supporting techniques
ISO/TR 14061	Technical Report for forest management

Guidelines for Environmental Auditing and other related investigations

ISO 14010	General principles on Environmental Auditing
ISO 14011	Audit procedures-Auditing of environmental management systems
ISO 14012	Qualification criteria for environmental auditors
ISO/WD 14015	Environmental assessment of sites and entities

Environmental Labels and Declarations

ISO 14020	Basic Principles
ISO 14021	Self-declaration environmental claims-terms and definitions
ISO 14024	Environmental Labeling Type I-Guiding Principles and Procedures
ISO 14025	Environmental Labeling Type III-Guiding Principles and Procedures

Evaluating Environmental Performance

ISO/DIS 14031	Environmental performance evaluation-Guidelines
ISO/TR 14032	Example illustration of the use of the 14031 guidance

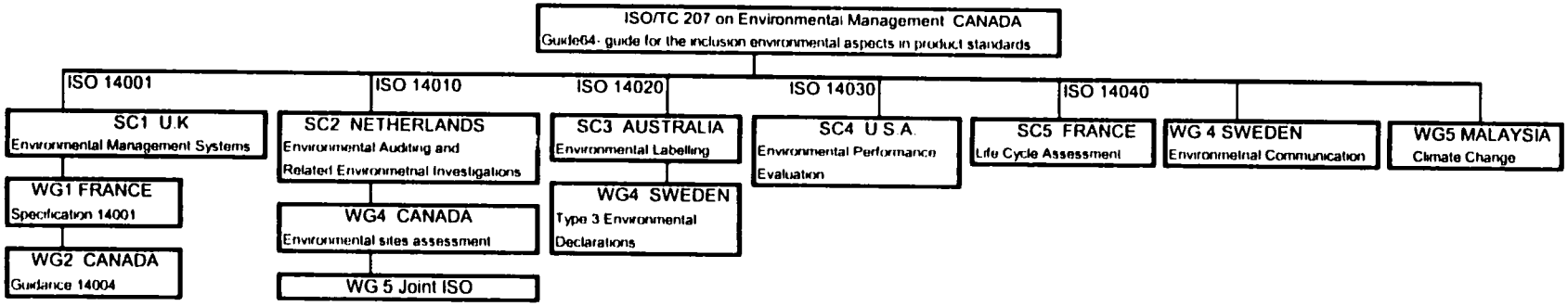
Life Cycle Assessment (LCA)

ISO 14040	LCA-Principles and Framework
ISO 14041	LCA-Inventory Analysis
ISO 14042	LCA-Impact Assessment
ISO 14043	LCA-Interpretation
ISO 14048	Formatting of data for LCA
ISO 14049	Example illustration of the application in the 14041

Sources: Hogarth, 1999: 120; ISO, 1998: 6-7.

Appendix B

ISO/TC 207 Committee Structure



SC: SubCommittee
WG: Working Group
JTG: Joint Technical Group
CSG: Common Study Group
JAG: Joint Advisory Group

Source: ISO/TC 207, 2002. www.tc207.org/comm_structure/index.html.

Appendix C

ISO Member Bodies and Designated Representative Organizations

ISO Member Bodies

Country		Designated Organization
Albania	DSC	Drejtoria e Stardardizimit dhe Cilesise Keshill I Ministrave
Algeria	INAPI	Institut Algérien de Normalisation et de Propriété Industrielle
Argentina	IRAM	Instituto Argentino de Racionalización de Materiales
Armenia	SARM	Department for Standardization, Metrology and Certification
Australia	SAA	Standards Australia
Austria	ON	Österreichisches Normungsinstiut
Bangladesh	BSTI	Bangladesh Standards and Testing Institution
Barbados	BNSI	Barbados National Standards Institution
Belarus	BELST	Committee for Standardization, Metrology, and Certification
Belgium	IBN	Institut Belge de Normalisation
Bosnia and Herzegovina		BASMP
Botswana	BOBS	
Brazil	ABNT	Associação Brasileira de Normas Técnicas
Bulgaria	BDS	Committee for Standardization and Metrology at the Council of Ministers
Canada	SCC	Standards Council of Canada
Chile	INN	Instituto Nacional de Normalización
China	CSBTS	China State Bureau of Technical Supervision
Colombia	ICONTEC	Instituto Colombiano de Normas Técnicas
Croatia	DZNM	State Office for Standardization and Metrology
Cuba	NC	Comité Estatal de Normalización
Cyprus	CYS	Cyprus Organization for Standards and Control of Quality
Czech Republic	COSMT	Czech Office for Standards, Metrology, and Testing
Denmark	DS	Dansk Standard
Egypt	EOS	Egyptian Organization for Standardization and Quality Control
Ethiopia	ESA	Ethiopian Authority for Standardization
Finland	SFS	Finnish Standards Association
France	AFNOR	Assoation française de normalisation
Germany	DIN	Deutshes Institut für Normung
Greece	ELOT	Hellenic Organization for Standardization
Hungary	MSZH	Magyar Szabványügyi Hivatal
Iceland	STRI	Icelandic Council for Standardization
India	BIS	Bureau of Indian Standards
Indonesia	DSN	Dewan Standardisasi Nasional
Iran	ISIRI	Institute of Standards and Industrial Research of Iran
Ireland	NSAI	National Standards Authority of Ireland
Israel	SII	Standards Institution of Israel
Italy	UNI	Ente Nazionale Italiano di Unificazione
Jamaica	JBS	Jamaica Bureau of Standards
Japan	JISC	Japanese Industrial Standards Committee
Kazakhstan	KAZMENST	Committee for Standardization, Metrology and Certification
Kenya	KEBS	Kenya Bureau of Standards
Kuwait	KOWSMD	
South Korea	CSK	Committee for Standardization of the Democratic People's

		Republic of Korea
North Korea	KBS	Bureau of Standards
Libya	LNCSM	Libyan National Centre for Standardization and Metrology
Malaysia	SIRIM	Standards and Industiral Research Institute of Malaysia
Malta	MBS Malta	Malta Board of Standards
Mauritius	MSB	Mauritius Standards Bureau
Mexico	DGN	Dirección General de Normas
Mongolia	MISM	Mongolian National Institute for Standardization and Metrology
Morocco	SNIMA	Service de normalisation industrielle marocaine
Netherlands	NNI	Nederlands Normalisatie-Institut
New Zealand	SNZ	Standards New Zealand
Norway	NSF	Norges Standariseringsforbund
Pakistan	PSI	Pakistan Standards Institution
Panama	COPANIT	
Philippines	BPS	Bureau of Product Standards
Poland	PKN	Polish Committee for Standardization
Portugal	IPQ	Instituto Português da Qualidade
Romania	IRS	Institutional Român de Standardizare
Russia	GOSTR	Committee of the Russian Federation for Standardization, Metrology, and Certification
Saudi Arabia	SASO	Saudi Arabian Standards Organization
Singapore	SISIR	Singapore Institute of Standards and Industrial Research
Slovakia	UNMS	Slovak Office of Standards, Metrology, and Testing
Slovenia	SMIS	Standards and Metrology Institute
South Africa	SABS	South African Bureau of Standards
Spain	AENOR	Asociación Española de Normalización y Certificatión
Sri Lanka	SLSI	Sri Lanka Standards Institution
Sweden	SIS	Standardiseringskommissio-nen I Sverige
Switzerland	SNV	Swiss Association for Standardization
Syria	SASMO	Syrian Arab Organization for Standardization and Metrology
Tanzania	TBS	Tanzania Bureau of Standards
Thailand	TISI	Thai Insustrial Standards Insitute
Trinidad/Tobago	TTBS	Trinidad and Tobago Bureau of Standards
Tunisia	INNORPI	Institut national de la normalisation et de la proprieté industrielle
Turkey	TSE	Türk Standardlari Enstitüsü
Ukraine	DSTU	State Committee of Ukraine for Standardization, Metrology, and Certification
United Arab Emirates	SSUAE	Directorate of Standardization and Metrology
UK	BSI	British Standards Institute
Uruguay	UNIT	Insituto Uruguayo de Normas Técnicas
USA	ANSI	American National Standards Institute
Uzbekistan	UZGOST	Uzbek State Centre for Standardization, Metrology, and Certification
Venezuela	COVENIN	Comisión Venezolana de Normas Industiales
Viet Nam	TCVN	Directorate for Standards and Quality
Yugoslavia	SZS	Savezni zavod za standardizaciji
Zimbabwe	SAZ	Standards Association of Zimbabwe

Correspondent Members

Country	Designated Organization	
Albania	DPS	
Angola	IANORQ	
Azerbaijan	AZGOST	
Bahrain		Directorate of Standards and Metrology

Bolivia	IBNORCA	
Brunei		Construction Planning and Research Unit
Cameroon	CCNQ	
Congo	OCC	
Cote-d'Ivoire	CODINORM	
El Salvador	CONACYT	
Estonia	EVS	National Standards Board of Estonia
Guatemala	COGUANOR	
Hong Kong		Industry Department
Kyrgyzstan	KYRGYZST	
Latvia	LVS	
Lebannon	LIBNOR	
Lithuania	LST	Lithuanian Standardization Office
Macau, China	CPTTM	
Madagascar	BNM	
Malawi	MBS Malawi	Malawi Bureau of Standards
Mozambique		National Institute of Standardization and Quality
Namibia	NSIQO	
Nepal	NBSM	Nepal Bureau of Standards and Metrology
Nicaragua	DTNM	
Oman		Directorate General for Specifications and Measurements
Papua New Guinea	PNGS	National Standards Council
Paraguay	INTN	
Peru	INDECOPI	Instituto Nacional de Defensa de la competencia y de la Protección de la Propiedad Intelectual
Qatar		Department of Standards and Measurements
Rwanda	ORN	
Saint Lucia	SLBS	
Seychelles	SBS	
Sudan	SSMO	
Swaziland	SQAS	
Turkmenistan	MSIT	Major State Inspection of Turkmenistan
Uganda	UNBS	Uganda National bureau of Standards
Yemen	YSMO	Yemen Standardization, Metrology, and Quality Control Organization

Subscriber Members

Country	Designated Organization	
Antigua/Barbuda	ABBS	Antigua and Barbuda Bureau of Standards
Benin	CEBENOR	
Burundi	BBN	Bureau burundais de normalisation et contrôle de la qualité
Cambodia	ISC	
Dominica	DBOS	
Dominican Republic	DIGENOR	
Fiji	FTSQCO	Fiji Trade Standards and Quality Control Office
Grenada	GDBS	Grenada Bureau of Standards
Guyana	GNBS	
Honduras	COHCIT	
Lesotho	LSQAS	
Mali	MLIDNI	
Palestine	PSI	

Source: ISO, 2002. http://www.iso.ch/iso/en/aboutiso/isomembers/index.html. Accessed on 08/15/02.

Appendix D

ISO/TC 207 Members and Liaison Organizations at the Initial Stage, in 1995

Participating Members

Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cuba, Czech Republic, Denmark, Ecuador, Finland, France, Germany, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Republic of Korea, Malaysia, Mauritius, Mexico, Mongolia, Netherlands, New Zealand, Norway, Philippines, Romania, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Turkey, Ukraine, UK, USA, Uruguay, Venezuela, Zimbabwe.

Observing Members

Algeria, Barbados, Croatia, Egypt, Estonia, Greece, Hong Kong, Iceland, Libya, Lithuania, Poland, Portugal, Slovakia, Slovenia, Sri Lanka, Vietnam, Yugoslavia.

Internal Liaison Organizations

ISO/TC 61 on Plastics, ISO/TC 176 on Quality Management and Quality Assurance, ISO/TC 203 on Technical Energy Systems, IEC/TC 75.

External Liaison Organizations

Consumers International, Environmental Defense Fund, European chemical Industry Council, European Environmental Bureau, Friends of the Earth International, Industrial Minerals Association, International chamber of Commerce, The International Council on Metals and the Environment, International Electrotechnical Commission, International Federation of Organic Agriculture Movement, International Institute for Sustainable Development, International Iron and Steel Institute, International Network for Environmental Management, International Primary Aluminum Institute, International Trade Centre, Organization for Economic Co-operation & Development, United Nations conference on Trade and Development, United nations Environment Program, World Wide fund for Nature.

Source: Cascio, et al. 1996. Figure 1-2: TC 207 membership, mid-1995.

Appendix E

ISO/TC 207 Members and Liaison Organizations (as of June. 2000)

Participating Members (61)

Algeria (IANOR)
Argentina (IRAM)
Australia (SAI)
Austria (ON)
Bangladesh (BSTI)
Barbados (BNSI)
Belgium (IBN)
Brazil (ABNT)
Canada (SCC)
Chile (INN)
China (CSBTS)
Colombia (ICONTEC)
Costa Rica (INTECO)
Cuba (NC)
Czech Republic (CSNI)
Denmark (DS)
Ecuador (INEN)
Egypt (EOS)
Finland (SFS)
France (AFNOR)
Germany (DIN)
Ghana (GSB)
Greece (ELOT)
Hungary (MSZT)
India (BIS)
Indonesia (BSN)
Iran (ISIRI)
Ireland (NSAI)
Israel (SII)
Italy (UNI)
Jamaica (JBS)
Japan (JISC)
Korea (Republic of) (KATS)
Malaysia (DSM)
Korea (Democratic People's Republic of) (CSK)
Mauritius (MSB)
Mexico (DGN)
Morocco (SNIMA)
Mongolia (MNCSM)
Netherlands (NNI)
New Zealand (SNZ)
Norway (NSF)
Philippines (BPS)
Poland (PKN)
Romania (ASRO)
Russian Federation (GOSTR)
Singapore (PSB)
South Africa (SABS)
Spain (AENOR)
Sri Lanka (SLSI)
Sweden (SIS)
Switzerland (SNV)
Tanzania (TBS)
Thailand (TISI)
Trinidad/Tobago (TTBS)
Turkey (TSE)
United Kingdom (BSI)
Uruguay (UNIT)
USA (ANSI)
Venezuela (FONDONORMA)
Vietnam (TCVN)
Zimbabwe (SAZ)

Observing Members (15)

Armenia (SARM)
Botswana (BOBS)
Croatia (DZNM)
Estonia (EKS)
Ethiopia (QSAE)
Hong Kong (HKG)
Iceland (STRI)
Libyan Arab Jamahiriya (LNCSM)
Lithuania (LST)
Moldova (Republic of) (MOLDST)
Portugal (IPQ)
Slovakia (SUTN)
Slovenia (SMIS)
Ukraine (DSTU)
Yugoslavia (SZS)

Liaison Organizations (42)

Group A

European Chemical Industry Council
Consumers International
European Commission
European Environmental Bureau
International Federation of Consulting Engineers
Global Ecolabelling Network
International Accreditaton Forum
International Academy for Quality
International Chamber of Commerce
International Iron & Steel Institute
International Laboratory Accreditation Cooperation
International Network for Environmental Management
International Primary Aluminium Institute

IQNet (The International Certification Network)
National Wildlife Federation
Organisation for Economic Cooperation and Development
Sierra Club
United Nations Conference on Trade and Development
United Nations Environment Programme
World Federation of the Sporting Goods Industry
World Stewardship Institute

Group B

Asian Productivity Organization
Confederation of European Paper Industries
European Manufacturers of Expanded Polystyrene
European Apparel and Textile Association
Friends of the Earth
Forest Stewardship Council
International Association for Impact Assessment
International Federation of Organic Agriculture Movement
International Institute for Sustainable Development
Industrial Minerals Association - Europe
World Health Organization
World Trade Organization
ISO/TC 61, Plastics
ISO/TC 91, Surface Active Agents
ISO/TC 176, Quality Management & Quality Assurance
ISO/TC 197, Hydrogen Energy Technology
ISO/TC 203, Technical Energy Systems
ISO/TC 146, Air Quality
ISO/TC 146/SC1, Stationary Source Emissions
ISO/TC 190/SC7, Soil Quality

Source: ISO/TC 207, 2001.

Appendix F

SIC Codes

The US Office of Management and Budget developed the Standard Industrial Classification (SIC) coding system in 1987 to facilitate the classification of establishments by the type of activity in North America. Each industry code is based on primary activity, which details the organization's principal product(s), manufactured or distributed, or service rendered.

Agriculture, Forestry, and Fishing
- 0100 Agricultural Production - Crops
- 0200 Agricultural Production - Livestock
- 0700 Agricultural Services
- 0900 Fishing, Hunting and Trapping
- 0800 Forestry

Construction
- 1500 General Building Contractors
- 1600 Heavy Construction, Except Building
- 1700 Special Trade Contractors

Finance, Insurance and Real Estate Services
- 6000 Depository Institutions
- 6100 Nondepository Institutions
- 6200 Security and Commodity Brokers
- 6300 Insurance Carriers
- 6400 Insurance Agents, Brokers and Service
- 6500 Real Estate
- 6700 Holding and Other Investment Offices

Manufacturing
- 2000 Food and Kindred Products
- 2100 Tobacco Products
- 2200 Textile Mill Products
- 2300 Apparel and Other Textile Products
- 2400 Lumber and Wood Products
- 2500 Furniture and Fixtures
- 2600 Paper and Allied Products
- 2700 Printing and Publishing
- 2800 Chemicals and Allied Products
- 2900 Petroleum and Coal Products
- 3000 Rubber and Miscellaneous Plastics Products
- 3100 Leather and Leather Products
- 3200 Stone, Clay and Glass Products
- 3300 Primary Metal Industries
- 3400 Fabricated Metal Products
- 3500 Industrial and Commercial Machinery/Computer Equipment
- 3600 Electronic and Other Electrical Equipment/Components
- 3700 Transportation Equipment
- 3800 Instruments and Related Products
- 3900 Miscellaneous Manufacturing Industries

Mining
- 1000 Metal Mining
- 1200 Coal Mining
- 1300 Oil and Gas Extraction
- 1400 Nonmetallic Minerals, Except Fuels

Nonclassifiable Establishments
- 9900 Nonclassifiable Establishments

Public Administration
- 9100 Executive, Legislative and General
- 9200 Justice, Public Order and Safety
- 9300 Finance, Taxation and Monetary Policy
- 9400 Administration of Human Resources
- 9500 Environmental Quality and Housing
- 9600 Administration of Economic Programs
- 9700 National Security and International Affairs

Public Utilities
- 4600 Pipelines, Except Natural Gas
- 4700 Transportation Services
- 4800 Communications
- 4900 Electric, Gas and Sanitary Services

Retail Trade
- 5200 Building Materials and Garden Supplies
- 5300 General Merchandise Stores
- 5400 Food Stores

5500 Automotive Dealers and Service Stations
5600 Apparel and Accessory Stores
5700 Furniture and Homefurnishing Stores
5800 Eating and Drinking Places
5900 Miscellaneous Retail

Services

7000 Hotels and Other Lodging Places
7200 Personal Services
7300 Business Services
7500 Automotive Repair, Services and Parking
7600 Miscellaneous Repair Services
7800 Motion Pictures
7900 Amusement and Recreation Services
8000 Health Services
8200 Educational Services
8300 Social Services
8400 Museums, Botanical, Zoological Gardens
8600 Membership Organizations
8700 Engineering and Management
8800 Private Households
8900 Services

Transportation

4000 Railroad Transportation
4100 Local and Interurban Passenger Transit
4200 Trucking and Warehousing
4300 Postal Service
4400 Water Transportation
4500 Transportation By Air

Wholesale Trade

5000 Wholesale Trade - Durable Goods
5100 Wholesale Trade - Nondurable Goods

Source: Globus Registry. 2000. www.globusregistry.com/sic.