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THE EFFECTIVENESS OF ISO 14001 IN THE UNITED STATES

by

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April 1999

A group project thesis submitted to meet the degree requirements for the Master of Environmental Science & Management

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June 18, 1999

Acknowledgements

We would like to recognize and specially thank the following individuals for their guidance, advice, support, and commitment to environmental excellence in business. Magali Delmas, Linda Fernandez, James Frew, and Arturo Keller at the Donald Bren School of Environmental Science & Management at the University of California, Santa Barbara; Deborah Seifert at the Community Nutrition Institute; Ann Brett, Tom Ferguson, Eric Inglis, Chuck Maxwell, John Metzger, Bob Michels, and Phil Raba at Imation Corporation; Jennifer Smith-Grubb and Robert Stephens at the Multi State Working Group on Environmental Management Systems; Brad Boyes and Tom Umenhofer at Sierra Pacific Environmental; and Jerry Speir at the Tulane Institute for Environmental Law and Policy.

Without them, this project would not have been possible. Thank you!

Executive Summary

The Effectiveness of ISO 14001 in the U.S.

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ISO 14001 contains guidelines for developing voluntary Environmental Management Systems (EMSs). It is a key component of the ISO 14000 Series. This report, conducted by a research team from the Donald Bren School of Environmental Science and Management at the University of California, Santa Barbara, evaluates the effectiveness of ISO 14001 in the U.S. in terms of its environmental, stakeholder, and organizational implications.

We conducted a business case study to obtain information and experience in the organizational implications of adopting the ISO 14001 EMS standard. Our observations show that instead of a single common objective, there are numerous motivating factors for corporations to implement ISO 14001. We also discovered uncertainties in the meaning and intent of the standard in several areas, including the definition of environmental aspects and use of environmental performance indicators.

To obtain perspectives on the effectiveness of ISO 14001, we surveyed ISO 14001-certified companies in the U.S., a number of U.S. non-governmental organizations (NGOs), and several ISO 14001 auditors. Most firms reported that the benefits of implementation outweighed the costs. However, most NGOs were skeptical about the ability of ISO 14001 to improve environmental performance.

We conclude that ISO 14001 has the potential to become an effective tool for improving organizational environmental performance in the future. However, we believe that, in its current state, some of the standard's ambiguities remain obstacles to implementation. For example, the lack of definition and guidance on the methods for identifying significant environmental aspects and the absence of a common approach for comparing the environmental performance among industrial sectors and individual firms makes evaluations across companies difficult. We developed management tools to address these ambiguities and to assist managers in implementing ISO 14001 EMSs until the standard is revised.

Our recommendations include: defining environmental aspects, impacts, and performance indicators; establishing public environmental reporting requirements; encouraging the use of environmental cost accounting tools; and increasing the consistency of the auditing criteria.

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ACRONYMS

ANSI: American National Standards Institute

BS 7750: British Standard 7750

DFE: Design for the Environment

EHS: Environmental Health and Safety

EMAS: ECO-Management and Audit Scheme

EMS: Environmental Management System

EPA: U.S. Environmental Protection Agency

EU: European Union

EPE: Environmental Performance Evaluation

GATT: General Agreement on Trade and Tariffs

ISO: International Organization for Standardization

LCA: Life Cycle Assessment

MSWG: Multi State Working Group on Environmental Management Systems

NEPA: U.S. National Environmental Policy Act

NGO: Non-Governmental Organization

P2: Pollution Prevention

RCRA: U.S. Resource Conservation and Recovery Act

SAGE: Strategic Advisory Group for the Environment

SIC: Standard Industrial Code

TAG: Technical Advisory Group

TC 207: ISO's Technical Committee 207

TRI: U.S. EPA's Toxic Release Inventory

1. Introduction

The ISO 14000 Series[1] is a set of international standards for voluntary environmental management that has the potential to significantly impact global environmental policy-making. It is the first set of standards for environmental management applicable to both private and public organizations worldwide. The Series is based upon the premise that sound environmental management strategies can improve an organization's performance - that a greening of business pays in a competitive world. This seemingly paradoxical premise is the result of a significant shift in environmental policy-making over the past decade.

During the 1990s, market-based regulatory approaches, such as tradable emission permits, have gained increasing popularity over traditional command-and-control approaches to environmental problems[2]. Market-based approaches allow managers greater flexibility in choosing *how* to meet regulatory requirements. Freed from often inefficient mandated command-and-control actions, market-based solutions challenge businesses to employ innovative means for complying with specific criteria set by regulatory authorities. This allows firms to incorporate environmental philosophies into their corporate strategies and decision-making processes. The ISO 14000 Series guidelines represent the next step in this cultural evolution from reactive-curative to proactive-preventative environmental management.

In short, the ISO 14000 Series is designed to promote environmental compliance, ensure a commitment to pollution prevention, and foster continual improvement of environmental performance through efficient environmental management. It is important to note that ISO 14000 does not impose specific performance targets or emission levels, nor does it replace environmental regulations. Rather it proposes a framework for effective environmental management that promotes commitment to environmental improvement above and beyond compliance with governmental regulations.

Organizations worldwide in both public and private sectors are beginning to embrace the ISO 14000 guidelines, specifically the certifiable ISO 14001 standard for Environmental Management Systems (EMSs)[3]. Literature suggests that firms

[1] International Organization for Standardization, 1997.
[2] Cascio et.al., 1996.
[3] The ISO 14001 standard is the general guidance document on the use of the specifications for an environmental management system. For details, see International Organization for Standardization, 1997.

40are interested in pursuing ISO 14001 for a variety of environmental, organizational, and financial reasons, including[4]:

- Improved compliance and environmental performance
- Increased access to new and international markets
- Reduced regulatory compliance costs, environmental liabilities, and insurance costs
- Improved industry-government relations
- Enhanced public image and competitive advantage

While the above are powerful incentives for implementing an ISO 14001 EMS, there remains a high degree of uncertainty and ambiguity associated with the ISO 14000 Series, not least because there is little supporting data available.

According to a U.S. Environmental Protection Agency (EPA) funded project on ISO 14001 based environmental management systems, there are two major sources of uncertainty surrounding the implementation of an ISO 14001 EMS[5]. Firstly, the project questioned the ability of the ISO 14001standard to help companies achieve their environmental goals. While the participating companies realized several short-term benefits, including improved environmental awareness, cooperation among employees, and enhanced regulatory compliance, they remained uncertain about the realization of long-term goals, such as reduced environmental management costs and increased access to international markets[6].

Secondly, the project commented that companies are still learning to translate environmental objectives into operational processes. They feel the lack of explanation or instruction in ISO 14001 with respect to implementing environmental goals has hindered firms in adopting many of the ISO 14000 standards. The project identified that ISO 14001 certified companies have expressed the need for:

- Clarification on certain passages of the standard, including the EMS auditing process,
- Management tools for conducting EMS self-assessment,
- Guidance on identification and assessment of environmental aspects and impacts, and

[4] Johnson, 1997.
[5] Diamond, 1996.
[6] Diamond, 1996.

- ISO 14001 implementation case studies[7].

These two sources of uncertainty, the probability of the realization of environmental goals and the lack of clarity of the ISO 14001 standard, have led to numerous misperceptions about the ISO 14000 Series throughout the U.S. This report addresses these uncertainties, and further analyzes additional questions about the implications of implementing ISO 14001 in the U.S.

The purpose of this report is to assess the effectiveness of ISO 14001 in the U.S. We have done this by studying the environmental, organizational, and stakeholder impacts of ISO 14001. Our project team, consisting of five graduate students from the Donald Bren School of Environmental Science and Management at the University of California, Santa Barbara, evaluated the ISO 14001 standard from the perspectives of businesses, regulators, non-governmental organizations, and auditors. The ISO 14001 Standard is the focus of our report because it is currently the most important element of the ISO 14000 Series and provides the guidelines for constructing an EMS. Additionally, ISO 14001's use and effectiveness have been controversial and debated among various interest groups in the U.S.

Section 2 of this report provides background information on EMSs, certification, auditing, the ISO 14000 Series, and a comprehensive review of worldwide implementation of ISO 14001. Section 3 describes our research approach. This is followed by our research results and analysis of environmental, organizational, and stakeholder impacts of ISO 14001. We next offer a discussion section that contains an evaluation of our results, comments on the validity of our results, and our evaluation of the ISO 14001 standard. The report concludes with an analysis of ISO 14001 as a policy tool, recommendations for modifications to the standard, suggested management tools for implementation, and suggestions for future research.

The Appendix includes a detailed report of our business case study, which describes how we implemented an ISO 14000-like EMS at a magnetic tape manufacturing plant. Also included in the Appendix is our corporate questionnaire and response data, our NGO survey and response data, and a list of related ISO 14000 web sites.

[7] Diamond, 1996.

2. Background

2.1 ENVIRONMENTAL MANAGEMENT SYSTEMS

Over the past twenty years, with the creation of complex environmental regulations, and mankind's increasingly heavier impact on Earth's resources, businesses have begun to monitor their environmental impacts. Historically, managing environmental issues was not part of a company's strategic decision-making process, but businesses have increasingly realized that environmental management is a critical aspect of overall business strategy and success.

Today, an EMS is an integral "part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy[8]." EMSs range from informal components of corporate management systems focused on environmental compliance to formal management systems designed to comply with the ISO 14001 standard, or another EMS standard.

As EMSs have grown in importance, so has the variety of EMS approaches. Worldwide, there are currently three major EMS standards:

1. ISO 14001 Standard of the ISO 14000 Series[9],
2. British Standard 7750 [10],
3. The EU's Eco-Management and Audit Scheme (EMAS) [11].

These standards do not replace government environmental regulations, but rather, act as complements to regulations. Nevertheless, some governments have incorporated EMS standards into their environmental policies. The U.S. EPA is currently researching the appropriate relationship of ISO 14000 to governmental environmental policy and encourages corporations' adoption of ISO 14001 EMSs[12].

[8] ISO 14001, Section 3.6.
[9] Quality Network, 1996a.
[10] Quality Network, 1996b.
[11] Quality Network, 1996c.
[12] U.S. Environmental Protection Agency, 1998.

2.1.1 OVERVIEW OF CERTIFIABLE EMS APPROACHES

An EMS can be "certified[13]" if it can be officially approved by an auditor authorized by a standards institute, such as the American National Standards Institute (ANSI) in the U.S. While all three major EMS standards (ISO 14001, BS 7750 and EMAS) are certifiable, the following overview of certification and auditing procedures specifically pertains to ISO 14001 in the U.S.

The **ISO 14001 standard** is the component of the ISO 14000 Series that contains the guidelines for designing an EMS. It is also currently the only standard in the Series that is certifiable. (The other standards in the ISO 14000 Series provide guidelines for associated environmental management system components.) The ISO 14001 standard and the other components of the ISO 14000 Series are described in detail in Section 2.2.

Although the three certifiable EMS standards are based on the same principles, they differ in important details (see Table 1). BS 7750, published in 1992, was the first of the three standards and has influenced the development of the other two[14]. EMAS is commonly considered the strictest, because of its specific requirements for audits and its non-voluntary status. ISO 14001 was developed in response to a growing need for an international, certifiable EMS standard[15]. ISO 14001 is similar in design to EMAS, but it includes an emphasis on pollution prevention, and contains less stringent auditing requirements.

British Standard (BS) 7750

The draft version of British Standard 7750 was published in March 1992. It followed the approach of the British Quality Standard system, BS 5750, and became the model used by ISO in the preparation of ISO 14001. In January 1994, BS 7750 was revised in order to make it compatible with EMAS and ISO 14001.

An applicant for BS 7750 must be assessed by an accredited certification body, but BS 7750 certification is open to any organization whose activities affect the environment. Also, BS 7750 is not restricted to a site-by-site basis, specifies no time intervals between audits, and does not require annual environmental statements from certified companies[16]. As with all voluntary EMS standards, compliance with the BS 7750 standard does not replace regulatory compliance.

[13] For details on certification, see section 2.1.2 "ISO 14001 Certification and Related Auditing"
[14] Quality Network, 1996a.
[15] Cascio, et.al., 1996.
[16] Quality Network, 1996a.

	ISO 14001	BS 7750	EMAS
Geographic scope	Worldwide	National (Britain) and other countries	European Union
Type of standard	Voluntary	Voluntary	Requirement
Applicability	• Whole or part of an organization • Activities, products, and services in any sector • Industrial and nonindustrial organizations, including government agencies and NGOs	• Whole or part of an organization • All activities and sectors • Industrial and nonindustrial organizations, including government agencies and NGOs	• Individual facilities • Site-specific industrial activities
Focus	• Environmental management system • Indirect link to environmental improvements	• Environmental management system • Environmental improvements emerge from system	• Environmental performance improvements at site • Communication of improvements to public
Initial environ-mental review	• Suggested, but not required by standard	• Suggested, but not required in standard	• Required
Policy commitments	• Continual improvement of EMS • Prevention of pollution • Compliance to applicable environmental regulations and voluntary commitments	• Continual improvement of environmental performance	• Continual improvement of environmental performance • Compliance to applicable environmental regulations
Audits	• EMS audits required • Monitoring and measuring of key environmental characteristics required • Audit frequency not specified	• EMS audits required • Compliance or environmental performance audits not required • Audit frequency not specified	• Audits of EMS, processes, data, and environmental performance required • Audit frequency at least every 3 years
Public communication	• Only company environmental policy must be made public • Other external communications left to management	• Only company environmental policy must be made public • Other external communications left to management	• Description of environmental policy, program, and management system must be made public • Public statement and annual simplified statement with supporting data required

Table 1. Comparison of ISO 14000 to BS 7750 and EMAS (Source: Cascio, et. al., 1996)

Eco-Management and Audit Scheme (EMAS)

Europe's Eco-Management and Audit Scheme (EMAS) followed the development of BS 7750. EMAS was adopted by the European Union (EU) on June 29, 1993, and became effective April 10, 1995[17]. EMAS is a site-based registration system (i.e. the certification is granted for individual industrial sites) but considers off-site activities that may have a bearing upon environmental management at the registered site. EMAS is primarily aimed at the industrial sector. However, in the UK the standard has been extended to allow registration for local government.

EMAS is considered a stricter standard than either BS 7750 or ISO 14001, because of three requirements[18]. EMAS-certified companies usually face little difficulty and low implementation costs when seeking ISO 14001 certification. EMAS specifies that companies should reduce their environmental impacts to levels not exceeding those corresponding to the "Economically Viable Application of Best Available Technology" (EVABAT[19]). In addition, EMAS requires that an external audit be conducted at least once every three years. Finally, every EMAS certified company must publish a comprehensive environmental statement. An external verifier or auditor must also confirm this statement.

2.1.2 ISO 14001 CERTIFICATION AND RELATED AUDITING

ISO 14001 Certification Process

Prior to seeking ISO 14001 certification, a company must implement an EMS (or enhance its existing EMS) in accordance with the ISO 14001 standard. A company must also conduct an internal audit to confirm that its EMS meets the requirements of the standard, or to identify any need for change and initiate necessary corrective action (see Figure 1).

The formal process of obtaining ISO 14001 certification entails three-steps, performed by an external, accredited auditor. (All accredited auditors are associated with a national registrar. Accredited auditors conduct the ISO 14001 Certification Audit and determine the status of the company's EMS. The registrar conducts ISO 14001 auditing training for auditors, stipulates certain auditing practices, monitors its auditors, and assigns auditors to companies seeking ISO 14001 certification.) The first step, the **Third-Party Pre-Assessment**, is an informal evaluation of a company's EMS. The aim is to identify and correct any obvious non-conformity.

[17] Quality Network, 1996c.
[18] Cascio et al., 1996.
[19] The practical application of this concept is somewhat controversial, since EVABAT specifies neither the exact point at which the technology has to be "available", nor does it set clear criteria for defining economic viability.

The second step, often informally referred to as a "**Desktop Audit**," consists of a thorough review of all EMS-associated documentation to ensure their compliance with the ISO 14001 requirements.

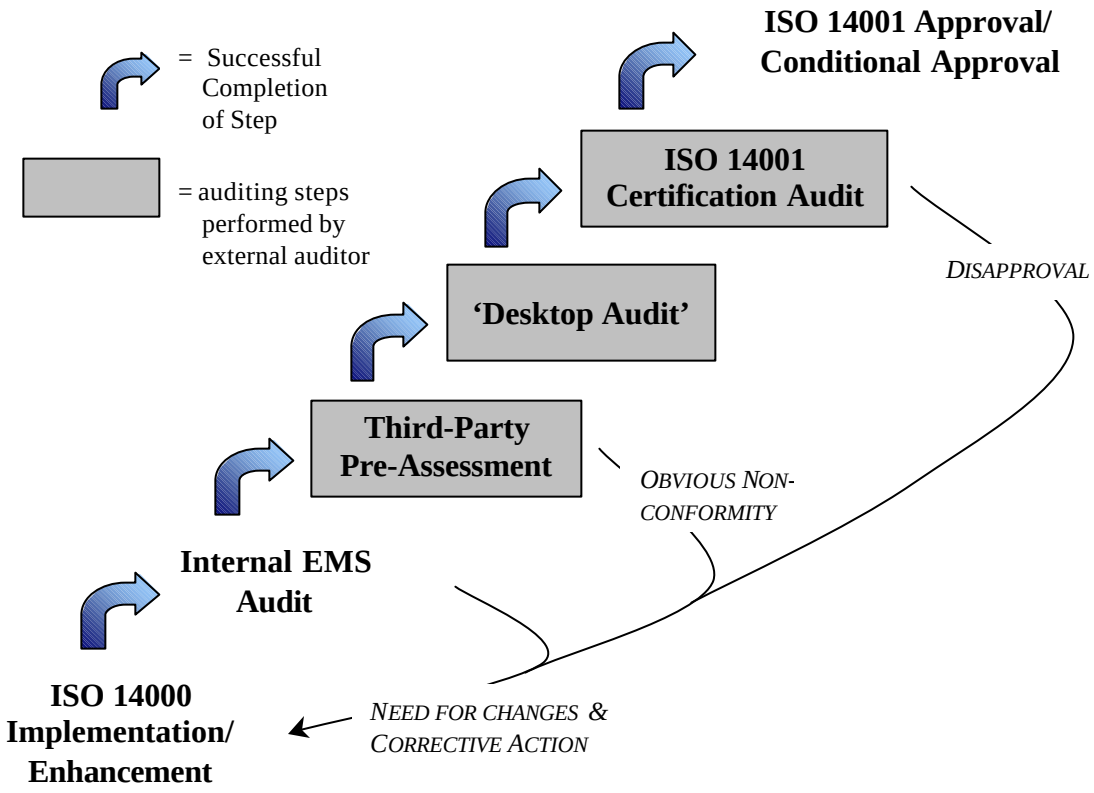

Figure 1. Critical Steps in the ISO 14001 Certification Process

Finally, the **Certification Audit** is a formal and highly structured review of the company's entire EMS and its compliance with ISO 14001. The Certification Audit has three possible outcomes[20]:

1. **Approval** – the EMS complies with the ISO 14001 standard
2. **Conditional Approval** – minor non-compliance, deadlines for corrective actions will be agreed upon in the closing meeting and must be documented
3. **Disapproval** – major non-compliance, including poor implementation of (part of) the EMS

[20] Johnson, 1997.

Auditing Beyond Certification

The certification process is usually followed by formal, third-party **surveillance audits** to ensure the continued compliance with the ISO 14001 standard. The nature and frequency of the surveillance audits are not defined in the Series, but vary with the terms of certification specific to each company. For example, surveillance audits may be performed regularly throughout the period during which a certification is valid, they may constitute a reassessment upon expiration of the certification, or they may serve as a monitoring tool for indefinitely valid certifications[21].

Often misunderstood, a **(EHS) Compliance Audit** confirms a company's compliance with regulatory statutes and permit requirements. Neither the EMS audit, nor the ISO 14001 Certification Audit can be substituted for a Compliance Audit.

Audits can be classified according to the party that is performing the audit:

- **First-party audit:** An audit conducted within an organization by internal parties. For example, an Internal EMS Audit
- **Second-party audit:** An audit used in a contract situation. For example, an informal audit performed by an ISO 14001 certified company to evaluate the EMS performance of a certified supplier
- **Third-party audit:** An external audit conducted by an accredited auditor in order to determine the certification status of a company's EMS. For example, the ISO 14001 Certification Audit

During our research, we found that confusion about audits and uncertainty about their implications increased the skepticism of companies about implementing ISO 14001. We discuss this topic further in Section5 (Research Results & Analysis).

2.2 THE ISO 14000 SERIES

2.2.1 INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

The International Organization for Standardization (ISO)[22] is a non-governmental organization, dedicated to facilitating the exchange of goods and services worldwide through the promotion of international standardization. The organization was founded in 1946 with headquarters in Geneva, Switzerland. Today, representatives of national standards bodies from over 100 countries are members of ISO. ISO has developed international, voluntary, consensus standards for sectors

[21] Johnson, 1997.

[22] The abbreviation ISO for the International Organization for Standardization is not an acronym, but rather derived from the Greek word *isos* meaning equal.

such as manufacturing, trade, quality control and, most recently, environmental management systems. Although the standards are by nature voluntary, some governments choose to adopt parts or all of a standard in their legal requirements[23].

Each ISO published standard (including all of the standards included in the ISO 14000 series) must pass a six-phase approval process. ISO appoints a Technical Committee (TC) to spearhead the following approval process for each standard:

1. *Proposal phase*: Discussion of need for standard and implications of increased standardization.
2. *Preparatory phase*: Preparation of working draft of proposed standard through expert subcommittees.
3. *Committee phase*: Refinement of draft by all TC members until consensus is reached.
4. *Enquiry phase*: Circulation of draft to all ISO members bodies for feedback (5 months response time). Incorporation of feedback into final draft.
5. *Approval phase*: Circulation of final draft to all ISO member bodies for approval vote (2 months response time).
6. *Publication phase*: Publication of ISO standard.

One of ISO's most widely known standards is the ISO 9000 series, which provides businesses with a framework for total quality management across multinational lines. ISO 9000 emphasizes concepts of continuous improvement, strategic planning, and organizational goal setting. It was published in 1987, and currently over 100,000 organizations worldwide have adopted the ISO 9000 principles and gained certification. ISO 9000 served as an important stepping stone in the creation of ISO 14000.

2.2.2 THE RATIONALE FOR DEVELOPING ISO 14000

The development of the ISO 14000 Series was stimulated by two important agreements[24]:

- The General Agreement on Trade and Tariffs (GATT), published in 1986, urged participating parties to foster international trade and prevent the imposition of trade barriers. The Agreement

[23] Cascio, et.al., 1996.
[24] Cascio, et.al., 1996.

recommended that no standard should be adopted if it restricts international trade more than necessary to achieve the policy objective.

- The Rio Agreement, adopted in 1992 by the parties to the UN Conference in Rio de Janeiro, requires a commitment to responsible environmental management and global sustainability.

A regional environmental management standard, such as EMAS, may conflict with GATT if it creates a trade barrier for non-certified companies. In response to this potential conflict, the ISO established a Strategic Advisory Group for the Environment (SAGE). SAGE assessed the need for an international EMS standard that would encourage responsible environmental management without violating GATT. As a result, Technical Committee 207 (TC 207) was formed in 1993 to develop the ISO 14000 Series[25].

One of the prime motivators for industrial support of the ISO 14000 Series is its potential to facilitate trade by replacing the increasing number of national and regional environmental standards, some of which had become quasi-trade barriers[26]. Any environmental standard can become a trade barrier if it is used to discriminate against a potential trade partner. ISO 14000 is an international consensus document that is intended to remove trade barriers by unifying approaches to eco-labeling, environmental management, and life cycle assessment. ISO 14000 was also designed to influence international development and commerce by building a worldwide consensus that there is a need for a common terminology for environmental management systems[27].

With the acceptance of ISO 14001 as an international EMS standard, and the increasing number of certified firms worldwide, there is a danger that ISO 14001 may become a barrier to trade itself, if it promotes preferential selection of certified companies over non-certified ones. Since one of the initial rationales for developing ISO 14000 was to provide internationally recognized standards that prevent the establishment of trade barriers, a concerted effort has to be made to ensure that certified firms are rewarded for their commitment, while non-certified firms are not penalized for not complying with the voluntary standard.

[25] International Organization for Standardization, 1997.
[26] Cascio, et.al., 1996.
[27] Cascio et.al., 1996.

2.2.3 THE DEVELOPMENT OF ISO 14000

In 1993, ISO assigned the TC 207 to create the ISO 14000 environmental management series. TC 207 is an international committee comprised of the member bodies of ISO. (ANSI is the member body for the U.S. [28]) To represent U.S. interests in TC 207, ANSI formed a Technical Advisory Group (TAG) to obtain consensus on a U.S. position among affected interest groups. By the end of 1995, the TAG had over 470 members, including representatives from U.S. industry, business associations, environmental groups, academia, and government[29].

Non-Governmental Organizations (NGOs) were not invited to participate in the U.S. TAG discussions on ISO 14000 until 1994 when much of the document had already been written[30]. The NGOs invited to join the discussion included the National Wildlife Federation, Environmental Defense Fund, and the World Wildlife Fund. However, the ultimate impact of their participation in the process was at best unclear, and consequently, by 1996, most of these NGOs stopped participating[31].

In 1997, several environmental NGOs and policy institutions banded together to form the NGO Working Group. Although the Working Group has made substantial progress over the past two years, our NGO survey results show that the public interest sector still has concerns with the ISO 14001 standards and development process.

2.2.4 THE COMPONENTS OF THE ISO 14000 SERIES

In September 1996, ISO published the first edition of the ISO 14000 Series, a set of guidelines for developing systems and practices in six environmental sectors. The Series is divided into six sections, each containing one or more standards:

1. ISO standards 14001 and 14004 - *Environmental Management Systems*
2. ISO standards 14010 to 14012 - *Environmental Auditing*
3. ISO standards 14020 to 14025 - *Environmental Labeling*
4. ISO standard 14031 - *Environmental Performance Evaluation*
5. ISO standards 14040 to 14043 - *Life Cycle Assessment*
6. ISO standard 14060 - *Environmental Aspects in Product Standards*
   (the standard is now called ISO Guide 64)

[28] Cascio, et.al., 1996.
[29] Cascio, et.al., 1996.
[30] Seifert, 1998.
[31] Seifert, 1998.

The first and only edition that was published in 1996 focused on the EMS standard ISO 14001 and the Environmental Auditing standards (ISO 14010 – 14012)[32]. TC 207 is now refining these standards in response to practical experience and will likely be releasing an updated edition in the near future.

ISO 14001 is the only certifiable standard in the ISO 14000 Series. All other standards in the Series describe supporting functions, and thereby maximize the effectiveness of the ISO 14001 EMS[33]. However, the implementation of these supporting standards is not required for ISO 14001 certification.

Environmental Management Systems - ISO 14001 and 14004

ISO 14001 (*Environmental Management Systems: Specification with Guidance for Use*) provides the guidelines for an ISO 14001 EMS. It provides companies with a framework for incorporating environmental considerations into every aspect of their operations. Rather than prescribing specific control technology or environmental performance indicators, ISO 14001 encourages continual improvement of a company's environmental performance. Also, it should provide an informative evaluation to potential customers through the internationally recognized ISO 14001 certification. Figure 2 summarizes the fundamental components of an ISO 14001 EMS (and indicates the corresponding sections of the standard).

ISO 14001 was designed to be applicable to EMSs in all organizational sectors (including manufacturing, the service industry and even governmental agencies) worldwide. Although this comprehensiveness is necessary to achieve an internationally applicable standard, it also leaves ISO 14001 open to interpretation. Businesses seeking certification regard this partly as an opportunity, but primarily as a challenge.

ISO 14004 (*Environmental Management Systems – General Guidelines on Principles, Systems and Supporting Techniques*) is the companion piece to ISO 14001. It offers guidelines and examples of different methods for creating an EMS and meeting the requirements of ISO 14001. Although it complements ISO 14001, ISO 14004 is not certifiable.

Environmental Auditing - ISO 14010-14012

The Environmental Auditing standards were developed to achieve "standardization in the field of environmental auditing and related environmental investigations."

ISO 14010 (*Guidelines for Environmental Auditing: General Principles*) defines key terms and describes general auditing objectives, criteria, and practices.

[32] The other sections were published in draft and are still being revised by TC 207.
[33] Cascio et.al., 1996.

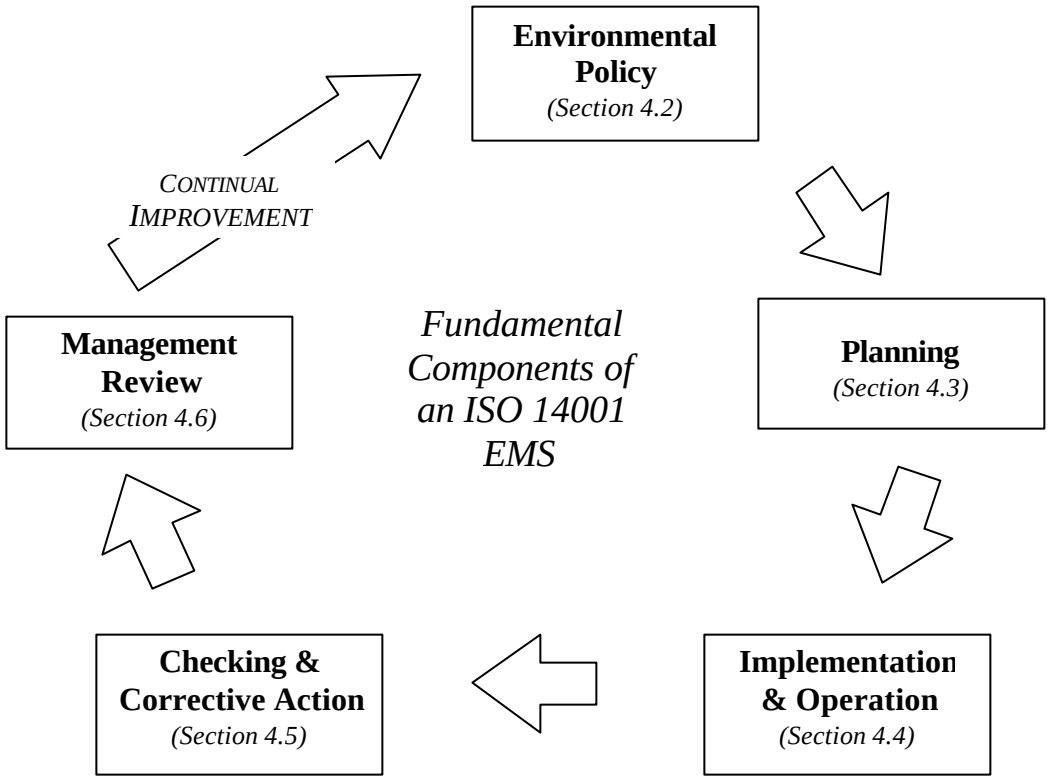

Figure 2. The fundamental components of an ISO 14001 EMS

ISO 14011 (*Guidelines for Environmental Auditing: Auditing Procedures Part I: Auditing of Environmental Management Systems*) provides guidelines for the auditing process, including preparation, execution and reporting of the audit. ISO 14011 focuses on the EMS audit required in ISO 14001. ISO 14010 and ISO 14011 focus on first-party audits, although many of the guidelines provided may be adapted to second- and third-party audits.

ISO 14012 (*Guidelines for Environmental Auditing: Qualification Criteria for Environmental Auditors of Environmental Management Systems*) describes the key qualification criteria for individual environmental auditors and may be applied to all three types of audits. ISO 14012 also contains important definitions, and two annexes that provide guidelines for evaluating an auditor's qualifications and for developing national registration bodies.

Environmental Labeling - ISO 14020-14024

The Environmental Labeling standards were developed to provide factual, comprehensible and internationally comparable information on the environmental aspects of products. Information on products may be provided (i) by the manufacturer or distributor of the product ('*Self-declaration Claims*') or (ii) by an independent third-party ('*Practitioner Programs*')[34].

The Environmental Labeling requirements are divided into five ISO standards. ISO 14020 and ISO 14021 are useful to manufacturers, distributors and buyers, while ISO 14022 and ISO 14023 are primarily written for manufacturers and distributors that provide environmental information on their products and services.

ISO 14020 (*Environmental Labeling: Basic Principles for All Environmental Labeling*) provides general guidelines for developing and evaluating environmental claims about products and services.

ISO 14021 (*Environmental Labeling: Self-Declaration of Environmental Claims – Terms and Definitions*) documents current labeling techniques and defines key terms.

ISO 14022 (*Environmental Labeling Symbols*) addresses the use of symbols in self-declaration environmental claims. ISO 14022 is consistent with the U.S. Federal Trade Commission guidelines on the use of symbols in environmental labeling.

ISO 14023 (*Environmental Labeling: Testing & Verification Methodologies*) determines the principles for testing and verification methodologies used to substantiate environmental claims.

ISO 14024 (*Environmental Labeling: Practitioner Programs: Guiding Principles, Practices and Certification Procedures of Multiple Criteria (Type I) Programs*) lays out guiding principles, practices and criteria for multiple-criteria-based practitioner programs (such as Green Seal or Blue Angel[35]). ISO 14024 is intended to help practitioner programs evaluate products and award approval to companies[36].

Widespread implementation of the Environmental Labeling standards will allow consumers to make informed choices about the products they purchase and the companies they support. Companies that value the environment and limit the impacts of their products and services may benefit through an improved public image created by credible environmental advertising.

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[34] Johnson, 1997.

[35] The "Green Seal of Approval" is granted by Green Seal, Washington, D.C. to products that it finds to cause less environmental harm than other similar products on the market. The Blue Angel is a German practitioner program, awarding environmentally responsible products.

[36] Johnson, 1997.

Environmental Performance Evaluation (EPE) – ISO 14031

ISO 14031 (*Guidelines on Environmental Performance Evaluation*) is a guidance document for evaluating the environmental performance of a company's activities, products, and services. ISO 14031 should serve as a basis for developing environmental performance indicators (EPIs) applicable to a company's specified impacts, objectives and targets.

Life Cycle Assessment - ISO 14040-14042

A Life Cycle Assessment (LCA) is a systematic method of determining how a product impacts the environment throughout its entire life cycle. The assessment evaluates all significant energy and material inputs and outputs associated with a product and its by-products, from the acquisition of raw materials to the product's ultimate disposal or reuse. LCA is hence an expansion of the more narrowly focused assessment of a product's environmental impacts as required by ISO 14001.

The Life Cycle Assessment standards currently cover four areas:

ISO 14040 (Life Cycle Assessment: *Principles and Framework*) introduces the basic concepts for conducting a LCA. This standard provides a comprehensive "overview of the practice, application, and limitations of LCA[37].

ISO 14041 (*Life Cycle Assessment: Goals and Definitions/Scope and Inventory Analysis*) describes the guidelines for evaluating the environmental inputs and outputs of product systems.

ISO 14042 (*Life Cycle Assessment - Impact Assessment*) provides guidelines for using LCA impact assessment to help firms evaluate their significant environmental impacts.

ISO 14043 (*Life Cycle Assessment: Improvement Assessment*) contains information on improving the total environmental performance of product systems. (Some have suggested that this last section would be more useful if it addressed interpretation of LCA results[38].)

Environmental Product Standards - ISO Guide 64 (formerly ISO 14060)

ISO Guide 64 addresses the incorporation of environmental aspects into product standards. It is directed at individuals or organizations involved in the drafting of product standards. ISO Guide 64 is designed to minimize the adverse effects of

[37] Cascio, et.al., 1996.
[38] Cascio, et.al,.1996.

specific requirements of a product standard (set by a standard-setting body) that may cause an environmental impact.

2.2.5 PROJECT FOCUS

The standards contained in the ISO 14000 Series can be divided into two major categories according to their focus.[39] (See figure 3) This report focuses on the organizational evaluation aspects of the ISO 14000 series, primarily ISO 14001, rather than the product evaluation aspects. Our focus corresponds to the interest of many U.S. government and non-government organizations in determining the proper relationship between an ISO 14001 EMS and environmental regulatory policy. Environmental audits and performance evaluations are tools used in organization evaluations, so their relevant ISO standards are addressed in this report. The product evaluation aspects of the ISO 14000 series are not addressed because they focus on reducing the impacts of products, not on an organization's management structure.

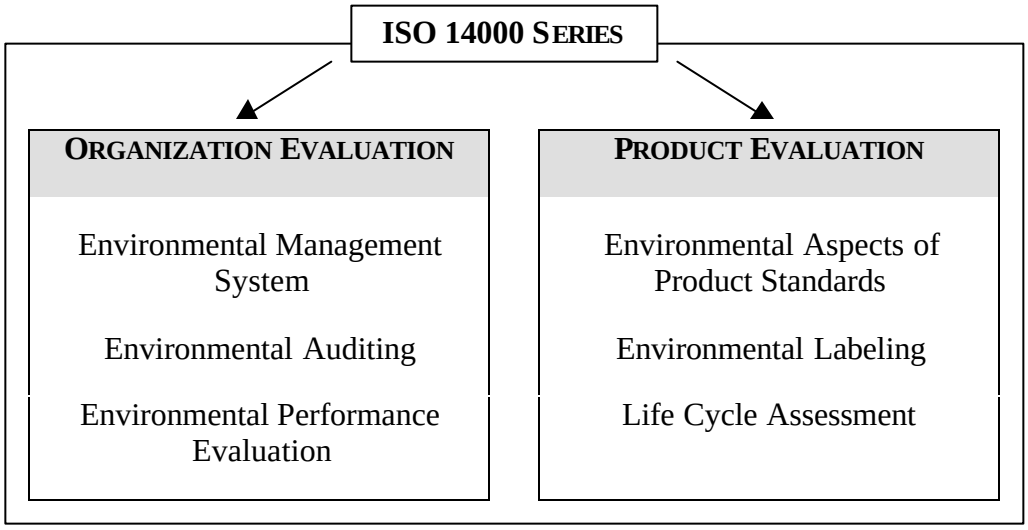

Figure 3. Organizational and Product Categories of the ISO 14000 Series

[39] Cascio, et.al., 1996.

2.3 WORLDWIDE PERSPECTIVES ON ISO 14001

The implementation of ISO 14001 as an EMS standard varies significantly across the globe. Out of the approximately 7400 ISO 14001 certified firms worldwide (December 98), 19% are located in Japan, 13% in the UK and Germany (see Table 2). As can be seen from Table 2, implementation of ISO 14001 has been relatively slow outside of Asia and Western Europe. In fact, only 3% of the firms are located in the U.S. Firms from the developing countries and the transitional economies of Central and Eastern Europe account for an insignificant proportion of the total.

REGION	COUNTRY	CERTIFIED	% TOTAL	
Western Europe		**4.047**	**55%**	
	UK	*950*		*13%*
	Germany	*950*		*13%*
	Sweden	*311*		*4%*
	Netherlands	*300*		*4%*
	Switzerland	*292*		*4%*
	Denmark	*250*		*3%*
	Austria	*180*		*2%*
	France	*177*		*2%*
	Finland	*120*		*2%*
	Spain	*116*		*2%*
	Others	*401*		*5%*
Asia-Pacific		**2,774**	**38%**	
	Japan	*1.392*		*19%*
	Korea	*463*		*6%*
	Taiwan	*364*		*5%*
	Australia	*125*		*2%*
	Others	*430*		*6%*
North America		**290**	**4%**	
	USA	*200*		*3%*
	Canada	*90*		*1%*
Central and Eastern Europe		**70**	**<1%**	
Latin America		**143**	**2%**	
Middle East		**18**	**<1%**	
Africa		**40**	**<1%**	
TOTAL (12/08/98)		**7,382**	**100%**	*100%*

Table 2. ISO 14000 Certified Firms Worldwide (Source: Peglau, 1998)

Although implementation of ISO 14001 is currently sparse outside of Japan and Western Europe, the number of certified firms in several countries, including the U.S. and Canada, is expected to rise over the next decade. This is due to an

increasing globalization of trade, and the belief by U.S. firms that ISO 14000 will be necessary in the international market. The following section of the report summarizes the status of ISO 14001 implementation and regional perspectives across the globe.

2.3.1 WESTERN EUROPE

In the early 1980's Great Britain, Scandinavia and the Netherlands initiated environmental management strategies in Europe by adopting the compliance audit practices from the U.S.[40]. By the early 1990's, the focus had shifted from environmental compliance auditing to designing comprehensive environmental management systems. The three major certifiable standards (BS 7750, EMAS, and ISO 14001) are all supported in Europe.

Great Britain

ISO 14001 certified companies in Britain span a broad spectrum of industries and business sectors, including chemical, transportation, construction, paper and printing, petroleum, electronics and computer hardware, furniture, utilities, and even the Hereford City Council[41]. There is a general trend for British ISO 14001 certified companies to be strongly involved in international trade (many multi-nationals are certified) and to have a long-standing commitment to environmental management. Out of the 48 ISO 14000 companies listed by Quality Network, 47 are also certified for BS 7750, and 4 are certified for EMAS (certification for both BS 7750 and EMAS was generally obtained previous to ISO certification)[42].

Germany

ISO 14001 certification in Germany includes all industries, although the transportation and communication industries have the largest number of certified firms. The majority of certified companies are medium in size with 10 to 200 employees. Currently, Germany ranks second worldwide (together with Britain) in number of ISO 14001 certified companies. Germany is also home to 1,670 EMAS certified companies, more than ten times that of any other European country[43]. The enthusiastic response to ISO 14001 certification is partly explained by the fact that certification for the stricter EMAS standard facilitates ISO 14001 certification. All ISO 14001 certified German companies are also EMAS certified. There seems to be

[40] Baker & McKensie, 1993.
[41] Quality Network, 1996a.
[42] Quality Network, 1996a.
[43] Peglau, 1998.

more reluctance, however, for EMAS certified companies to adopt ISO 14001 as well. The general motivators for the widespread implementation of EMS standards in Germany seem to be "good corporate citizenship", as well as a response to consumer demands.

Scandinavia

Scandinavian countries are also becoming increasingly enthusiastic supporters of ISO 14001. In December1998, there were 311 certified companies in Sweden, 250 in Denmark, 120 in Finland, and 60 in Norway. Similar to trends in Britain, ISO 14001 certified companies often have a long-standing record of environmental commitment. (Some Swedish companies published their first environmental policy statements as early as the late 1960's. [44]) The Scandinavian approach to environmental management seems to be very holistic – several companies have extended the ISO 14001 principles from their operational processes to transportation and on-site catering business components. The range of industries appears to be largely limited to forest industry and wood processing operations, the chemical industry, energy production, and the telecommunications sector.

The Netherlands

In contrast to the motivators in neighboring European countries, environmental protection efforts in the Netherlands are strongly driven by the Dutch government [45]. Recently, an "Internal Environmental Care System" (IECS) was introduced, requiring the largest 10,000 companies in the country to implement a specific EMS standard. The IECS is designed to be proportional to the size of the company involved; only the largest companies will be required to have a system comparable to EMAS or ISO 14001.

Switzerland

ISO 14001 certified companies in Switzerland, similar to Germany, are primarily medium-sized and span a wide range of industries including transportation, construction, electronics and optics, food and beverages, printing, chemical, and metal industries. Unlike in Germany, however, none of the 292 ISO 14001 certified companies in Switzerland are also EMAS certified.

[44] Baker and McKensie, 1996.
[45] Baker and McKensie, 1996.

2.3.2 ASIA-PACIFIC

Japan leads the world in terms of ISO 14001 certified companies (19% of world total), and together with Korea and Taiwan accounts for most of the ISO 14001 certified companies in the Asia-Pacific region. Other prominent nations in the region have been relatively slow to implement ISO 14001. Thailand, Indonesia, Singapore, Malaysia, Hong Kong, India and China collectively contain only approximately 6 % of ISO 14001 certified companies worldwide.

Japan

For Japanese firms, the driving forces for certification are the perceived additional competitive advantages associated with environmentally responsible business, and the increased access to new markets. The most prominent supporter of ISO 14001 in Japan is the electronics industry, followed by the machinery manufacturing industry.

Japanese companies have watched the development of the ISO 14000 Series closely, and are increasingly interested in ensuring that Japan's national standards are compatible with internationally adopted standards. Japan established the Environmental Management Standardization Study Committee in May 1992, as the Japanese representation to TC 207. The Committee resides within the Japanese Industrial Standards Committee (JISC), and is now taking steps to adapt the Japan Industrial Standards (JIS) to comply with the ISO 14000 Series. Also, local governments are studying how to replace their current "command and control" approach to environmental regulation with ISO 14000 principles.

The Japan Accreditation Board for Conformity Assessment (JAB) is responsible for authorizing Japanese registrars for ISO 14001 as well as other standards. The JAB is also responsible for authorizing and overseeing the organizations that train and certify environmental auditors.

Korea

Because of Korea's strong industrial economy, its government has pursued ISO 14001 since 1994[46]. The motivations for Korea's interest in ISO 14000 are trade implications and a desire by firms to improve their public image.

Korea has adopted an Environmentally Friendly Companies Act that encourages companies to provide information on their environmental performance. The act offers a basis for improving environmental performance and dissemination of

[46] US-AEP, 1998e.

information on progress to government and the public. Compliance appears motivated by a desire to obtain ISO 14001 certification in the future.

Taiwan

Taiwan has shown considerable support of sustainable business practices. The China Productivity Center currently provides government-subsidized management consulting to Taiwan industry and is assisting industries in implementing ISO 14001 [47]. The Taiwan Environmental Protection Agency promotes the "Green Mark" (eco-labeling) system, and the Bureau of Foreign Trade collects information to track ISO 14001 implementation[48].

In addition, the Ministry of Economic Affairs (MOEA), the central agency for economic and industrial planning and program implementation within Taiwan, supports an inter-ministerial committee to study ISO 14000 and its incorporation into Taiwan's existing national standards system, the China National Standards[49].

Indonesia

In contrast to Japan, Korea and Taiwan, Indonesian industry has shown a low level of interest in ISO 14000, which is surprising given its expansive export economy[50]. Recently though, a number of industry associations and chambers of commerce have been offering seminars and workshops on ISO 14000. Also, the Ministry of Industry and Trade is examining ISO 14000 as a mechanism to assist industry in implementing eco-labeling and pollution prevention practices.

A possible signal of Indonesia's increasing environmental awareness and need for improved industrial environmental performance is "Proper Prokasih", a business performance rating program initiated by the Indonesian Ministry of Environment in 1995. "Proper Prokasih" is a publicly announced rating system of company environmental performance and compliance with regulations. It is the first central government program in the world to publish a single index of environmental performance[51]. The program's main objectives are to increase environmental compliance by industry, create incentives for companies to strengthen their environmental management systems, and to prepare Indonesian companies for ISO 14001 certification.

[47] US-AEP, 1998h.
[48] US-AEP, 1998h.
[49] US-AEP, 1998h.
[50] US-AEP, 1998a.
[51] Wheeler and Afsah, 1996.

Malaysia

Similar to Indonesia, Malaysia's government sector is now aggressively promoting ISO 14000 after a slow start. The Ministry of International Trade and Industry (MITI), the lead agency for industrial development and international trade in Malaysia, asserts that environmental management is a major policy concern[52]. Currently, MITI is warning industry that ISO 14001 certification will likely become a precondition to export growth. The recently privatized Standards and Industrial Research Institute of Malaysia has been charged with leading the ISO 14000 efforts in Malaysia and will be the country's registrar. The Malaysian International Chamber of Commerce (MICCI) is also taking an active role in ISO 14001 implementation. Because its large corporate members believe that they must be serious about ISO 14001, MICCI has a thorough training program for corporate officers[53].

China

Although implementation of ISO 14001 has been slow in China, government officials seem to be increasingly embracing the standard. In 1996, the State Bureau of Environmental Protection designated the coastal trade city of Xiamen for the first ISO 14001 pilot program, with the aim to certify 20 pilot companies[54]. In 1997, the Chinese government established an environmental management and auditing certification center to provide ISO 14000 training. China plans to incorporate ISO 14000 into its regulatory requirements sometime in the future[55].

India

Although industry associations in India are beginning to show interest in ISO 14001 out of concern that the standard will become a critical factor in export trade, stronger national support will be necessary to accelerate implementation[56].

2.3.3 NORTH AMERICA

Canada

Canada's industry is showing an increasing interest in the potential effects of ISO 14000, especially within the arena of international trade and customer expectations. To date, 90 Canadian companies have attained ISO 14001 certification[57].

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[52] US-AEP, 1998c.
[53] US-AEP, 1998c.
[54] Hand, 1997.
[55] Hand, 1997.
[56] US-AEP, 1998d.

The Environmental Regulatory Affairs Directorate - Industry Canada notes that Canadian firms seem particularly interested in meeting customer demands for companies' adherence to environmental standards, and in exploring the international trade benefits of ISO 14001 certification[58].

The Standards Council of Canada (SCC), created by the Canadian Parliament in 1970, has taken a prominent role in advocating ISO 14000. (The SCC is responsible for accrediting Canadian organizations to serve as national registrars for ISO certification.) The SCC, which is composed of government and non-government members, acts as both the official Canadian representation to ISO and the lead secretariat of the TC 207. The SCC has played a vital role in boosting the credibility of the ISO 14000 Series throughout Canada by developing a National EMS Accreditation Program, which follows the ISO 14000 principles[59].

In addition to the SCC's support, Canada's legal system is also beginning to promote ISO 14001. For example, in a 1996 court ruling for a company that had failed to comply with environmental laws, the judge mandated the firm to attain ISO 14001 certification in lieu of compensatory or punitive damages[60].

United States

In the United States, attitudes toward the ISO 14000 Series range from distrust to enthusiasm, with an increasing shift towards the latter as a better understanding of the Series evolves. However, government agencies, the corporate sector, and the environmental community still haven't reached a consensus regarding the Series' potential implications.

The EPA's Office of Reinvention is currently developing a database with information on EMSs gathered from various EPA pilot projects across the nation. The database will help the EPA evaluate the effectiveness of EMSs, including ISO 14001, in terms of six criteria: environmental performance, compliance, pollution prevention, environmental conditions, costs and benefits to implementing facilities, and stakeholder participation and confidence[61].

Meanwhile, the regulatory and legal implications of ISO 14001 certification continue to present an issue of debate within the U.S. During this study, contact with U.S. NGOs indicated that a large number of environmental advocacy and non-profit organizations are opposed to ISO 14001, because they believe the standard will erode the strength of current environmental regulations. Essentially they fear

[57] Peglau, 1998.
[58] Marcus and Willig, 1997.
[59] Standards Council of Canada, 1997.
[60] *Alberta Court v. Re Prospec Chemicals*, February 1996.
[61] U. S. Environmental Protection Agency, 1998.

that the EPA may grant regulatory relief to certified firms, and question the vague emission and performance standards. The misperception that ISO 14001 certification enables businesses to become eligible for regulatory relief, rather than regulatory streamlining (i.e. the improvement of industry-government relations, and an increase in regulatory efficiency) has caused much confusion and debate.

The majority of U.S. firms generally perceive ISO 14001 as an innovative set of guidelines for developing company-specific EMSs, yet only 200 U.S. companies have actually obtained ISO 14001 certification[62]. However, ISO 14001 certified U.S. companies are becoming increasingly interested in requiring environmental evaluations of their suppliers. This could lead to a significant increase in the number of ISO 14001 certified firms in the U.S. in the near future.

The U.S. representative to TC 207 is ANSI, a non-profit organization that includes representatives of several governmental agencies, including the EPA, the Department of Energy, and the Occupational Safety and Health Administration.

2.3.4 CENTRAL AND EASTERN EUROPE

The transitional economies of Central and Eastern Europe contain only one percent of ISO 14001 certified companies worldwide. Poland and Hungary, who are attempting to forge close ties with the European Union, are leading the region in implementing ISO 14001, but certified firms are still few. There is only one certified company in Russia to date.

Disarray in the legal system, associated with the transition to a market-based economy, is the primary reason for slow implementation of ISO 14001 in this geographical area[63]. The US Agency for International Development (USAID) is supporting programs to increase Russia's capacity to deal with its pervasive environmental pollution problems. In October 1997, USAID sponsored an ISO 14000 training program for Russian decision-makers[64]. Comments by attendees of the conference suggested strong suspicion that any attempt by the government to require ISO 14001 would only be a means to raise new revenues from the already heavily taxed Russian industry. Overcoming this suspicion will be a major obstacle before ISO 14001 can be successfully implemented in Russia.

[62] Peglau, 1998.
[63] Shideler and Cascio, 1997.
[64] Shideler and Cascio, 1997.

2.3.5 THE REST OF THE WORLD

Latin America, Africa and the Middle East together account for less than 3% of ISO 14001 certified companies worldwide[65]. Within these regions, certified companies are predominantly located in Brazil, Argentina, Mexico, and South Africa. Mexico and Argentina have integrated ISO 14000 into their regulatory scheme. In a joint effort with government regulators, the World Bank is supporting a pilot program in Mexico to transfer approaches to ISO 14001 implementation from large companies to their suppliers[66]. Institutional weaknesses, lack of skilled manpower, and inadequate training facilities have been suggested as the major obstacles to implementing environmental management systems in these regions[67].

[65] Peglau, 1998.
[66] Hanrahan, 1997.
[67] Dasgupta, et.al., 1998.

3. Business Case Study

Based on our preliminary research about the perception of ISO 14000 in the U.S., we decided to include four major U.S. stakeholders in our analysis of the effectiveness of ISO 14000: (1) government, (2) businesses, (3) non-governmental organizations, and (4) auditors. We realize that there are other stakeholders that may be affected by ISO 14001. However, we decided to focus on these four, since they participate in implementing the standard, or are directly involved in the policy discussions surrounding the Series. To detect the most pressing concerns and to subsequently achieve results that are valuable to stakeholders, it was crucial for us to gain first-hand insights into the complexities of implementing an ISO 14001-like EMS. Therefore, our project team conducted a business case study at the Imation Corporation plant in Camarillo, CA, in cooperation with Sierra Pacific Environmental, Inc., Santa Barbara, CA. (See Appendix A1 for the Business Case Study Report.) The project, aimed at modifying the plant's existing EMS into an "ISO 14001-like EMS", comprised three major assignments:

1. Compilation of a comprehensive site history,

2. Development, documentation, and organization of EMS elements to create an ISO 14001-like EMS,

3. Creation of an 'ISO 14000 Roadmap', an electronic database detailing how the modified EMS meets ISO 14001 requirements.

Three members of our project team completed the assignments in the period from June 29th to August 28th, 1998. During that time, we closely collaborated with Environmental, Health & Safety (EHS) staff at the Imation plant, as well as corporate representatives from Imation's headquarters.

Our project team used the experiences and insights gained during the case study to

- obtain first-hand examples for the assessment of ISO 14001,
- evaluate the organizational implications of ISO 14001 from a corporate perspective, and
- identify key questions for further research.

Our project team successfully implemented an ISO 14001-like EMS at Imation Corporation's plant in Camarillo, CA. As recorded in the company's newly developed ISO 14000 Roadmap, the EMS met or exceeded the standard's requirements with few exceptions. Our project team advised the plant's

management on the steps necessary to make the system fully ISO 14001 compatible.

Imation's implementation of an ISO 14001-like EMS was greatly facilitated by the organizational structure and resources already present at the plant. Some of the most important features were the strong management commitment, a closely cooperating EHS staff at the plant and corporate level, the environmental database, and the ISO 9000 quality management system.

The seven most important areas of ambiguity or uncertainty detected during the case study are:

- **Environmental Aspects & Impacts** – How are environmental aspects and significant impacts defined and identified?
- **Environmental Performance** – How is environmental performance measured? How can the effectiveness of the performance indicators be evaluated? Does the standard have a significant effect on environmental performance?
- **Motivation for Certification** – What are the primary reasons for companies to seek ISO 14001 certification?
- **EMS Cost Accounting** – What are the financial benefits resulting from certification? How do companies track environmental costs and benefits?
- **EMS Audits** – Is the EMS Audit a perceived hurdle to certification? What are the legal implications and uncertainties associated with the audit?
- **Organizational Keys to Success** – How can a company gauge the extent of organizational modifications required for implementing the ISO 14001 standard.
- **Gap Analysis** – How can a company accurately assess its existing EMS and hence determine the EMS elements that require enhancement in order to comply with the standard.

Our project team investigated these topics further during our subsequent research. The results and conclusions of our research, in terms of environmental, stakeholder, organizational and legal implications, are presented in Section 5 (Research Results & Analysis).

Section 5.1 ('**Environmental implications')** is the discussion of approaches to environmental aspects, impacts and measuring environmental performance. Section 5.2. ('**Stakeholder implications')** includes corporate views on motivations for certification and EMS cost accounting, as well as the auditor's perspective on EMS

auditing. We also present the results on our research into government, regulatory and public interest group perspectives on ISO 14001. Section 5.3. (‘**Organizational implications**’) contains the organizational keys to success noted during our business case study. Section 5.4. (‘**Legal implications’)** describes the potential legal ramifications of ISO 14001 implementation. The Gap Analysis is discussed in Section 7 (**Conclusions & Recommendations**) of our report under “Management Tools” (Section 7.3), which presents a number of assessment and implementation tools designed to facilitate the ISO 14001 certification process.

4. Research Approach

General Review of Published Material

For all areas of the research, we made extensive use of a myriad of materials published in print and on the Internet, in addition to conversations with stakeholders. The printed materials we used included the ISO 14000 Series document[68], books and articles describing problems encountered during the implementation of ISO 14001, and a collection of case studies, for example the U.S. Asia Environmental Partnership business case studies and others[69]. We also used implementation guides and various annual reports from certified companies, including those from IBM, Lucent Technologies, Northern Indiana Public Service Company (NIPSCO), Allergan Inc.

The Internet proved a valuable source for up-to-date information such as corporate environmental reports, case studies conducted by environmental professionals, databases published by various research organizations, and public statements by governmental and NGOs in the U.S. We have compiled a complete list of ISO 14000 related websites in Appendix A4.

Environmental Research

We researched the environmental implications of ISO 14001 through the use of general literature on corporate and institutional perspectives in addition to case studies. The case studies that we used for the analysis covered a broad spectrum of industries, products, services, and business sizes.

Stakeholder Research

We developed two survey questionnaires to gather information from (1) ISO 14001 certified U.S. companies and (2) U.S. environmental NGOs and policy institutions on their perspectives on the effectiveness of ISO 14001.

ISO 14001 certified U.S. companies

We conducted a questionnaire-based survey to ascertain how ISO 14001 certified companies in the U.S. currently perceive the effectiveness of the ISO 14001 standard. The target group for the survey was senior environmental managers of U.S. companies that had received ISO 14001 certification prior to November 1998. We chose to direct the questionnaires to Environmental Managers instead of Chief

[68] International Organization for Standardization, 1997.
[69] Baker, 1996.

Executive Officers (CEOs), as Environmental Managers are likely to be more familiar with the implementation and effectiveness of their companies' EMSs.

We initially hoped to survey three different types of firms 1) ISO 14001 certified firms, 2) firms who considered seeking ISO 14001 certification, but decided against it, and 3) non-certified firms who had not ever considered implementing ISO 14001. After discussing the difficulty of making comparisons across industries, locations, and size associated with random return rates, we decided to limit our questionnaire to focus on only the certified firms. We felt our questionnaire could be most effective in identifying how and why other companies chose to implement ISO 14001.

We used Globus International's database of ISO 14001 certified companies[70] in combination with the listing of certified firms in McGraw Hill's Environmental Management Report[71] to identify the U.S. certified companies. According to Globus International, 180 U.S. companies had received ISO 14001 certification by November 1998.

We designed our questionnaire with the three main purposes in mind. Our project team hoped to clarify

1. corporate motivations for seeking ISO 14001 certification,
2. the amount of resources (financial and human) necessary to successfully design and implement and ISO 14001 EMS, and
3. the overall effectiveness of an ISO 14001 EMS in terms of observed costs and benefits of certification.

In addition, the questionnaire aimed to determine the role of several financial tools (environmental accounting, cost-benefit analysis, and environmental reporting.) in creating an effective EMS.

Since the Multi State Working Group on Environmental Management Systems (MSWG) is currently conducting national pilot projects to study the impacts of ISO 14000 in the U.S., we collaborated with them to develop targeted research questions that would meet both of our needs.

In an effort to compare environmental expenditures between certified and non-certified firms, we designed these two questions such that they were comparable to pollution expenditure data compiled in the U.S. Bureau of Census Pollution Abatement Capital Expenditures (PACE) report[72]. We hoped to analyze general

[70] Globus International, 1999.
[71] McGraw-Hill, 1998.
[72] U.S. Bureau of Census, 1996.

trends in the cost of new and total pollution abatement expenditures between certified and non-certified firms to determine if differences existed.

We designed the questionnaire to include the following six sections for the reasons indicated below (see Appendix A2 for the complete questionnaire):

- **Company information** – Background information on company. We grouped firms by the size of each facility and its entire corporation in terms of both number of employees and annual revenue. Since we were aware of several multinational corporations that were certified, in addition to small facilities, we divided these questions into three ranges as follows:
  - **Small**: Less than $10 million/ Under 1000 employees
  - **Medium**: Between $10-$500 million/ Between 1000-5000 employees
  - **Large**: Greater than $500 million/ Over 5000 employees

  To better understand the correlation (if any) between ISO 9000 and 14000 we also inquired if firms were ISO 9000 certified, and if so, how this system was integrated with their ISO 14001 system.
- **Incentives for certification** – Motivation for developing ISO 14001 EMS. Through our literature reviews and discussions with the MSWG, we identified six areas that might serve as potential driving forces for seeking certification:
  - Environmental Performance
  - Regulatory Effectiveness
  - Management Effectiveness
  - Competitive Advantage
  - Financial Impacts
  - Stakeholders Interest
- **Implementation of ISO 14001 EMS** - Design process and obstacles encountered during implementation of ISO 14001. We felt it was important to discover which stakeholders were involved in the ISO 14001 design and implementation processes. To clarify the constraints to seeking certification, we wanted to also query firms about possible obstacles to implementing ISO 14000. Since the importance of pollution prevention is unique to ISO 14000, we felt it would be helpful to determine how effective the standard was in encouraging these environmental processes.

- **Effectiveness of ISO 14001 EMS** - Impact of ISO 14001 implementation on various aspects of company performance. Since the standard is so new, the literature only hints at possible impacts of ISO 14001 certification, but very little data exists on the actual benefits and effectiveness of an ISO 14001 EMS, so we chose to survey firms about the impacts to their business' performance in the following areas:
  - Environmental Performance
  - Regulatory Performance
  - Management Effectiveness
  - Communication
  - Financial Effectiveness
  - Competitive Advantage
- **Links to facility's overall management system** – Integration of ISO 14001 EMS into overall management structure. In theory, an ISO 14001 EMS should permeate all business divisions and departments. To test if this were the case, we asked firms to comment on the impact and integration of their ISO 14001 EMS on a variety of common business operations.
- **Costs and Benefits of certification** - Financial implications of certification. The literature was very vague in describing the actual benefits of implementing an ISO 14001 EMS, and we felt it would be illuminating to learn how certified firms perceived the benefits so far. We inquired as to whether or not firms conducted cost benefit analyses prior to seeking certification as an indicator of firms' concern with the importance of financial benefits associated with certification. To help demystify the actual costs of developing and certifying an EMS, we queried firms about their range of costs. Finally we looked at indirect financial impacts of implementing an ISO 14001 EMS to help determine if firms could improve their competitive advantage.

In addition to our group's internal review of the questionnaire, the MSWG provided us with helpful comments, as did our faculty advisors and additional Bren School faculty members (Magali Delmas, Linda Fernandez, and Charlie Kolstad), in addition to Tom Umenhofer of Sierra Pacific Environmental.

On November 21st, 1998, we mailed the corporate questionnaires to 152 (84%) of the 180 U.S. certified companies. There were no valid addresses available at the time of mailing for the remaining 29 companies. In early January, six

questionnaires were re-sent as a result of follow-up phone calls to companies that had not yet responded. Three questionnaires were returned as not deliverable. One questionnaire was returned with a note indicating that the facility had been closed.

The analysis of corporate perspectives included in this report is based on the questionnaire responses received by February 15th, 1999 (see Appendix A2 for the complete questionnaire response data). The response data was first entered into an Excel spreadsheet and subsequently transferred to an SPSS (statistical computer software package) data sheet for analysis. We used SPSS to assign a unique numerical code for each data point. From this data we created frequency tables, bar graphs, and pie charts to analyze trends corporate perceptions of ISO 14000.

Environmental NGOs and Policy Institutions

In addition to the corporate questionnaire, we also designed, administered, and analyzed a survey of environmental NGOs and policy institutions in the U.S. in order to determine their knowledge and perception of ISO 14001. Since NGO's possess a significant amount of political clout in the U.S., it can be argued that in order for ISO 14001 to be successful, it needs the blessing of NGO's. We chose NGOs for our survey by reviewing an extensive list of environmental NGO's and policy institutions. The list included some of the largest and most well known environmental NGO and policy institutions in the U.S., as well as a majority of the members of the NGO Working Group.

After conducting an initial literature review, we felt it was important to collect information on the following five areas in order to gain a comprehensive understanding of NGO involvement in, knowledge of, and perception of ISO 14001: see Appendix A3 for the entire survey and the response data):

- **ISO 14001 policy discussions** – Involvement in policy discussions and in the standard development process
- **Regulatory innovation** – Attitudes towards and involvement in regulatory innovation
- **Regulatory implications** – Perceived regulatory implications of ISO 14001
- **Environmental education** – Education about ISO 14001
- **Perceptions of ISO 14001 certification** – Perception of certified companies, as well as toward the certification and auditing process

The final NGO survey was reviewed by our project team, faculty from the Donald Bren School (our advisors and Magali Delmas), Jerry Speir of the Tulane Institute of Environmental Law and Policy, and other environmental professionals. We also consulted with Professor Rob Wilder of the University of California, Santa Barbara

in the development of the survey. The survey was mailed to 51 environmental NGOs and policy institutions on November 21st, 1998.

After analyzing the written survey results, we identified several areas that needed clarification. We conducted follow-up interviews with three of the ten respondents (six respondents had asked not to be contacted and the other respondent was unavailable at the time). During these follow-up interviews, which lasted approximately ten minutes each, we clarified and expanded on the survey responses through the following questions:

- What is the purpose for your organization's participation in the discussions about ISO 14001? How did your organization become involved in these discussions? (*Only asked if respondent's organization had been involved in discussions.*)
- Why isn't your organization involved in the discussions about ISO 14001?
- What is the main strength/weakness of ISO 14001?
- What do you consider the alternatives to ISO 14001, if any?
- Do you have any suggestions about how to get the environmental NGO sector more involved in the discussions about ISO 14001?
- Should ISO 14001 certified firms be granted regulatory relief? Why or why not?

The response data was entered into an Excel spreadsheet and analyzed for general trends in the data. Due to the limited data available, we did not perform comprehensive statistical analyses. The information acquired from the telephone interviews further supported the conclusions.

Auditor Surveys

We conducted telephone interviews to evaluate auditor's perspectives about ISO 14001. After evaluating the literature and the business case study findings, we developed the following questions to ask during the interviews. Each interview lasted approximately 20 minutes.

- What is your overall evaluation of the ISO 14001 standard? Have you encountered any general problem areas with respect to the ISO 14001 certification audit?

- Do you consider the standard to be successful in accomplishing its goals of promoting environmental compliance, commitment to pollution prevention, and continual improvement of environmental performance?

- On what materials do you base the evaluation of a company's EMS?

- Is it necessary for you to be familiar with the company's business sector to conduct an effective audit?

- Do you check the company's compliance with EHS regulations during an EMS audit? If so, does non-compliance affect the outcome of the ISO 14001 certification audit, and/or do you report non-compliance to the EPA?

- What is the nature and frequency of surveillance audits?

- Is de-certification possible? If so, under what circumstances?

- What, if any, are the legal implications associated with the ISO 14001 certification audit or the internal ISO 14001 EMS audit?

- What, if any, changes would you suggest with respect to the ISO 14000 Series in general and the auditing-related sections in particular?

We also conducted telephone interviews as a follow-up to the surveys of corporate representatives, environmental NGOs and policy institutions. The results from these interviews are discussed as part of the corresponding survey data.

Organizational Research

For organizational implications of ISO 14001, our research focused on determining a set of indicators that would provide readily accessible information to companies about the likely effort and success of ISO 14001 implementation. During the business case study, our project team encountered several "Organizational Keys to Success". The results presented in this report are a synthesis of insights gained during our case study.

Legal Research

In order to assess the possible legal implications of ISO 14000, we conducted a literature review, studied cases on the WESTLAW database.

5. Research Results & Analysis

5.1 ENVIRONMENTAL IMPLICATIONS

The key question of the environmental implications of ISO 14001 is whether or not the standard effectively improves the environmental performance of an organization. In this context, our business case study indicated that the answer to this question lies primarily in two of the required elements of the ISO 14001 EMS process:

- Planning –Identifying environmental aspects and impacts.
- Checking and corrective action –Measuring environmental performance, evaluating the effectiveness of the performance indicators, and determining if the implementation of the ISO 14001 standard has a visible environmental impact.

Consequently, our research on the environmental implications of ISO 14001 focused on the identification of environmental aspects and the evaluation of environmental performance.

5.1.1 IDENTIFICATION OF ENVIRONMENTAL ASPECTS

This part of our research relied upon direct observations during our business case study, in addition to reviewing surveys conducted by other organizations, and EMS documentation published by companies on the Internet or other publicly available sources.

Definition and Guidance Documents

Evidence from our business case study and review of other published case studies[73] suggests confusion among U.S. organizations about the standard's definition of environmental aspects when applied to their operations. ISO 14001 requires that an organization's EMS planning process identify, among other things, "the environmental aspects of its activities, products, or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment. [74]" Section 3.3 of

[73] Diamond, 1996.
[74] International Organization for Standardization, 1997.

ISO 14001 defines environmental aspect as an "element of an organization's activities, products or services that can interact with the environment."

Our initial literature review focused on the two guidance documents within the ISO 14000 series—Annex A of ISO 14001 (*Guidance on the Use of the Specification*) and ISO 14004 (*Environmental Management Systems—General Guidance on Principles, Systems and Supporting Mechanisms*). These documents provide some guidance on the intent of the standard, but do not significantly narrow the meaning of "environmental aspects" and the approach that should be used for their identification. The guidance document provides only a single example each for the environmental aspect and impact of an activity, product, and service[75].

During the business case study, our project team and client representative had difficulty applying ISO 14001's definition of "environmental aspect" to the company's manufacturing operations. The lack of clear guidance by the standard caused the company to rely on regulatory requirements to identify environmental aspects. The result was a compliance-driven environmental aspect identification matrix with regulated aspects (e.g., air emissions, RCRA waste generation, and wastewater discharge) dominating over non-regulatory aspects (e.g., water and energy consumption). At the end of the case study, the client representative expressed frustration with the standard, and a need for better guidance in identifying specific organizational elements that are environmental aspects, with examples from other industries.

Further evidence to support our findings is provided in a 1996 survey of 18 firms that participated in an EMS demonstration project funded by the US EPA [76]. The problems reported by the companies included confusion over the definition of "environmental aspects," which was consistent with our own observation during the business case study. This was most clearly expressed by the Madison Gas and Electric Company, a public utility located in Madison, Wisconsin: "Perhaps the greatest difficulty we faced in implementing ISO 14001 was in defining significant environmental aspects. This element raises a number of critical issues such as: determining which stakeholder concerns are significant, how *significance* should be measured, how a company ensures that all significant aspects have been identified, and how the process for identifying significant aspects should be sustained over time. [77]"

When four of the firms participating in the EPA demonstration project were independently audited, the results showed significant differences between the interpretation of ISO 14001's requirements by the organizations and the

[75] ISO 14004, Section 4.2.2.
[76] Diamond, 1996.
[77] Diamond, 1996.

independent auditors. One of the most significant problems identified by the auditors was failure to consider all activities, products or services in identifying a company's environmental aspects, which was attributed to confusion about the standard's definition of environmental aspects.

These results suggest no clear understanding among U.S. firms about ISO 14001's definition of environmental aspects, which has caused a focus on regulatory requirements for aspect identification.

Consistency in Identification Methods

Evidence from our review of the process used by U.S. organizations to identify the environmental aspects of their operations suggests wide variation in approaches. Section A.3.1 of the Annex to ISO 14001 states that the process for environmental aspect identification should take into account both normal and abnormal operating conditions, including shutdown and start-up conditions, and "reasonably foreseeable" or emergency conditions. The process should focus on categories of activities, products, and services, but is not intended to require a "detailed" life cycle analysis. According to the Annex, organizations should take into account the inputs and outputs of current and past activities, products, and services with consideration of: (1) emissions to air, (2) releases to water, (3) waste management, (4) contamination of land, (5) use of raw materials and natural resources, and (6) other local environmental and community issues.

ISO 14004 suggests that an organization identify its environmental aspects through an "initial environmental review" using a variety of possible common techniques including questionnaires, interviews, checklists, direct inspection and measurement, record review and benchmarking (a technique for studying best practice).

The food processing industry provides a good example of the application of the concept of environmental aspects to industrial processes and its potential use to improve environmental performance. Key resources used by the industry include raw materials, water and energy, and it generates significant amounts of wastewater, solid waste, and air emissions. The following is a summary of the environmental aspects of the food processing industry[78]:

- Use of natural resources
    - Water: the food processing industry is a large user of water. Uses include process ingredient, cleaning source, conveyor medium, and sanitizing agent.
    - Raw materials: plant and vegetable materials

[78] US-AEP, 1999.

    - Energy use: primarily electric power, with some naturals gas to operate facility boilers

- Waste streams
    - Waste water: biochemical oxygen demand (BOD), pathogenic organisms, pH
    - Solid waste: organic materials from mechanical preparation processes, packaging
    - Air emissions: biological treatment processes, boilers

Our review of organizational approaches to identification of environmental aspects found a wide range of interpretations and approaches to the standard—from simple to complex—that we attribute to confusion about the meaning and intent of the standard. The U.S. EPA[79] describes two general approaches for identifying significant environmental aspects. The first approach is the "expert-based method," which uses an organization's in-house staff to identify significant environmental aspects and set objectives. The second approach is the "criteria-based method," which is a systematic approach to setting criteria, ranking, and scoring environmental aspects. The following are examples of both approaches.

H-R Industries, the first printed wiring board manufacturer in the U.S. to obtain ISO 14001 certification, used the expert-based approach to identify its significant environmental aspects[80]. Key managers from its major departments met with the CEO to "brainstorm" how the company's activities impacted the environment, focusing on those aspects over which the company had "some control or influence." The associated or potential environmental impact was then determined for each environmental aspect identified. Similar environmental aspects were then grouped into categories (e.g., water use).

Another example of the expert-based method is the process used by Milan Screw Products, a small manufacturing firm in southeastern Michigan. It established a "cross-functional environmental task force" and used a brainstorming session to identify their aspects and impacts[81]. They listed all company inputs, outputs and conversions, and examined company purchases, processes, and waste streams. Stakeholders were identified and their concerns were added to the list of environmental aspects. Once the environmental aspects were identified, the group used a risk-based approach to rating the probability of impact occurring and the consequences of the impact.

[79] U.S. EPA, 1997.
[80] U.S. EPA, 1997.
[81] Diamond, 1996.

The TRINOVA Corporation, a manufacturer of hydraulic fittings for the airline industry, followed a similar approach using an interdisciplinary team to identify environmental aspects[82]. The Hach Company, which manufactures instruments and reagents for water quality testing, used the table of contents from its EHS manual to develop an "environmental effects register" [83].

The Federal Manufacturing & Technologies Division of Allied Signal developed a more complex criteria-based approach to environmental aspect identification. It developed a complicated matrix and point system for identifying and ranking the environmental aspects at its U.S. DOE Kansas City plant[84]. It focused on the RCRA-waste aspect of its operation with the objective of reducing its output by pollution prevention methods. For example, the facility identified "solid waste released to land" as a significant environmental aspect and evaluated the scale, magnitude, and control of this aspect by each of 19 activity groups at the facility.

Our review of environmental aspect identification found a wide range of methodologies due to lack of guidance by the ISO 14000 Series. The U.S. EPA has attempted to fill this void by funding an EMS guide for organizations, but this provides only a framework for identification of environmental aspects and their significance[85]. It contains a methodology for identifying environmental aspects that blends the expert-based and criteria-based approach. It does not provide specific guidance for setting criteria, but establishes a framework that an organization's experts can use to identify significant environmental aspects.

Since the number of U.S. companies implementing ISO 14001 is relatively small, the availability of information to thoroughly evaluate environmental aspect identification methodologies is limited until the completion of a number of pilot studies in progress. The MSWG has developed data protocols [86] for use in evaluating these pilot projects, including baseline studies to determine how environmental aspects are identified, and follow-up studies to determine the effectiveness at improving an organization's environmental performance over statutory requirements.

5.1.2 ENVIRONMENTAL REPORTING

Environmental reporting, mainly in conjunction with environmental accounting, has evolved over the last decade. In the beginning, a company might mention in its annual report that it had an interest in environmental protection or pollution

[82] Diamond, 1996.
[83] Diamond, 1996
[84] White & Huyett, 1998.
[85] Stapleton, et. al., 1996.
[86] Villani, 1998.

prevention, but no further discussion usually appeared. Eventually, some companies began to publish their environmental policies, and now firms are beginning to share important financial data concerning their environmental actions in either the company's annual report or separately in an annual environmental report. It is the addition of financial data and discussions to these environmental reports that makes them increasingly valuable to stakeholders.

One of the greatest obstacles to environmental reporting is concern about the potential legal risk of environmental disclosures. We discuss the legal implications of ISO 14001 and the problem of disclosure in Section 5.4.

A growing number of companies (both ISO 14001 certified and not) are producing informative annual reports that contain important environmental information. While some financial environmental data will (and should be) proprietary, the use of financial tools to create internal environmental reports (a tool itself) has proven helpful in designing systems that protect the environment and save money.

For example, in its 1997 annual report, Northern Indiana State Power Company (NIPSCO) sets an excellent example of communicating its possible and probable environmental liabilities[87]. The company goes to great length to discuss changes in relevant environmental regulations and the impacts (or uncertainty) that the company will experience as a result. NIPSCO also identifies its potential CERCLA liability in several instances, and goes so far as to estimate the dollar amount of expected expenses. Certainly, a reader of this annual report would have a much greater understanding of the company's environmental awareness and potential liability than the standard annual financial report.

IBM's 1997 Progress Report[88] is another good example of how a firm can combine programmatic, organizational, and financial information into an informative report for stakeholders. The report includes estimated environmental savings and expenses, as well as environmental capital and expense data, and five years of data regarding the number of and dollar value of environmental fines.

Environmental reports bring together a company's entire environmental agenda, and demonstrate its true commitment to ISO 14001. Not only is this information important to outside investors, the community, and potential customers, but it is invaluably useful to managers and employees of the firm. Our project team believes that the trend in environmental reporting will continue to grow in popularity, as companies overcome the fear of disclosure and begin to reap the rewards of public communication.

[87] Northern Indiana State Power Companies, 1997
[88] IBM, 1998.

5.1.3 EVALUATION OF ENVIRONMENTAL PERFORMANCE

Although the ISO 14000 EMS model is intended to foster continual environmental improvement, the standard does not establish absolute requirements for environmental performance, other than a commitment to compliance with applicable regulations, nor is environmental performance a factor in certification. Our research focused on the measurement of environmental performance, factors affecting the use of environmental performance indicators (EPIs), and the impact of the ISO 14001 standard on the environmental performance of organizations adopting it.

Measuring Environmental Performance

True to the well-known axiom, "you can't manage what you don't measure," Section 4.5.1 of ISO 14001 requires an organization to have procedures to "monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment" as part of the checking and corrective action portion of its EMS. Over 500 companies worldwide are publishing separate environmental performance reports, and many others are including environmental information in their annual financial reports[89]. Although ISO 14001 requires an organization to measure and track its environmental performance, there are no adopted or commonly accepted EPIs. ISO 14031 (*Guidelines on Environmental Performance Evaluation*) contains over 100 examples of measures and indicators, but it does not propose a core set of metrics for comparison and benchmarking of performance, nor does it establish performance levels.

The voluntary basis of ISO 14031 and its lack of specificity appear to have contributed to the lack of a common set of EPIs by which organizations could measure and compare their performance. A recent survey of EPIs conducted by the Tellus Institute, a Boston-based non-profit research and consulting firm, on 30 corporate environmental reports in the U.S., Canada, and Europe found over 100 different, widely ranging EPIs in use[90]. These varied even within industry sectors and averaged 11 EPIs per report. Different measurement units were used, including pounds, tons, and percentages. Where used at all, normalization techniques differed. Murcott[91] compiled an extensive bibliography of "indicators of sustainable development" in common use that further support the conclusion of a lack of a common set of EPIs.

[89] Ford, 1998.
[90] White, 1998.
[91] Murcott, 1997.

Within the U.S., the Niagara Mohawk Power Corporation, an electric utility, has developed one of the most comprehensive systems for measuring and communicating environmental performance[92]. Their EPI is comprised of three categories of performance indicators—emissions and wastes, environmental compliance, and environmental enhancements. The measurement parameters for the three categories are:

Emission/Waste Parameters	Compliance Parameters	Environmental Enhancement Parameters

• SO_2 emitted
• NO_x emitted
• CO_2 emitted
• Solid waste generation
• Hazardous waste generation
• Heavy metals discharged in wastewater
	• Notices of violation
	• Fines
	• Exceedances/incidents
	  ▪ Air
	  ▪ Water
	  ▪ Oil spillage
	  ▪ PCB spillage
	  ▪ Chemical spillage
		• Pollution control/monitoring
		• Fish & wildlife habitat
		• Outdoor recreation
		• Land stewardship
		• Environmental education
		• Environmental research
		• Waste site remediation

Using a weighting and ranking system, a score is calculated for each of the three EPI categories at the end of a year. The scores are then rolled into a single composite index value and then compared to a base year calculation. Emission/waste parameters are calculated based on annual changes in pollution discharges and waste generation relative to the baseline. Each compliance parameter is rated on a point scale ranging from –2 to +2 that measures the degree of compliance. Environmental enhancements are rated based on the dollars the company invests annually in programs providing environmental investments.

Meanwhile, other innovative approaches to measuring environmental and social performance are being developed, as the following five examples show.

ICI is a large UK-based chemical firm that developed a quantitative measure of their "environmental burden[93]". Unlike the common practice of reporting total emissions in annual reports, ICI classifies its emissions by the type of impact, such

[92] Niagara Mohawk Power Corporation, 1997.
[93] World Resource Institute, 1997.

as global warming, human health effects, and ozone depletion. It then applies a potency factor to each category's individual emissions to calculate its quantitative index of environmental burden. It uses this approach to develop an emissions reduction strategy.

Nortel is an international telecommunications developer that has been reporting on its environmental performance since 1993. It devised a composite EPI to provide a single overall rating of the its performance, which is measured each year against a 1993 baseline[94]. Twenty-five parameters are measured using annual cost of sales as a normalizing factor to portray performance relative to production. Each parameter is weighed according to criteria such as environmental impact and degree of risk.

Dow Chemical is using the "balanced scorecard" approach, which involves measurement and reporting using a range of financial and non-financial metrics, to avoid becoming too focused on a few measures. It combines this approach with the use of key performance indicators to develop a sustainability measurement system covering the four broad categories of environment, social, economic and health. It has also developed an "eco-compass" to provide a simple, visual summary of its life-cycle data analysis using six eco-efficiency indicators—energy intensity, mass intensity, environmental and health risk potential, sustainability of resource usage, extent of revalorization (reuse, remanufacturing, and recycling), and service intensity[95].

The **Environmental Defense Fund** (EDF) developed an innovative approach to comparing similar industries. They combined data from the U.S. EPA's Toxic Release Inventory (TRI) database and information from other sources to create a system to benchmark 166 oil refineries by their pollutant emissions and non-product output[96]. To account for differences in refinery capacity, EDF normalized the data by unit of refinery input (e.g., emissions per barrel of oil).

The **Storebrand Scudder Environmental Value Fund** bases its decisions to invest on business environmental performance. It developed a proprietary sustainability index by which it assesses and compares business environmental performance[97]. The environmental indicators used to calculate the index include measures of global warming, ozone depletion, toxic release, material efficiency, energy intensity, water use, environmental liabilities, and environmental management quality. It uses the index to calculate an "environmental dividend" for the fund, which is the difference between the fund's environmental performance and the market on average.

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[94] Nortel, 1998.
[95] Ranganathan, 1998
[96] World Resources Institute, 1997
[97] Ranganathan, 1998

None of the examples cited above provides a good model for universal comparability across industrial sectors, but the Niagara Mohawk system is a good model for an intra-sector EPI comparison system. The significant differences between industries with regard to raw materials, processes, waste streams, and products/services will be a major obstacle to developing a universal EPI system that will let the public compare the relative environmental performance of organizations.

Application of EPIs

White and Zinkl's report for the Tellus Institute[98] provides interesting insight into factors that affect the use of EPIs by U.S. and Canadian firms. The survey respondents were 33 corporate environmental managers, mostly from large companies (i.e., annual revenues exceeding $1 billion), that attended two conferences in the U.S. and Canada. One-third of the respondents were from the chemical industry, 28 percent from electric utilities, and the remainder from other industrial sectors. Figure 4 summarizes the results of the responses to the Tellus survey question on the types of business decisions most affected by EPIs. The environmental managers cited regulatory compliance as their most important decision affected by EPIs, followed by strategic planning. Benchmarking, investment, and other core business decisions were also cited, but to a much lesser extent. These results suggest that measuring an organization's "environmental performance" is primarily viewed from the regulatory compliance perspective.

Although the results in Figure 4 suggest that EPI use is primarily compliance-driven, the Tellus survey also found that a majority of the respondents also tracked non-regulated measures. Figure 5 summarizes the results of the responses to the Tellus survey about which EPIs are used by the survey respondents. Corresponding to the results in Figure 4, the results in Figure 5 indicate that over 90 percent of the Tellus survey respondents use EPIs for measuring regulatory compliance and chemical releases, but almost half also used EPIs for non-regulatory metrics, including water and energy consumption, chemical inputs, and greenhouse gas emissions.

[98] White and Zinkl, 1997.

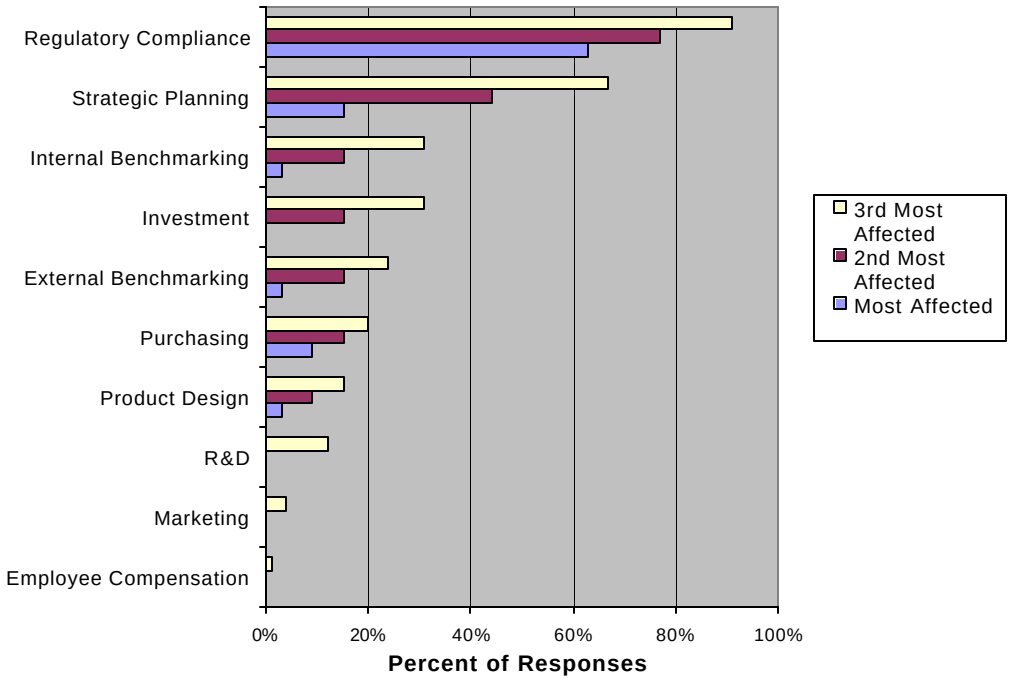

Figure 4. Tellus Survey Results on Top Three Business Decisions Most Affected by EPIs (Source: World Resources Institute, 1997.)

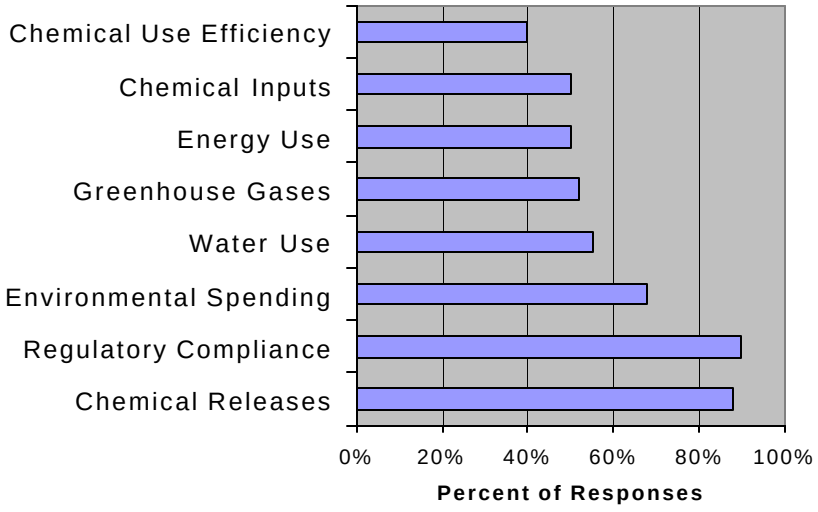

Figure 5. Tellus Survey Results on Which EPIs Do Managers Use (Source: World Resources Institute, 1997).

Although the intent of ISO 14000 is that an organization should monitor its overall environmental performance, the results of our research suggest that the choice of metrics is primarily compliance-driven. If the findings of the Tellus survey are representative of U.S. companies, measurement of non- regulatory environmental performance (e.g., energy and natural resource use) is not being given the same emphasis as measurement of regulatory-driven environmental parameters. The resulting skewing of metrics may not provide companies, policy-makers, and the public with the correct information to make comparative judgements about organizational environmental performance issues.

Effect of ISO 14001 Standard on Environmental Performance

This element of our research examined whether there are differences in environmental performance between certified and non-certified organizations. Table 3 is a summary of the responses from our corporate survey to questions regarding the impact of ISO 14001 on the organizations' environmental performance. The results show some evidence that adoption of the standard had improved the organization's environmental performance, but the degree of improvement appears to be only slight. This is probably due to the short time period since certification. ISO 14001 was not adopted until 1996, and few U.S. organizations had completed the certification process by the end of 1997 [99].

Our analysis of the impact of implementing ISO 14001 on a company's environmental performance was limited by the availability of time series data on the subject. However, we outline an approach for a rigorous examination of ISO 14001's effects on environmental performance in section "7.4 Future Research" that could provide important insights as soon as the necessary time series data becomes available.

5.2 STAKEHOLDER IMPLICATIONS

5.2.1 GOVERNMENT AND REGULATORY PERSPECTIVES

With the development and adoption of the ISO 14000 series of EMS standards, one of the most significant issues has been the appropriate relationship of the standard to government environmental regulatory programs. As discussed in Section 2.3, the governmental response to this issue outside the U.S., particularly in Japan and the EU countries, has been to actively embrace ISO 14001 or other EMS standards. Within the U.S., a position on the relationship of ISO 14001 to government environmental regulatory programs is still evolving.

[99] Peglau, 1998.

Performance Measure *(Total Responses)*	**Impact of ISO 14001 Performance Measure**				
	Decrease	Slight Decrease	No Change	Slight Increase	Increase
Total Emissions *(52)*	5	25	21	1	0
Recycled Waste *(52)*	2	8	13	21	8
Reused Waste *(52)*	1	4	21	22	4
Environmental Production Process *(51)*	0	1	35	14	1
Identified Environmental Impact *(52)*	0	3	15	28	6
Commitment to Pollution Prevention *(49)*	0	2	7	25	15
Estimated Environmental Risk (Liability) *(52)*	3	17	28	3	1

Table 3. Summary of Corporate Survey Responses to Impact of ISO 14001 Certification on Environmental Performance

U.S. EPA policy encourages industry to adopt voluntary standards of practice[100]. Examples are the Chemical Manufacturers Association's Responsible Care Initiative to improve the chemical industry's health, safety, and environmental performance record. Because of its interest in voluntary standards, the EPA has been an active participant, with full voting membership, in the U.S. TAG to TC 207 [101]. The EPA representatives to the TAG use the EPA Standards Network to

[100] U.S. Environmental Protection Agency, 1995c.
[101] U.S. Environmental Protection Agency, 1995b

disseminate information throughout the agency and coordinate EPA's comments on the draft standards.

On March 12, 1998, the EPA published its formal position statement on ISO 14001 [102], which states that "EPA encourages the use of EMSs that focus on improved environmental performance and compliance as well as source reduction (pollution prevention) and system performance." Regarding the relationship of ISO 14001 to regulatory compliance, the position statement goes on to say that "at this time, EPA is not basing any regulatory incentives solely on the use of EMSs, or certification to ISO 14001." EPA stated its intent to "explore … the relationship between the ISO 14000 series and other voluntary EMSs to government programs to enforce, verify, and promote compliance with environmental laws and regulations…."

The EPA policy statement also promotes environmental auditing by acknowledging that "environmental auditing was developed for sound business reasons, particularly as a means of helping regulated entities manage pollution control affirmatively over time instead of reacting to crises,"[103] and that "...the implementation of environmental auditing programs can result in better identification, resolution, and avoidance of environmental problems." However, the policy continues to state that the "agency will not promise to forgo inspections, reduce enforcement responses, nor offer other such incentives in exchange for implementation of environmental auditing or other sound environmental management practices[104]." In fact, EPA cautions that "audits evaluate, and are not a substitute for direct compliance activities, such as obtaining permits, installing controls, monitoring compliance, reporting violations, and keeping records." So, although EPA is supportive of environmental auditing and sound management practices, it doesn't commit to regulatory incentives or any resulting financial benefits for businesses.

The U.S. Department of Justice, on the other hand, suggests that its discretion might be influenced by voluntary environmental audits[105]. The Department "encourages self-auditing, self-policing, and voluntary disclosure of environmental violations" by the regulated community and states that such activities are viewed as mitigating factors in the Department's exercise of criminal environmental discretion.

To evaluate the use and effectiveness of EMSs, the U.S. EPA, in partnership with a number of states, created the MSWG. The goal of the MSWG is to gather credible information to be able to evaluate the relationship of ISO 14001 to key public policy issues. The primary mechanism to generate this information is national pilot projects. All data will be entered into a common database open to public policy

[102] U.S. Environmental Protection Agency, 1998
[103] Mostek, 1998.
[104] Mostek, 1998.
[105] Refsnes, 1998.

researchers. In addition, the MSWG is facilitating a 'Research Roundtable Process" with the intent of holding a National ISO 14000 Research Summit in late 1999.

5.2.2 CORPORATE PERSPECTIVES

Questionnaire Responses

Of the 152 corporate questionnaires mailed, we received a total of 55 responses (including one anonymously returned one) by February 15th, 1999. The responses represent 36% of those surveyed, and over 30% of the 180 U.S. ISO 14001 certified firms identified in the Globus International Database[106] as of November 1998. Three questionnaires were not deliverable, and consequently were returned to us unopened.

Three respondents voluntarily inserted additional environmental information about their companies with their questionnaire responses. This included informational cover letters, an annual environmental report, one corporate environmental policy statement, and an ISO 14000 company brochure.

Profile of Respondents

For purposes of analysis, we divided the U.S. into five regions. While we received responses from all of the geographic areas, the greatest number of responses originated in the Northeast, and the fewest in the Central region, which is consistent with the total number of certified firms in the U.S. In fact, the geographical origin of respondents closely mirrors the distribution of the total number certified firms in the country, as indicated in table 4.

	U.S. Distribution	Questionnaire Responses
West	18%	15%
Midwest	19%	18%
Central	10%	9%
Northeast	34%	42%
Southeast	18%	15%

Table 4. A Comparison of the Distribution of Certified Firms in the U.S. with the Geographic Origin of the Questionnaire Respondents

[106] Globus International, 1998.

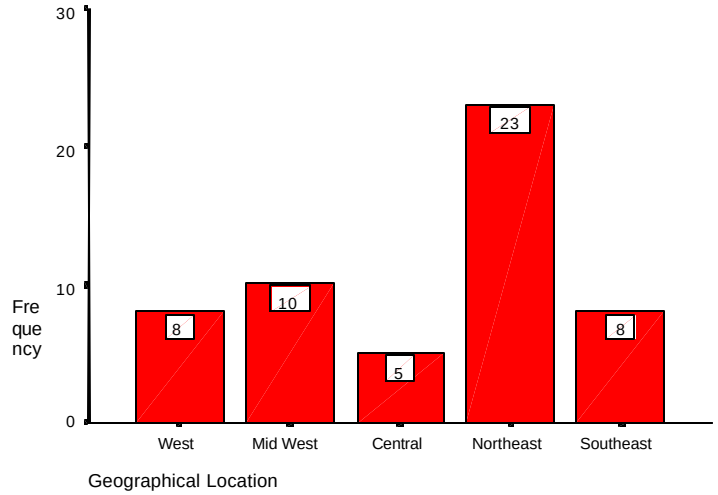

Figure 6. Geographic Distribution of Questionnaire Responses

As figure 7 illustrates, we received a majority of questionnaire responses from medium sized facilities, which were categorized as annual revenues of $10-$500 million. Additionally, over 65% of the certified facilities reported having a small number of employees (less than 1000 people).

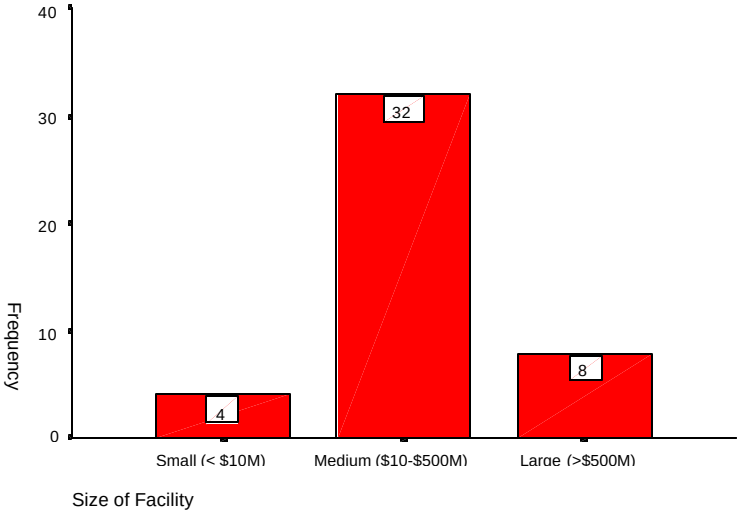

Figure 7. Size of Respondents' Facilities

While we were primarily interested in facilities' perspectives of ISO 14000, since they are the entities responsible for the daily management of EMSs, our questionnaire data identified a general profile of certain common characteristics of certified firms in the U.S. For example, in terms of industry, our questionnaire data

suggests that the most common industrial sectors to adopt ISO 14001 are those specializing in transportation equipment and parts, and electrical and electrical machinery. Other common industrial sectors (defined by SIC code) for certified firms include: chemicals and allied products; measuring, analyzing, and controlling instruments; primary metal industries; non-electrical machinery; and consulting (engineering, accounting, research, and management).

Of the 41 respondents that commented on the size of their corporation (instead of, or in addition to, their individual facility), 78% reported that their corporation was "Large," with annual revenues of greater than $500 million. In addition, 64% of the 42 responses about the number of corporate employees reported that their corporations have a large number of total employees (over 5000 people). Overall, 62% of the certified corporations (or parent corporations of the certified facilities) are publicly held. This suggests that larger firms may have a greater incentive in becoming certified than might smaller, or single facility firms.

Of the respondents, 84% were ISO 9000 certified in addition to being ISO 14001 certified. This finding may suggest that a firm that is ISO 9000 certified might have a competitive advantage in implementing ISO 14001. However, additional analytical research on the relationship of ISO 9000 to ISO 14000 is necessary before specific advantages can be documented. (Also, the fact that there are many ISO 9000 companies that are not ISO 14001 certified indicates that other factors weigh more heavily in the decision making process.)

We found slightly less unanimity in the response to Question 4 concerning the level of integration between ISO 9000 and ISO 14001 systems. Over half of the respondents described their ISO 9000 and ISO 14001 systems to be "Mostly Integrated," "Integrated," or "Highly Integrated." Yet, 18% of the respondents considered their ISO 9000 and ISO 14001 systems to be mostly "Separate Systems."

Incentives for Certification

The questionnaire data indicated that the primary corporate incentives in seeking certification are:

- To improve environmental performance through pollution control (see figure 8)
- To increase competitive advantage (see figure 9), and
- To improve internal management practices by ensuring compliance with environmental regulations (see figure 10)

Conversely, our data suggests that there are several aspects that did *not* serve as corporate incentives to those considering ISO 14001 certification. For example, firms were not seeking certification as a means to:

- Seek permit flexibility (i.e. regulatory relief) (see figure 11)
- Incur lower permit costs (see figure 12)
- Respond to shareholders requests (customers, buyers, lenders, etc.) (see figure 13)

The responses regarding the incentives for ISO 14001 certification imply that – contrary to the claims of some public interest groups - firms are interested in certification for reasons other than reducing their environmental responsibilities. Our data suggests that corporations are driven to obtain ISO 14001 certification by their desire to increase their business' efficiency and overall competitive advantage. It is interesting to note, however, that the reported lack of corporate interest in buyer requirements (see figure 13) - which could be considered a component of efficient business practices - could contradict this philosophy. The reasons for this discrepancy (perhaps greater focus on internal operations, or oversight of the importance of long term planning), are unexplained, and will require additional research.

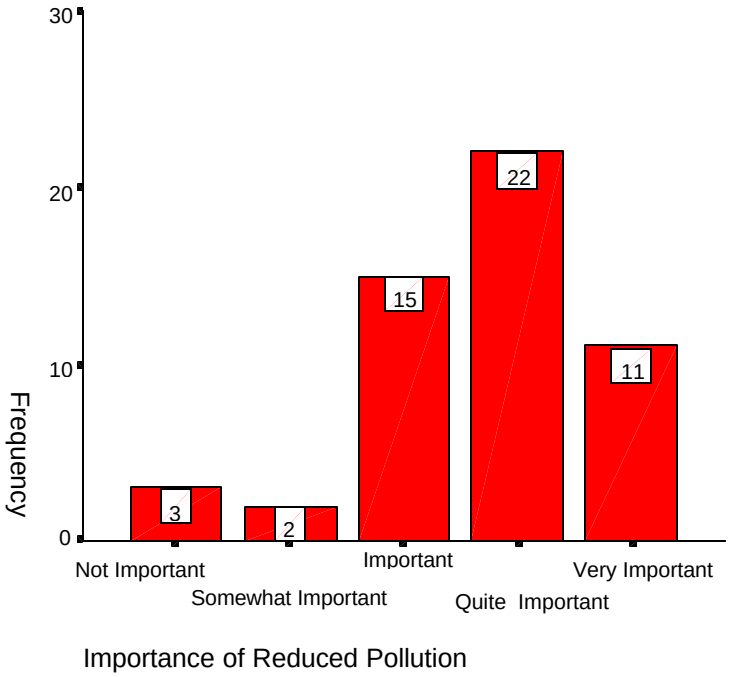

Figure 8. Importance of Reducing Pollution

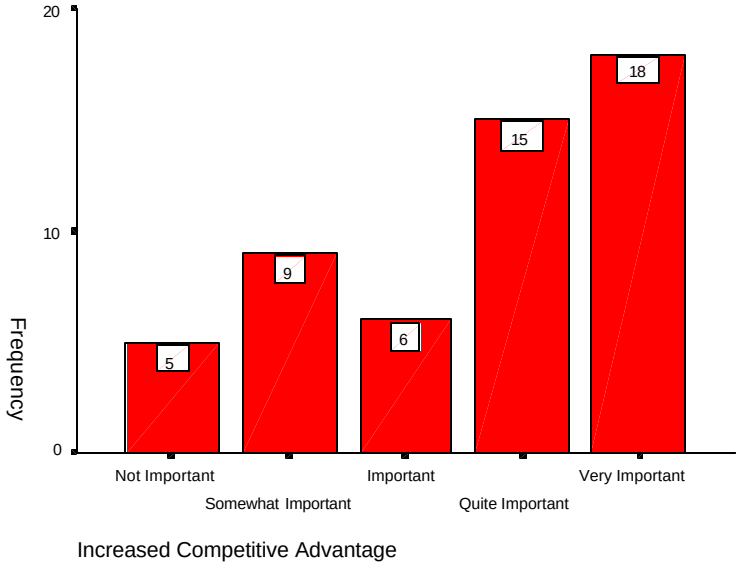

Figure 9. Importance of Increased Competitive Advantage

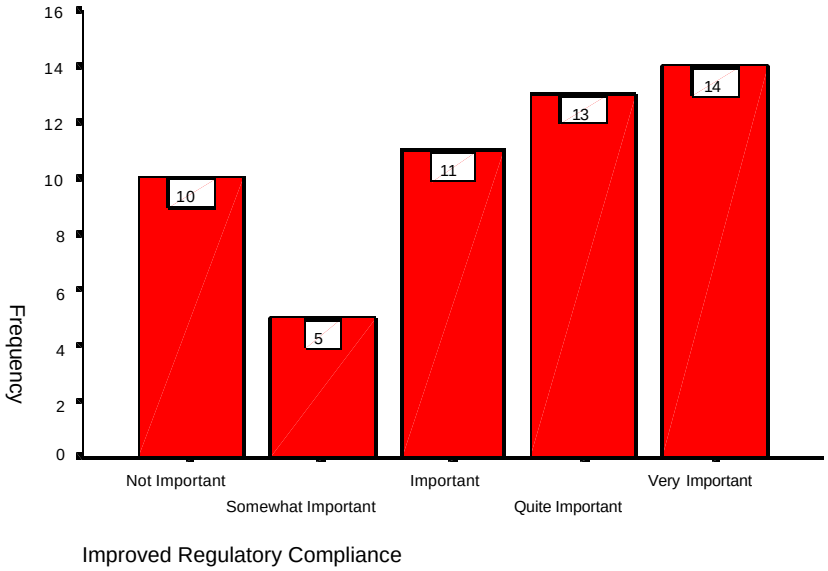

Figure 10. Importance of Internal Management in Terms of Improved Regulatory Compliance

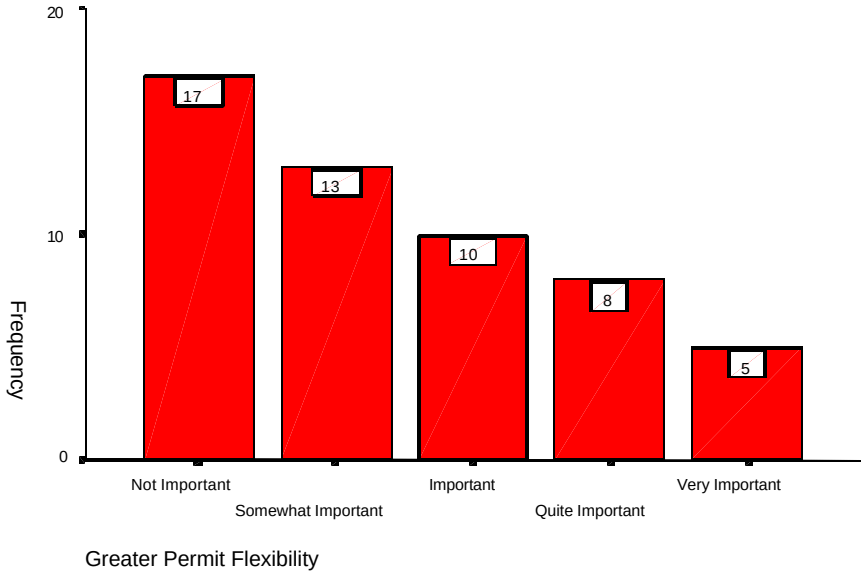

Figure 11. Importance of Greater Permit Flexibility

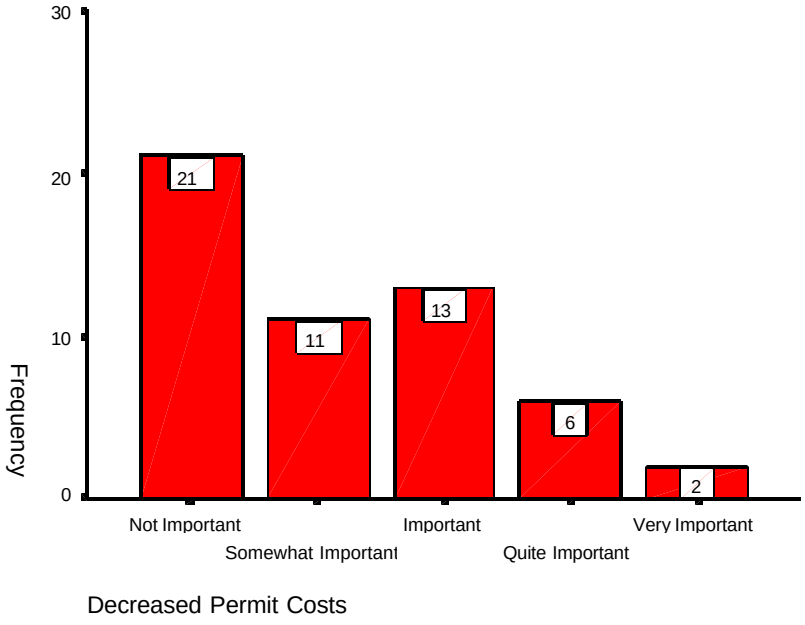

Figure 12. Importance of Decreased Permit Costs

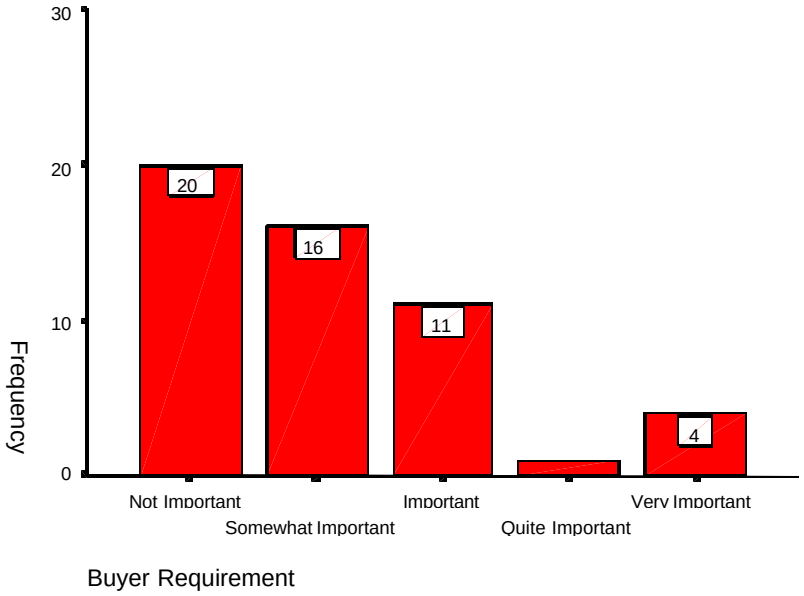

Figure 13. Importance of Buyer Requirements

Involvement in Implementation of ISO 14001 EMS

When asked to identify the individuals that were involved in implementing their ISO 14001 EMSs, 73% of the respondents stated that Environmental Managers were "Very Involved" in the process. Other key contributors included Senior Management and Employees.

The involvement of corporate representatives was evenly distributed across the range of "Very Involved" to "Not Involved." (See figure 14.)

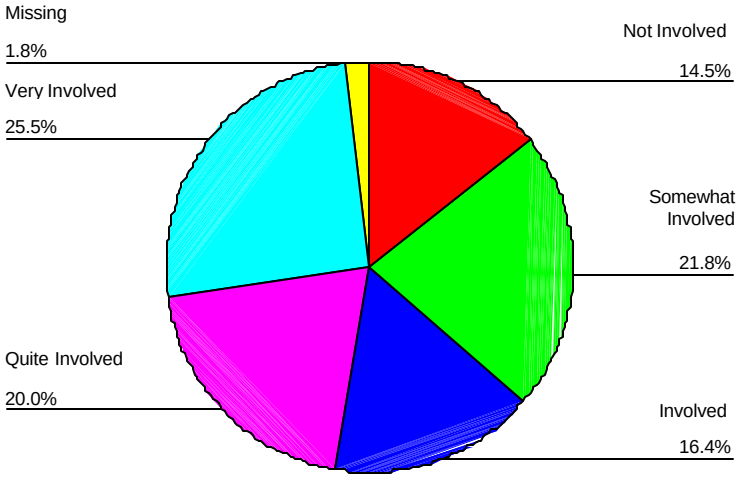

Figure 14. Involvement of Corporate Representatives

The respondents reported that other potential contributors, such as customers, shareholders, community members, distributors, lawyers, regulatory officials, and Marketing/Public Relations managers were generally not involved in the design, or the implementation, of a facility's EMS.

Constraints to Certification

Overall, the respondents claimed that the ten identified potential constraints to certification had not hindered their ability to design and implement their ISO 14001 EMS. Consequently, the greatest number of respondents indicated that the following were "Not a Constraint" to certification:

- Lack of top management support (58%)
- Registration cost of ISO 14001 EMS (46%)
- Design cost of ISO 14001 EMS (44%)
- Lack of understanding of ISO 14001 requirements (42%)
- Lack of personnel to implement and manage an ISO 14001 EMS (38%)
- Lack of time to implement an EMS (35%)

While the literature suggests that the financial costs and legal uncertainties of implementing the standard are prohibitive[107], our questionnaire data implies that these aspects did not present undue burdens on the facilities, as over 50% responded that the legal uncertainties were either "Not a Constraint," or a "Mild Constraint." However, 33% of the participants did feel that the threat of legal penalties from voluntary disclosure was a "Moderate Constraint." See figure 15.

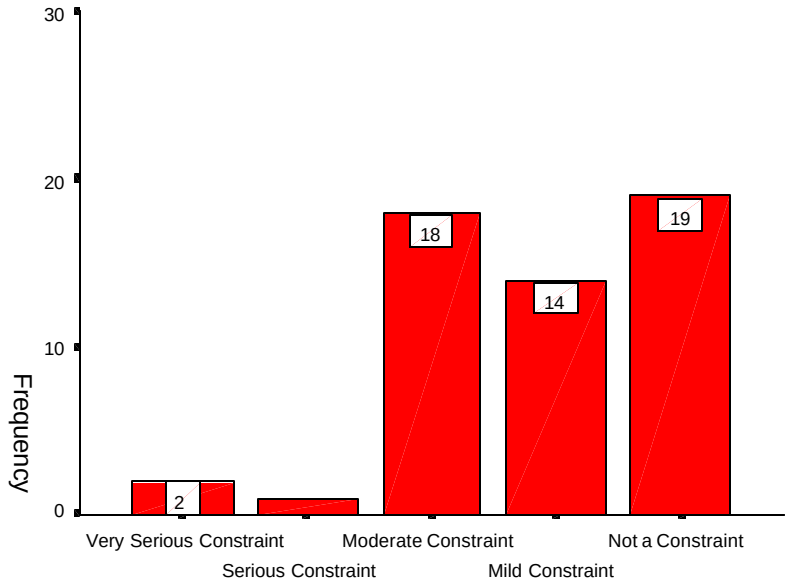

Figure 15. Constraints Associated with Potential Legal Penalties from Voluntary Disclosure

ISO 14001's Impact on Pollution Prevention (P2)

ISO 14001 is founded upon a commitment to Pollution Prevention (P2), regulatory compliance, and continual improvement. Due to lack of time series data, it is too early to properly evaluate the effectiveness of ISO 14001 with respect to any of the three principles. Since ISO 14001 is the only EMS to emphasize the importance of on pollution prevention, our questionnaire inquired how certified companies' ISO 14001 EMSs had affected their P2 *policies*.

The majority of the respondents indicated "No Change" in the development of innovative technologies, use of Design for the Environment (DFE) principles, and funding for environmental research and development. The respondents that did

[107] Cascio, 1996.

indicate a change in their P2 policies demonstrated a positive trend toward increased pollution prevention actions. Eleven percent of the respondents reported a "Slight Decrease" in new pollution prevention practices, and no firms reported a "Decrease" in the number of processes created.

Additionally, 58% of the respondents reported a "Slight Increase" in P2 activities as a result of ISO 14001. (See Figure 16.) Since improvements in environmental performance are difficult to define, identify, and monitor, the number of P2 policies may serve as a valid indicator of ISO 14001's true impact on environmental performance.

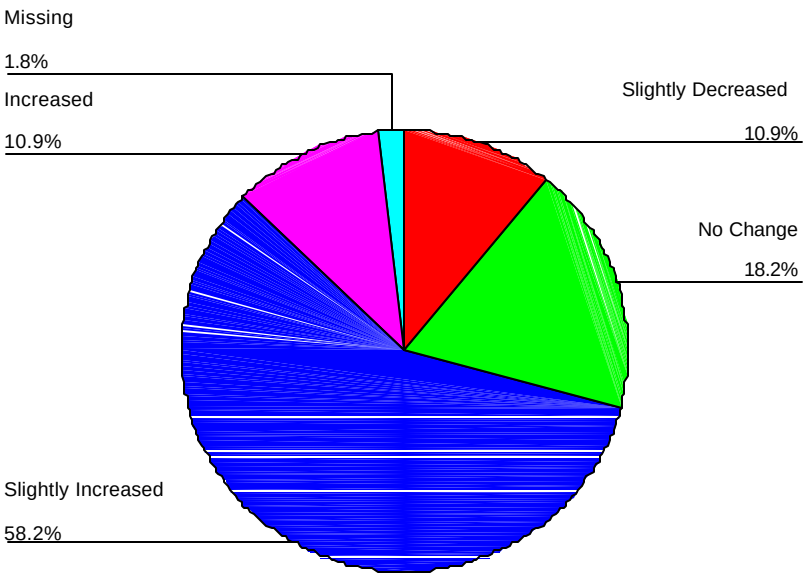

Figure 16. Creation of New Pollution Prevention Processes

Effectiveness of ISO 14001

We analyzed the questionnaire data for general trends in corporate perspectives on the overall effectiveness of ISO 14001 by surveying various impacts of certified firms' ISO 14001 EMSs. For the purpose of this analysis, we examined the results in terms of three of our project's criteria: environmental, stakeholder, and organizational impacts.

Environmental Impacts

Overall, the questionnaire responses suggest that ISO 14001 EMSs have generally improved the environmental performance of corporations. The questionnaire contained seven questions specifically related to ISO 14000's impact on environmental performance. For all but two of these questions, firms responded that ISO 14001 had either "Slightly Increased," or "Increased" their environmental performance. A sample of these environmental improvements includes:

- A stronger commitment to pollution prevention (76%)
- An increased number of identified environmental impacts (heightened awareness of environmental impacts) (69%)
- A decrease in the amount of total emissions (56%)
- An increase in the amount of total recycled waste (53%)

While the remaining two environmental questions did not indicate an improvement in environmental performance, they do indicate positive trends for improved performance in the future. Our data suggest that ISO 14001 implementation results in increased development of environmental production processes and decreasing environmental risks, as illustrated in Figures 17 and 18:

A total of 36% of the certified firms reported improved environmental regulatory compliance after implementing their ISO 14001 EMS. The trend in improved regulatory compliance, coupled with the 17% the of respondents who indicated that the number of their company's regulatory inspections decreased, might indicate that ISO 14001 could serve as an effective complement to traditional environmental regulation.

Stakeholders Impacts

Our report defines ISO 14001 stakeholders as the corporations, regulators, lawyers, auditors, investors, employees, managers, and citizens affected by a firm's environmental actions. We looked at corporate responses to stakeholders both from an internal and external perspective.

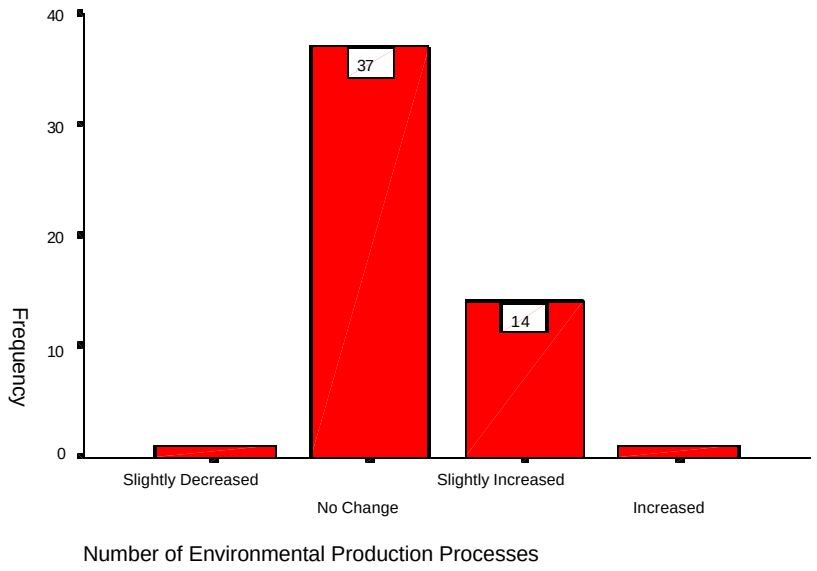

Figure 17. ISO 14001 EMS Impact on the Number of Environmental Production Processes

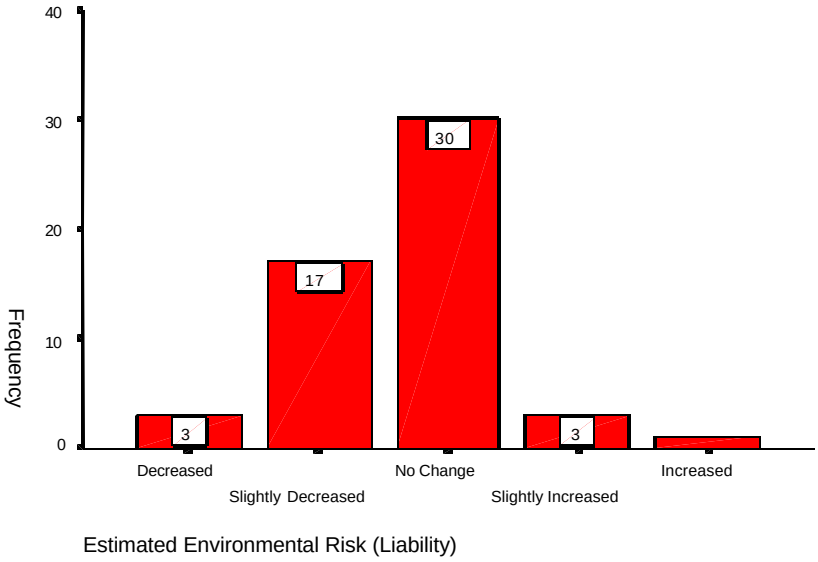

Figure 18. ISO 14001 EMS Impact on a Firm's Estimated Environmental Risk

Internally, our questionnaire indicated that the process of developing a ISO 14001 EMS helped 86% of managers to "Increase" or "Slightly Increase" their commitment to environmental stewardship (see figure 19.)

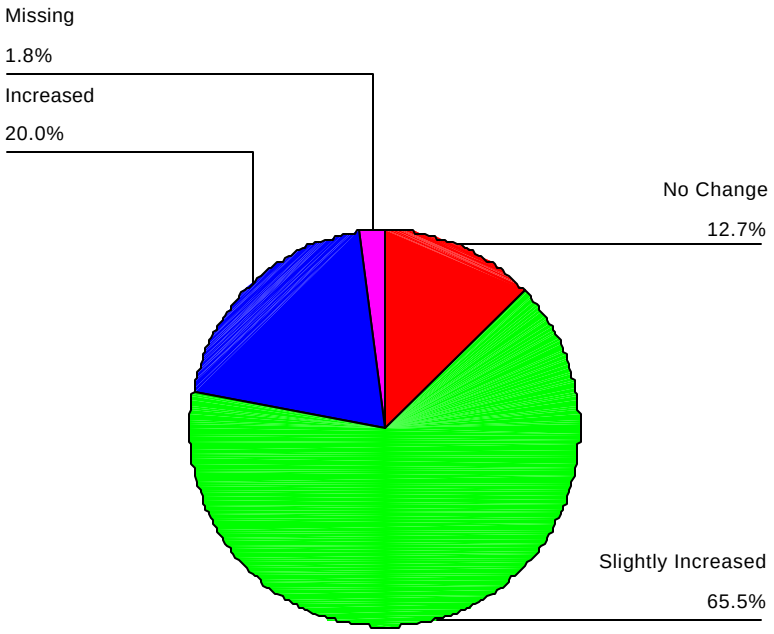

Figure 19. Management's Commitment to Environmental Stewardship

Perhaps as a result of this improved commitment, 58% of the respondents noted that their firm's public communication and education of environmental issues "Increased" or "Slightly Increased", and 53% of the respondents indicated that they had "Increased" or "Slightly Increased" their involvement of stakeholders in environmental issues.

Our data shows that external stakeholder involvement was quite low in the EMS development and implementation phases. Most participants reported that all of the external stakeholders (customers/clients, shareholders, community members, distributors, lawyers, and regulatory officials) were "Not Involved" in the EMS development or implementation processes.

Organizational Impacts

Organizationally, two broad trends in the data are important to note. The first is ISO 14001's apparent lack of financial impact, and the second is the standard's positive impact on certified firms' ability to increase their competitive advantage.

In terms of short-term financial gain, our data suggests that the existence of an ISO 14001 EMS does not directly enhance a certified firm's short-term bottom line. It

will be necessary for future projects to collect additional and detailed financial data over the course of several years to properly evaluate the long-term financial effectiveness.

Overall operating costs after implementing an ISO 14001 EMS were distributed in a roughly bell curve shaped pattern with the majority of respondents experiencing "No Change," and a few firms experiencing either "Increased" or "Decreased" costs (see figure 20).

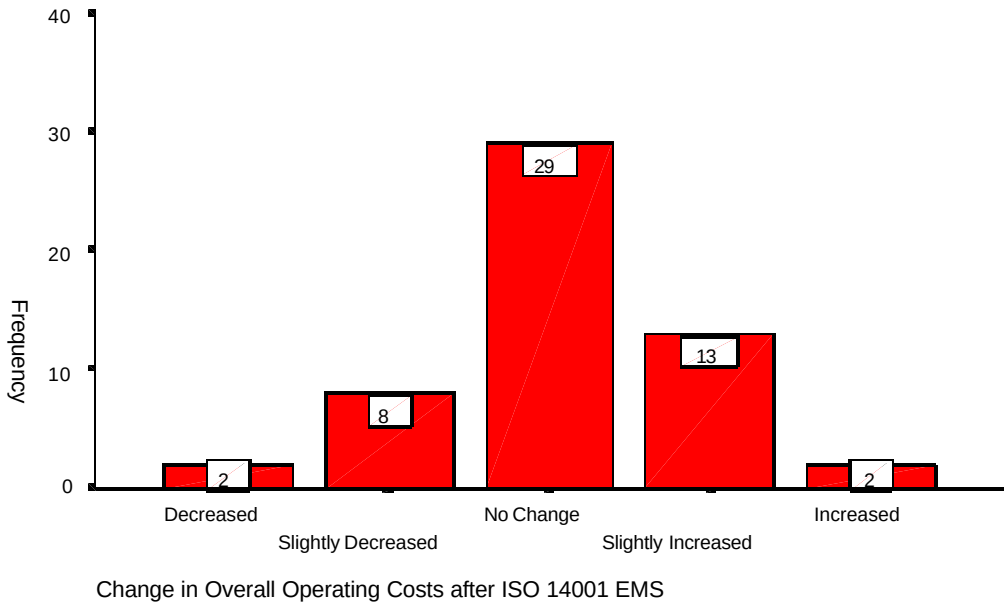

Figure 20. Impact on Operating Costs

Certified firms' access to financial capital also did not change after certification, nor did the total value of outside investment in a certified firm. Additionally, 86% of respondents reported "No Change" in insurance costs after obtaining ISO 14001 certification. None of the respondents reported an increase in insurance costs.

Our data suggests that ISO 14001 EMSs are effective in helping firms to achieve one of their main objectives — increasing their competitive advantage. Specifically, 59% of the questionnaire respondents indicated that their facility had "Increased" or "Slightly Increased" their competitive advantage since implementing ISO 14000. In addition, 44% of the certified firms reported "Increased" or "Slightly Increased" access to new markets. (See Figure 21.)

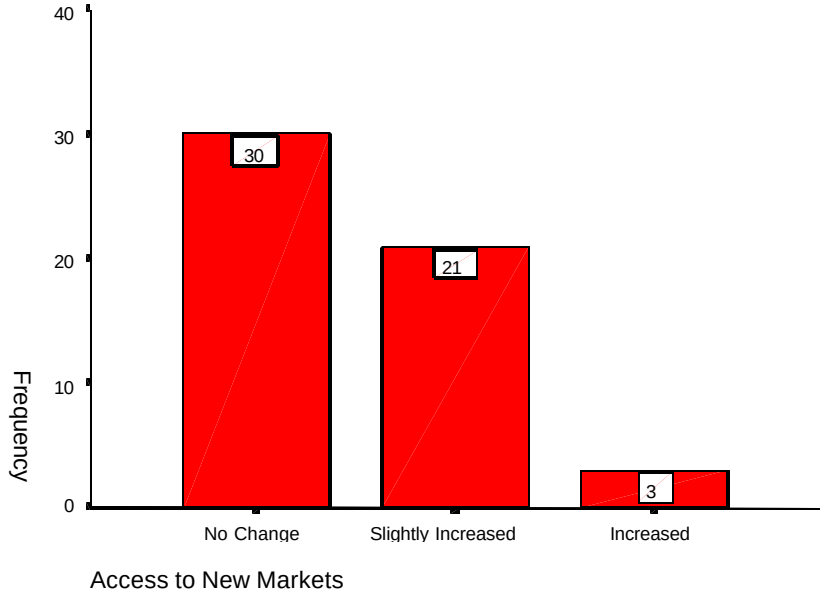

Figure 21. ISO 14001 EMS Impact on Firms' Access to New Markets

Links to a Facility's Management Strategy

An EMS is designed to encourage managers to consider environmental issues as part of a holistic business strategy, in that an EMS helps managers to incorporate environmental management in all aspects of a business' impacts. This philosophy differs from the common isolated examination of environmental impacts as a separate unrelated business system. Nevertheless, our data showed that there was a distinct lack of significant management system modification or incorporation of environmental issues into the traditional corporate management divisions.

Most respondents reported "Little" or "No Change" in their supplier/distributor requirements, accounting system, environmental research and development, and international strategy after implementing ISO 14001. While the most popular response for the impacts on certified firms' Marketing/Public Relations strategies and Purchasing systems was "Some Change," in both cases, the remaining negative responses outnumbered the positive ones (21 vs. 12, and 25 vs.7), respectively.

Costs and Benefits of Certification

A significant trend apparent in the responses pertained to firms' perceived overall benefit of ISO 14001. Of the respondents, 87% believed that the overall benefits of implementing an ISO 14001 EMS outweighed the costs. (See Figure 22.) This is a particularly interesting finding, since only 22% of the firms conducted a cost benefit

analysis prior to certification, and only 26% use environmental cost accounting to monitor their environmental savings and expenditures.

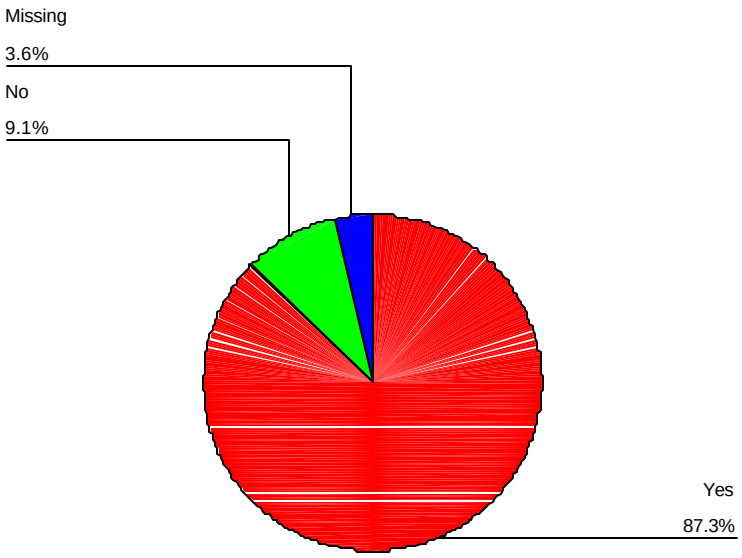

Figure 22. Costs and Benefits of Certification

The questionnaire provides helpful information on both ISO 14001 design and registration costs, especially for those firms who are currently considering seeking certification. As Figures 23 and 24 illustrate, 73% of the respondents spent less than $100,000 to design their ISO 14001 EMSs, and 91% of the certified firms spent less than $50,000 for their initial registration (Certification Audit, etc.).

Summary

Our results and analysis indicate that certified firms are, on the whole, supportive of ISO 14001. The reported benefits of certification include increased competitive advantages, access to new markets, improvement in internal and external communication, and improved environmental performance. Our data indicate that firms have improved their commitment to P2 and continual improvement as a result of implementing ISO 14001. While the costs of ISO 14001 vary depending on firms' individual circumstances, our data show that the average cost to design and implement an ISO 14001 EMS is approximately $150,000. Firms generally did not find this cost prohibitive, but some remain wary of the threat posed by potential legal liabilities associated with voluntary disclosure of environmental information. A summary of the questionnaire responses follows in Table 5. For additional information on the response data, please see Appendix A2.

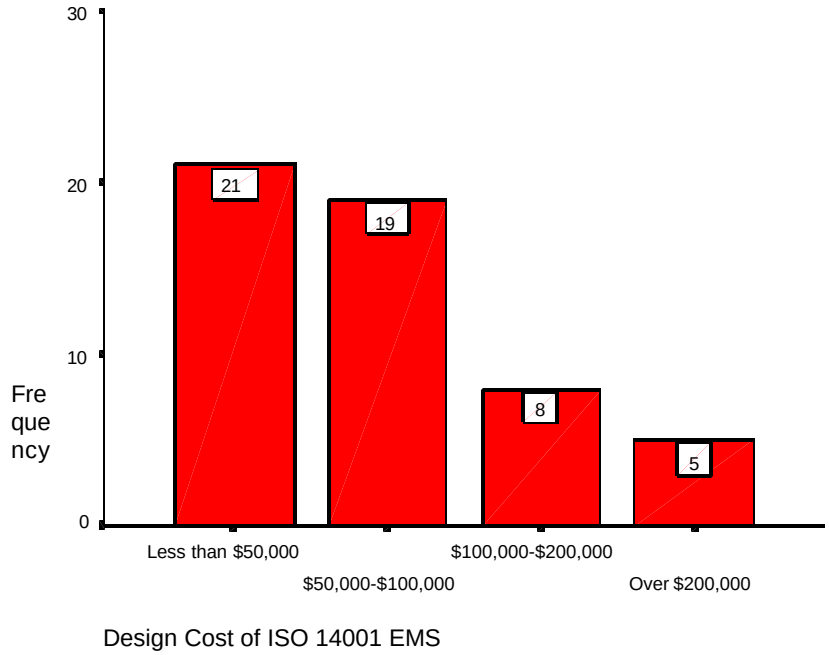

Figure 23. Design Cost of ISO 14001 EMS

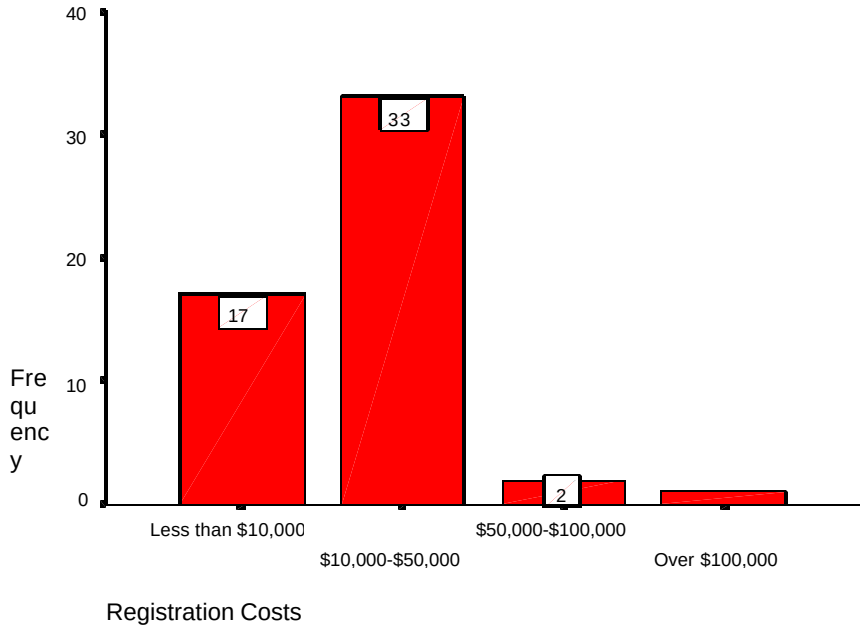

Figure 24. ISO 14001 EMS Registration Costs

Table 5: SUMMARY OF CORPORATE QUESTIONNAIRE RESPONSE DATA

QUESTION	*MOST COMMON RESPONSE*
BACKGROUND:	
1a. Facility size (Revenue)	*Between $10-$500 M*
1b. Facility size (Employees)	*Under 1000*
1c. Corp size (Revenue)	*>$500 M*
1d. Corp size (Employees)	*Over 5000*
2. Publicly held?	*Yes*
3. ISO 9000 certified?	*Yes*
4. ISO 9000 &14000 integration	*Highly integrated*
5. Envtl cost accounting	*No*
6. Annual envtl report?	*No*
INCENTIVES FOR CERTIFICATION:	
Environmental Performance	
7a. Improve regulatory compliance	*Very Important*
7b. Improve mgmt of envtl impacts	*Quite Important*
7c. Reduce envtl risk	*Quite Important*
7d. Reduce pollution	*Quite Important*
Regulatory Effectiveness	
7e. Greater permit flexibility	*Not Important*
7f. Revise regulatory inspections	*Not Important/Important*
7g. Improve regulatory compliance	*Very Important*
Management Effectiveness	
7h. Demonstrate envtl stewardship	*Very Important*
7i. Improve internal communication	*Important*
7j. Communication w/ community	*Important*
7k. Marketing opportunity	*Somewhat/Very/Important*
Competitive Advantage	
7l. Increase trade opportunities	*Very Important*
7m. Gain access to new markets	*Important*
7n. Increase competitive advantage	*Very Important*
7o. Increase market share	*Quite/Very Important*
Financial Impacts	
7p. Decrease insurance costs	*Not Important*
7q. Incur fewer regulatory fines	*Not Important*
7r. Decrease permit costs	*Not Important*
7s. Gain access to capital	*Not Important*
Stakeholders	
7t. Increase shareholder value	*Somewhat Important*
7u. Meet customer requirement	*Not/Somewhat/Important*
7v. Meet buyer requirement	*Not Important*
7w. Meet lender requirement	*Not Important*
IMPLEMENTATION OF ISO 14001 EMS:	
Stakeholder Involvement	
8a. Corporate representatives	*Very Involved*
8b. Senior management	*Quite Involved*
8c. Envtl. Managers	*Very Involved*
8d. Customers/clients	*Not Involved*
8e. Employees	*Quite Involved*
8f. Shareholders	*Not Involved*
8g. Community members	*Not Involved*
8h. Distributors	*Not Involved*
8j. Lawyers	*Not Involved*
8l. Marketing/Public Relations	*Not Involved*
8m. Regulatory Officials	*Not Involved*

QUESTION	*MOST COMMON RESPONSE*
IMPLEMENTATION OF ISO 14001 EMS (cont.)	
Constraints to Certification	
Management Constraints	
9a. Lack of mgmt support	*Not a constraint*
9b. Lack of personnel	*Not a constraint*
9c. Lack of time	*Not a constraint*
9d. Interpretation of the standard	*Not a constraint*
Financial Constraints	
9e. ISO 14001 design cost	*Not a constraint*
9f. ISO 14001 registration cost	*Not a constraint*
9g. Annual maintenance costs	*Not a constraint*
Regulatory Constraints	
9h.Uncertaintiy of audit use	*Not a constraint*
9i. Potential legal penalties	*Not a constraint*
9j. Lack of regulatory flexibility	*Not a constraint*
Impact on P2 Policies	
10a. Development of technologies	*No change*
10b. Envtl R & D funding	*No change*
10c. Use of DFE	*No change*
10d. New P2 practices	*Slightly Increased*

QUESTION	*MOST COMMON RESPONSE*
EFFECTIVENESS OF ISO 14001	
Environmental Performance	
11a. Total emission	*Slightly Decreased*
11b. Total recycled waste	*Slightly Increased*
11c. Reused waste	*Slightly Increased*
11d. Number of envtl processes	*No change*
11e. Identification of impacts	*Slightly Increased*
11f. Commitment to P2	*Slightly Increased*
11g. Envtl risk (liability)	*No change*
Regulatory Effectiveness	
11h. Cost of regulatory fines	*No change*
11i. Cost of regulatory compliance	*No change*
11j. Regulatory inspections	*No change*
11k. Regulatory compliance	*No change*
11l. Regulatory streamlining	*No change*
Management Effectiveness	
11m. Commitment to envtl stewardship	*Slightly Increased*
Communication	
11n. Envtl public education	*Slightly Increased*
11o. Involvement of stakeholders	*Slightly Increased*
Financial Effectiveness	
11p. Operating costs	*No change*
11q. Insurance costs	*No change*
11r. Access to capital	*No change*
11s. Value of outside investment	*No change*
Competitive Advantage	
11t. Access to new markets	*No change*
11u. Access to intl. markets	*No change*
11v. Competitive advantage	*Slightly Increased*

QUESTION	*MOST COMMON RESPONSE*	*QUESTION*	*MOST COMMON RESPONSE*
LINKS TO MANAGEMENT SYSTEM		**COSTS & BENEFITS OF CERTIFICATION**	
System modification after ISO 14001		13. Cost/benefit analysis?	*No*
12a. International strategy	*Not at all*	14. Design costs	*Less than $50,000*
12b. Research & development	*Not at all*	15. Registration costs	*Between $10,000-$50,000*
12c. Accounting	*Not at all*	16. Benefits outweigh the costs?	*Yes*
12d. Marketing/Public Relations	*Some*	17. Expectations of costs	*As expected*
12e. Purchasing	*Some*	**Changes after ISO 14001 certification**	
12f. Supplier Requirements	*Little*	18a. Insurance costs	*No change*
12g. Advertising strategy	*Not at all*	18b. Legal fees	*No change*
		18c. Regulatory fines	*No change*
		18d. Envtl liability	*Slightly Decreased*
		18e. Access to capital	*No change*
		18f. Market share	*No change*

Table 5. Summary of Corporate Survey Data

5.2.3 PUBLIC INTEREST GROUP PERSPECTIVES

In addition to querying corporations, we also surveyed the perspective of environmental non-governmental organizations and policy institutions toward ISO 14001 [108] because of their significant involvement in shaping current and future environmental regulations and governmental policies. (For ease of reading, we will refer to both types of organizations jointly as 'NGOs' for the remainder of this analysis.) Although ISO 14001 may significantly impact national environmental policies and corporate environmental practices, its development in the U.S. has proceeded with minimal involvement from NGOs[109].

Of the 51 NGO surveys mailed, we received 10 responses (20%) by February 10th, 1999. Although a majority of the survey respondents had participated in discussions about ISO 14001, all but one of these participants felt that their organization was not adequately represented or consulted in the progress, development, and implementation of ISO 14001 in the U.S. In follow-up phone interviews, two NGOs indicated that they felt their participation was solicited just so they could put their "rubber stamp of approval" on the ISO 14001 standards. One respondent also claimed that the NGO sector felt alienated since a large portion of the ISO 14001 standard was written before any of them were even invited to participate. Some survey respondents believe that the NGO sector's active participation, and ultimately its support, is necessary in order for ISO 14001 to be politically feasible and environmentally sound.

A majority of NGO survey respondents reported that the NGO sector was not appropriately involved in policy discussions about ISO 14001. They suggested several reasons for this lack of involvement, such as limited funding, limited staff time, and the belief that it isn't worthwhile for them to commit time, energy, and money into a process that they may be unable to affect. There was also a perceived fear that by participating in the process, they would indirectly be endorsing ISO 14001. However, most respondents did say that reimbursement of staff time and travel expenses would be helpful in supporting their organization's participation in regulatory innovation programs in the future.

Regulatory Implications

A majority of NGOs stressed their concern over the possibility that regulatory agencies may grant ISO 14001 certified companies certain types of regulatory relief. Michael McCloskey, Chairman of the Sierra Club, recently expressed his organization's position on the relationship between ISO 14001 and regulatory

[108] See Appendix 3 "NGO Survey Questionnaire & Data" for more information
[109] ICF Incorporated, 1997.

flexibility when he stated that, "Because ISO is a process—not a performance standard—use of it should not be rewarded as if it were [a performance standard]. Regulatory flexibility should be granted on the basis of performance obligations that are enforced and verified[110]." This view seems to be shared by other NGOs, although ISO 14001 is written as an internal management system and not a regulatory tool. The uncertainty of the regulatory implications of ISO 14001 certification is widespread among many NGO's. A majority of survey respondents indicated that ISO 14001 certified firms should not be granted fewer regulatory inspections, individualized permitting, streamlined monitoring and reporting requirements, or greater permit flexibility. Since it is difficult to equate ISO 14001 certification with improved environmental performance, regulatory relief is, according to most NGOs, simply out of the question.

Certification and Auditing Requirements

According to some NGO's, another problem with ISO 14001 involves the standard's certification and auditing requirements. NGO's worry that there is ample room for certified companies to mislead the public. They worry that third party certification is possible regardless of whether or not a company is in regulatory compliance, and self-certification may permit companies to misuse the standard[111]. Furthermore, due to the lack of time series data, the role of surveillance audits and the likelihood that auditors will decertify a company remains unclear. This causes great concern among many environmental NGO's.

As Appendix A3 indicates, there is a general consensus among NGO's that they have not been adequately involved in the ISO 14001development process. Although there may be some NGO's that fully support ISO 14001, the majority of our survey respondents feel that they just don't know enough about ISO 14001 and its implications on environmental performance to justify its use as a policy tool. Therefore, most NGO's indicated that regulatory agencies should not treat ISO 14001 certified companies any differently than non-certified companies

5.2.4 AUDITOR'S PERSPECTIVES

We obtained a total of 17 addresses for auditors performing ISO 14001 certification audits from the 12 ANSI-certified registrars in the U.S. Ten of the seventeen auditors agreed to a telephone interview concerning their work and experience with the ISO 14001 standard, and seven interviews were completed by January 31st, 1999.

[110] Ecologia, 1999.
[111] Telephone interview with anonymous environmental NGO on Feb. 7, 1999

Overall, the seven auditors we interviewed were supportive of ISO 14000. The interviewees perceived the standards as well written, and most of them had not encountered any general problem areas.

Accomplishing Goals of Standard

The seven auditors stated that ISO 14000 is effective in expanding a company's management system beyond compliance, and observed that ISO 14001 makes environmental responsibility part of the management system. In fact, three auditors specifically mentioned that they consider the standard to enhance pollution prevention efforts. Hence, an effective system also promotes EHS compliance. Furthermore, five interviewed auditors expressed the belief that a company that implements and maintains an ISO 14001 EMS will over time experience a marked improvement in environmental performance. (However, this belief cannot currently be backed up with statistically significant data.) Five auditors expressed favor for the standard because in their opinion it is the best thing to promote caring for the environment at the working level.

Material of Evaluation

During the certification process, a company must document that its EMS fully meets the criteria of the ISO 14001 standard. The audit team tours the facility and conducts interviews prior or during the pre-assessment audit in order to establish what materials they need to see to effectively evaluate the company's EMS. Hence, the materials and documents upon which a company's compliance with the ISO 14001 standard are judged differ on a case-by-case basis, and no generalizations can be made.

Familiarity with Business Sector

The individuals conducting the audits need to have extensive environmental management experience. In addition, at least one member of the audit team must be knowledgeable in the field of the company being audited. Alternatively, they may hire a specialist to advise the audit team.

EHS Compliance

An EMS audit establishes whether or not the organization has a management system in place, which enables the company to be in compliance with environmental regulations. All seven auditors agreed that compliance with environmental health and safety regulations (EHS) is not specifically checked during an EMS audit. However, if in their data collection and sampling of underlying monitoring information they do discover legal violations, they bring it to the attention of the company. The auditors do not report such findings to the EPA. It is left up to the organization to handle regulatory non-compliance.

Surveillance Audits

Even though the nature and frequency of the surveillance audits are not yet defined by the Series, the general consensus among all seven auditors we interviewed was that, once a company has received certification, the registrar performs surveillance audits every six to twelve months depending on the clients preference. The six-month audits only cover a small section of the standard, whereas the one-year audits cover proportionally more of the standard. Over a period of three years the entire standard is checked. The surveillance audits are designed to monitor the EMS and verify that the objective targets are still being met. The auditors look for maintenance and improvement of the EMS.

Decertification

If an ISO 14001 EMS is not maintained, and significant non-conformities are found during a surveillance audit, certification may be suspended. Following suspension, if the organization does not take actions to remove the non-conformities, certification may be revoked permanently. One of the auditors we interviewed did suspend certification temporarily to one company but after corrective actions had been taken, certification was reinstated.

Legal Implications

Five auditors did not foresee any potential legal risks involved in ISO 14000 implementation and certification. In fact they expressed the belief that ISO 1400 certification would fix and prevent non-compliance and thus lead to less liability. Certification promotes trust that the company is committed to continual improvement and prevention of pollution.

Only two auditors expressed concern with the possibility of legal risks involved in ISO 14001 EMS auditing and EMS documentation. Since an EMS is designed to document any deviations from regulatory standards, there is a risk of exposing a company to legal liability of information from EMS audits because documents are not bound by confidentiality agreements (such as the attorney-client privilege).

Suggested Modifications

Auditors offered two suggestions for possible changes to the standard. Firstly, auditors expressed concern about identifying environmental aspects, and suggested that additional guidelines could achieve greater consistency on this point. Secondly, one auditor suggested the addition of more specific criteria for individual industries, in order to reduce the breadth of the standard. He suggested that this may make the standard more appealing to companies considering the implementation of ISO 14000.

5.3 ORGANIZATIONAL IMPLICATIONS

With respect to organizational implications, we focused on 'Organizational Keys to Success' – a set of indicators that provide readily accessible information to companies about the likely effort and success of ISO 14001 implementation.

5.3.1 ORGANIZATIONAL KEYS TO SUCCESS

A substantial number of requirements of the ISO 14001 standard relate to the organizational structure of a company. Hence, integrating ISO 14001 into a company's existing management structure may entail a significant amount of organizational restructuring. In the face of uncertainty, this prospect could deter companies from considering ISO 14001 certification. Yet, unknowingly, a company may already fulfil the predominant part of the ISO 14001 requirements.

During the business case study, our project team determined "Organizational Keys to Success". This set of indicators, discussed below, will help companies to gauge the degree and scale of modifications necessary for certification based on the characteristics of the existing management structure.

Management Support

Visible management commitment to environmental concerns is critical for the successful implementation of an ISO 14001 EMS. Employees must be able to trust management's decision for ISO 14001 implementation and feel the continuing support for the decision. If a mutual trust between management and employees already exists, the decision for ISO 14001 certification will be endorsed more readily and adjustments to current operations are accommodated more quickly and effortlessly.

Established Management Review Process

A company with an established review process for its management system will face only minor modifications to implement Section 4.6 of ISO 14000. The review process has to be expanded to include the setting of annual environmental objectives and targets, the regular up-date of environmental aspects and impacts, and a review of the effectiveness of the EMS in terms of achieving the specified goals. Such a review should include a quarterly summary of environmental indicators to top management, as well as an annual meeting between top management and leading EHS staff. The annual meeting would serve to discuss past performance relative to goals, to review the appropriateness of metrics and indicators used to measure environmental performance, and to determine future environmental goals and related capital expenditures.

Regulatory Compliance

A company's record of regulatory compliance is a useful indicator, despite the fact that ISO 14001 certification is not dependent on regulatory compliance. It indicates that a substantial number of processes, plans and practices implicitly required by the standard (e.g. in Section 4.3.2, 4.4.7, and 4.5.2 of the ISO 14001 standard) are already implemented. Operating procedures, contingency and spill prevention plans, and accident investigation practices are examples of existing documents that contain ISO 14001 relevant information.

In addition, environmental regulations generally require appropriate monitoring of the regulated process, such as continuous emission testing or storm water analyses. This in turn provides the raw data for tracking environmental impacts and progress towards environmental targets as set within the EMS, thereby addressing the requirements in Section 4.5.1.

EHS Policy

A clearly presented EHS policy statement is the cornerstone of any EMS, and the framework for setting environmental goals. To be compatible with Section 4.2, the policy must include commitments to regulatory compliance, pollution prevention, and continual improvement. The EHS Policy should be supported and implemented by management and all employees. Requiring new employees to sign the policy or distributing an EHS policy leaflet with occasional company mailings are some easy and effective ways to raise employee environmental awareness. The policy should be linked to the company's publicly accessible web site (if available), not only to fulfil the ISO 14001 requirement (4.2.f), but also to advertise the company's proactive attitude.

ISO 9000 Certification

ISO 9000 certified companies have already implemented a systematic management of company documents and records. Hence ISO 9000 certification will substantially reduce the modifications necessary to comply with Sections 4.4.4, 4.4.5, 4.5.3 and the documentation and record-keeping requirements of all other sections. Companies without ISO 9000 certification may benefit from similar advantages, if documents have been well maintained, frequently up-dated and filed in a readily accessible system, which includes clear allocation of responsibilities for managing documents and an adequate record retention policy.

Clearly Defined Responsibilities

The implementation and maintenance of the EMS requires the allocation of environmental roles and responsibilities. Since environmental management includes aspects of EHS management, plant management and administration, many of the roles and responsibilities associated with an ISO 14001 EMS have already been

allocated – albeit often under a different description than that used in the ISO 14001 standard. For example, responsibilities such as supervision of hazardous waste operations, document control, and EHS training have often already been assigned. Hence, only minor modifications will be necessary to cover environmental responsibilities (which should include those explicitly stated in the standard, those implied for maintaining the system and some company-specific ones, determined by the individual management system).

In order to fulfil Section 4.4.1 of the standard, environmental responsibilities must be documented and communicated. Many companies will already have a suitable, adaptable system in place (for their other management functions). Posting of key environmental responsibilities in easily accessible locations facilitates coordination and cooperation.

Open Communication

The successful implementation of an EMS depends on cooperation and coordination between employees from different fields of work. Thus, open communication is a crucial component of any EMS. Well-functioning communication within a company is a particularly valuable asset for ISO 14001 implementation. Open communication between employees involved in environmental management can be achieved by electronic means (e.g. via e-mail, shared folders for EHS staff and a commonly accessible databases) or physical means (e.g. proximity of staff offices, EHS workshops, weekly meetings and a centralized documentation office). To meet all requirements in Section 4.4.3, the company must establish a procedure for responding to external communication. (An issue that may already have been covered under a company's practice regarding press releases or emergency response.) Descriptions of the procedure should be made available to all staff with environmental responsibilities and the reception staff.

EHS training program

Raising environmental awareness amongst employees may be one of the most involved parts of the implementation. Training should cover the EHS policy, the importance of conformance to policy and practices, the company's significant environmental impacts, environmental roles and responsibilities, and the potential consequences of departing from established policies and practices. Environmental training, if not already implemented in the company, can be integrated into current EHS training (both, in the classroom and on the job). Other means of meeting the requirements in Section 4.4.2 are the use of team meetings or regular workshops to discuss environmental concerns and efforts, or of bulletin boards, e-mail or frequent company-wide mailings to introduce an environmental topic-of-the-month.

Electronic Database

If available, an electronic database should be used for maintaining records, documents and regulatory requirements related to the EMS. The system has to be accessible to all staff directly involved in environmental management, and updated on a regular basis.

5.4 LEGAL IMPLICATIONS

ISO 14001 certification has potential legal consequences (in terms of confidentiality and discoverability) for U.S. businesses that are certified or engaged in the certification process. The development of the written EMS documentation, identification of regulatory compliance requirements, and third-party access to sensitive materials require legal attention.

The legal issue that many companies struggle with, and that in some cases prevents them from considering the implementation of ISO 14001, is the potential discovery of regulatory violations. ISO 14001 aids in the discovery of non-compliance with applicable environmental regulations. Improved compliance with environmental laws and regulations is considered a benefit of implementing ISO 14001. However, the concern is that the identification of violations during the implementation phase or self- or third-party audits can lead to potential liabilities. The violated regulations may involve strict liability (intent or negligence need not be shown) and/or the duty to disclose violations[112].

Another potential risk of legal liability is the fact that ISO 14001 requires companies to document details of environmental aspects of their operations not related to regulatory compliance, in order to track the effectiveness of the system. Audits conducted under ISO 14001 check these documents and may point to weaknesses in the company's handling of environmental matters such as records of system failures and minor spills. These findings may not be governed by any regulations but might still be used in legal proceedings as evidence. Company procedures and practices may be admissible in Court as evidence in legal actions such as wrongful discharge, employee injury and property damage lawsuits. Thus, if company has adopted an EMS with a written policy statement on environmental

[112] Wilson, 1998.

matters, and in it has specified related targets and objectives, it may also have created a standard under which it may be held accountable[113].

ISO 14001 stipulates that audit findings from internal or external audits be documented in a detailed written audit report. Some speculate[114] that these audit reports may become the new "smoking gun" of environmental litigation. Corporations might attempt to protect the confidentiality of audit reports and other documents through the attorney-client privilege and the attorney work product doctrine, the two traditional legal privileges that grant confidentiality.

- The **attorney-client privilege** is intended to encourage clients to freely communicate with their attorneys. It protects confidential attorney-client oral communication only. Written communication is not protected under this privilege. The attorney-client privilege applies only if the following conditions are met[115]:
  - the client must consult an attorney
  - the purpose of the consultation must be legal advice
  - the client must intend the communication to be confidential
  - the requisite confidentiality must be maintained.

- The **attorney work product doctrine** is intended to protect the strategy, organization, or other thought processes prepared by an attorney for impending trials from being discovered by opposing counsel. This privilege covers oral and written communication. In order for the attorney work product doctrine to apply, the following two conditions must be met[116]:
  - litigation must be anticipated
  - the audit must contain legal conclusions or theories (not only facts and objective data)

Past attempts to protect the results of the **ISO 14001 Certification** and **Surveillance Audits** conducted by an external auditing team under these two privileges have not been recognized in court[117]. The attorney-client privilege does not apply because the third-party audits do not involve the consultation of an

[113] Mostek, 1998.
[114] Mostek, 1998.
[115] Ilenda and Calhoun, 1997.
[116] Ilenda and Calhoun, 1997.
[117] Lally, 1998.

attorney for legal advice. Instead, an independent registrar evaluates the EMS in order to give an opinion on the state of the EMS to the National Registration Board. The work product doctrine only protects information gathered in anticipation of litigation, which is not the case in a third-party audit. Thus, the information gathered in the external audits may be discoverable in court.

On the other hand, results of **internal EMS audits** can typically be kept confidential under attorney-client privilege if the audit was conducted under the supervision of an attorney. This could be an in house or outside attorney. In order for this privilege to be recognized in court, the audit must be directed and controlled by the attorney and the role of the attorney must be to give legal advice. The privilege does not apply if the attorney's main involvement is in a business capacity, not as legal counsel[118].

A possible protection against self-incrimination through an EMS audit may be the emergence of a **self-evaluation privilege** granted by State law. Under this law, audit reports are not admissible in civil, criminal, or administrative court proceedings. The purpose of this legislation is to provide incentive for environmental auditing. The EPA's 1995 *Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations* include four features intended as incentives for self-evaluation.

1. Penalties for violations are completely waived under certain conditions, including discovery of the violations during an environmental audit, voluntary disclosure to the EPA within 10 days, and no serious harm or endangerment resulting from the violation.
2. Up to a 75% reduction in penalties may be granted if all conditions of (1) are met, except 'discovery of the violations during an environmental audit'.
3. Criminal prosecution for environmental crimes will not be recommended to the United States Department of Justice if all conditions of (1) are met and "the violation does not involve: (i) a prevalent management philosophy or practice that concealed or condoned environmental violations: or (ii) high-level corporate officials' or managers' conscious involvement in, or willful blindness to, the violation".[119]
4. Audit reports will not be routinely requested or used to initiate criminal or civil investigations.

[118] Gray, et. al., 1993.
[119] Mostek, 1998.

As of mid-1997, 19 states have passes the self-evaluation privilege into law[120]. However, since the privilege is very new it is not yet certain if it will be recognized in court.

These results underline the importance (and complexity) of the legal implications of ISO 14000, yet they also indicate that many of the legal issues can be dealt with, and need not preclude companies from seeking ISO 14001 certification.

[120] Ilenda and Calhoun, 1997.

6. Discussion of Results

6.1 EVALUATION OF RESULTS

During the implementation of our business case study, we encountered seven areas of ambiguity within the ISO 14001 standard. Our subsequent research analyzed these seven topic in terms of the environmental, stakeholder, organizational and legal implications of the ISO 14000 Series in general, and the ISO 14001 standard in particular. Despite the limited availability of time series data, we were able to reveal a number of trends associated with the implementation of the Series, as well as strengths and weaknesses of the ISO 14001 standard. Below we discuss our research, the validity of our results, and provide our analysis of the standard.

6.1.1 DISCUSSION OF ENVIRONMENTAL IMPLICATIONS

With respect to environmental implications, we found a lack of consistency in the methodology used for identifying environmental aspects and determining their significance, as well as in the use of environmental performance indicators. In both cases, we feel the lack of consistency is linked to a weakness in the standard's definitions and guidelines. As a result, companies are developing innovative (but individualized) approaches to measuring environmental performance, which prevents a comparison of environmental performance between individual firms or business sectors.

While we appreciate the need for the ISO 14000 Series to remain sufficiently broad and flexible to be applicable to widely differing industries across the globe, we believe a common methodology for identifying and measuring environmental aspects, impacts, and performance indicators is necessary. After all, to create a true standard for environmental management practices worldwide, it is imperative to create a basis for meaningful comparison between companies' environmental performances.

Environmental Aspects and Impacts

First, our research results suggest that there is a need for ISO to clarify the identification and evaluation of environmental aspects. Researchers have compared the current process for identifying environmental aspects and impacts under ISO 14001 to the process for identifying and evaluating environmental impacts under

the U.S. National Environmental Policy Act (NEPA)[121]. For example, Eccleston found that "strong parallels exist between the goals and requirements of NEPA and the specifications for implementing an [ISO 14000] Environmental Management System (EMS)." In contrast to ISO 14001's lack of specification about environmental aspect definition and interpretation of significance, Eccleston writes:

> *…NEPA's regulations provide highly prescriptive direction and requirements for ensuring that an accurate and scientifically defensible analysis has been prepared that provides decision makers with information sufficient to reach an informed decision. These requirements are reinforced by nearly 30 years of experience, gained by agencies that are engaged in diverse missions and environmental issues. Properly combined, a NEPA/EMS system provides a synergistic process for planning actions and implementing decisions in a manner that protects and enhances environmental quality, while minimizing cost.*

The "initial study" process under NEPA provides a possible model for improving the environmental aspect identification process under ISO 14001. Most federal, state or local public agencies that operate under NEPA or similar state laws utilize a detailed checklist to aid their identification of potentially significant impacts of new project development. These impacts include both regulated and non-regulated impacts, such as resource consumption and public services needs.

We developed a checklist (see Section 7.3.3) that can be used by managers to aid their identification of environmental aspects until the standard can provide more guidance. The checklist uses the matrix format to compare an organization's activities, products, and services to the environment in which it operates.

Environmental Reporting

While the usefulness of environmental reports is increasing every year, we believe there is still additional room for growth. Even the most detailed of annual environmental reports rarely mention the successes and failures of their EMSs, nor the financial costs and benefits resulting from its environmental programs. Here again, we found fault with the ISO 14001 requirements, or rather lack thereof, for publicly communicating a company's environmental performance. While section 4.2 (f) of ISO 14001 requires that a company's environmental policy be available to the public, disclosure of the actual programs taken to uphold that policy are not required to be disclosed, as they are under EMAS[122].

[121] Eccleston, 1998.
[122] Cascio,1996, p. 27.

Environmental Performance

We discovered that a major weakness of the standard is its lack of specific performance indicators and common metrics for tracking and comparing performance. The result is a wide range of practices for measuring environmental performance with the inability to make meaningful comparisons between industries. Our conclusion is that there is a need for a common system of measuring environmental performance. One possible system for measuring corporate environmental and social performance has been proposed by the World Resources Institute (WRI)[123]. WRI proposes a common set of Environmental Performance Indicators (EPIs), which they group into four key categories of environmental performance based on resource inputs and outputs of a firm as follows:

1. **Materials use:** quantities and types of materials used, separated by composition and source.
2. **Energy consumption:** quantities and types of energy used or generated, differentiated by fuel types.
3. **Non-product output:** quantities and types of wastes created before recycling, treatment or disposal, distinguishing production efficiency from end-of-pipe pollution control.
4. **Pollutant releases:** quantities and types of pollutants released to air, water, and land, including toxic chemicals, greenhouse gases, solid wastes, and other pollutants of concern.

We also found that there was a lack of any meaningful information to determine whether adoption of ISO 14001 actually improves the environmental performance of U.S. firms. This is largely due to the few numbers of U.S. firms interested in the standard until recently, which results in the absence of sufficient time series data for scientific studies. In time, the U.S. EPA's TRI should be a tremendous database of information on the environmental performance of U.S. industry that will become a very useful tool for future research on the environmental effectiveness of ISO 14000. Our preliminary research in this area suggested that the TRI could be effectively used to compare ISO 14001-certified to non-certified companies by SIC code, once sufficient time series information is available.

6.1.2 DISCUSSION OF STAKEHOLDER IMPLICATIONS

In addition to evaluating the environmental effectiveness of ISO 14001, we also aimed to clarify governmental, corporate, and auditors perspectives on ISO 14001. For the most part, we found significant differences in the perceptions of the ISO 14001 standard between these three parties.

[123] World Resources Institute, 1997.

Corporate Perspectives

Eighty-seven percent of the questionnaire respondents claimed that the benefits of certification outweighed the costs. This is an even more positive response than we expected, although our sample size was limited to only ISO 14001 certified companies. We believe that this enthusiastic response is at least partly indicative of a combination of both qualitative and financial benefits, since only 22% of companies monitor their environmental expenditures and savings through environmental cost accounting, and hence are able to recognize their financial payoffs.

We expected firms to embrace environmental cost accounting much more than they reported. To truly manage environmental impacts, we believe firms should ensure that environmental cost accounting principles are used to track overall savings and expenses of environmental projects. Additionally, we believe that corporations should devote a section of their annual financial report to environmental issues (or create an entire annual environmental report). These reports will be most helpful if they incorporate financial information and evaluations of regulatory impacts.

We were also surprised by the apparent lack of constraints to achieving certification. According to the certified firms we surveyed, financial and legal uncertainties did not significantly discourage firms from obtaining certification.

NGO Perspectives

In contrast to the positive response from certified companies and auditors, most NGO's are suspicious of ISO 14001's implications. NGO's feel that the standard has its strengths, but leaves many important questions unanswered. Overall, our survey illustrates the confusion and uncertainty that exists in the NGO community regarding ISO 14001. The sector as a whole feels that they have been underrepresented in the development process of the standard. There is also a significant level of suspicion and uncertainty regarding the effect of ISO 14001 on a company's environmental performance, and therefore, a majority of NGOs believe that its use as a policy tool is unwarranted. Based on the data gathered about the NGO sector's involvement in, and experience with ISO 14001, we feel it would be advisable for TC207 to seek the NGO sectors' active participation in the future development of the ISO 14000 Series.

Auditor Perspectives

Although the sample size of auditors was relatively small, we were surprised that all seven auditors were quite supportive and enthusiastic about ISO 14001. They expressed a belief that ISO 14001 is an innovative process to promote firms to makes environmental responsibility part of their management systems.

Additionally, given the vague nature of ISO 14001, we were surprised that none of the interviewed auditors identified any problem areas within the standard.

6.1.3 DISCUSSION OF ORGANIZATIONAL & LEGAL IMPLICATIONS

With respect to the organizational and legal implications, we think that a lack of clarity and the misconceptions arising from it have resulted in more confusion and skepticism than is warranted. Implementing any of the ISO 14000 Series' elements will certainly involve organizational adjustments, and probably increase administrative efforts in certain areas.

We were surprised by the lack of integration of a company's ISO EMS into its common business practices, and feel that this integration will be necessary in the future to reap all the possible organizational benefits of ISO 14001. From the results of our corporate survey, it appears that half of certified firms may be foregoing an opportunity to increase their efficiency by failing to integrate environmental issues into a comprehensive business strategy[124].

The legal ramifications, both real and perceived, of ISO 14001 have also caused much debate, speculation and misunderstandings. Auditors and many certified companies do not perceive legal implications as a hindrance to implementing an ISO 14001 EMS. However, for non-certified companies, the uncertainty about legal consequences may sway the decision against ISO 14001. We hope that the results of our investigation into the legal aspects of ISO 14001 will prove useful to companies that are engaged in evaluating their potential liabilities under the standard.

6.2 VALIDITY OF THE PRIMARY RESEARCH RESULTS

With respect to corporate managers, a few companies that we spoke with criticized the questionnaire:

- *The corporate questionnaire was perceived to be biased against firms with EMSs prior to seeking ISO 14001 certification*. Some firms felt that they could not answer the questions because they did not experience major structural, behavioral, or environmental changes to their EMSs in connection with certification. This presented another very interesting question: What is the real value

[124] Please refer to section 7.3 "Environmental Cost Accounting Tools" for a discussion of integrating business systems by utilizing environmental cost accounting.

gained by seeking ISO 14001 certification if a company is already comfortable with their management of environmental impacts[125]?

- *The corporate questionnaire was thought to have a narrow understanding of improvements in corporate environmental performance*. Some respondents felt that the questionnaire didn't adequately recognize them for their improvements in environmental performance. Respondents explained that the main impetus for changes in their environmental actions was not ISO 14001, but rather an effort to comply with environmental statutes like the Clean Air Act, which mandated new pollution control technologies. We acknowledge that the source of environmental improvements may lie not with the implementation of the standard itself, but rather with external, in this case, regulatory factors. Yet, ISO 14001 may play a crucial role in helping firms to identify and manage regulatory requirements. Also, ISO 14001 is not concerned with a firm's past compliance record, but rather focuses on how a firm can strive to make additional environmental improvements in the future.

Our NGO survey may have overestimated the NGO's involvement in, and knowledge of, the standard since approximately 80% of those surveyed failed to respond. Lack of knowledge concerning the standard could have been a key factor in this small response rate. Furthermore, since 6 of the respondents were policy institutions, several of the survey questions did not apply.

The interviews with ISO 14001 auditors may have included bias from two sources. Firstly, it seemed as though the interviewed auditors did not volunteer their own opinions on the standard, but rather gave answers that represented the companies they worked for, i.e. the registrars. In fact, one auditor specifically mentioned that she was relaying information representative of her firm's stance on the issue in question. She declined to give her personal perspective. Secondly, it is obviously in the auditors' best interest to promote the standard. Hence, their opinions on potentially deterring matters such as the legal implications of an ISO 14001 EMS may be tainted as well (the majority of auditors stated that they were not aware of the possibility of any legal risks).

Finally, the quality and quantity of our data is certainly affected by the rather recent introduction of the standard and the consequently limited availability of meaningful statistics. Companies, NGOs, and auditors provided us with useful data, yet there is no doubt that trends about the ISO 14000 Series and its implications will become clearer as time passes and greater experience is gained with the implementation and maintenance of EMSs.

[125] Please refer to section 7.4 "Future Research" for further discussion of research questions on this, and related topics.

6.3 EVALUATION OF THE ISO 14001 STANDARD

This section is based on both our research and experience gained during our business case study. While there are both strengths and weaknesses to the ISO 14001 EMS standard, we believe that, in general, the standard is successful in heightening companies' awareness of the importance of managing environmental impacts and actions. We see the standard as a useful guideline for companies when they are developing or redefining their environmental philosophies. More specifically, we feel ISO 14001's strengths lie in building a framework for:

- Beginning the environmental management process by carefully and thoughtfully defining a company's environmental philosophy
- Identifying environmental impacts and aspects
- Setting regular objectives and targets for managing environmental impacts
- Creating a thorough employee training program
- Providing documentation/record guidelines
- Requiring regular management reviews to ensure top management commitment and involvement as well as system improvements

Conversely, we do find several faults with the standard. These include:

- Ambiguous definitions and general vagueness of terms (environmental aspect, environmental impact, continual improvement, etc.)
- Lack of substantial public environmental reporting and public communication requirements
- Inconsistent global applications and interpretations of the standard
- Lack of clarity about the EMS auditing criteria
- No requirements for tracking the financial success or failure of an EMS (via environmental cost accounting, cost benefit analysis, etc.)
- No guidelines for standard environmental performance indicators, which consequently makes the comparison of certified firms' environmental performance virtually impossible.

In short, we see the standard as a useful guideline for companies to use when developing or redefining their environmental philosophies, but its significant uncertainties and limitations need to be recognized and addressed in a revised version of ISO 14001.

6.3.1 COMMENTS ON THE INDIVIDUAL SECTIONS OF ISO 14001

General Requirements – Section 4.1

This section requires the development of an environmental management system pursuant to Sections 4.2 - 4.6.

Environmental Policy – Section 4.2

The Environmental Policy section describes the required commitments and structure of an ISO 14001-certified EMS. Specifically, companies must make a commitment to pollution prevention, regulatory compliance, and continual improvement in environmental performance in a manner that is appropriate to the "nature, scale and environmental impacts of its activities, products and services."

While ISO 14001 is founded on the premise that a successful EMS will likely lead to improved environmental performance, the explanation and definition of "continual improvement" is missing. The remaining requirements of a certifiable environmental policy--commitment to pollution prevention, and compliance with environmental regulations--are more straightforward and less subject to interpretation.

We believe that defining a corporation's environmental policy is a critical first step in shaping or reshaping a company's environmental philosophy. Top management must be willing to embrace and support the policy in all aspects of a company's operations.

This section is strengthened by the requirement that companies must create a "framework for setting and reviewing environmental objectives and targets."[126]

Planning – Section 4.3

This section covers Environmental Aspects, Legal Requirements, Objectives and Targets, and Environmental Management Programs.

With respect to Environmental Aspects, the exact definition and their environmental significance is vague and needs to offer firms more guidance. However, validating the importance of this critical planning process by requiring this step strengthens the section.

We feel the Legal Requirements section is extremely vague and generally not useful to firms. More explanation is needed in this section.

[126] ISO 14001, Section 4.2.d.

The Objectives and Targets section is quite helpful unlike many sections in the standard, as it specifically requires that managers apply interdisciplinary perspectives to their evaluation of objectives and targets (i.e. legal, financial, etc.).

The section discussing Environmental Management Programs is helpful in forcing managers to specifically consider (and document) environmental responsibilities and environmental timelines in accordance with the firm's objectives and targets throughout the company.

Implementation and Operation – Section 4.4

Although well written, this section could be strengthened by including examples and case studies.

The section discussing Structure and Responsibility, like the previous Planning section, requires that authority and responsibility shall be clearly delegated and communicated. During our business case study we found that creating a "responsibility matrix" was very helpful in clearly communicating environmental responsibilities.

In addition to acknowledging the need for employee training, the Training, Awareness, and Competence section helps to ensure that a firm's environmental impacts are communicated to employees. This is a significant attempt to heighten overall environmental awareness as well as commitment to ISO 14001.

While the Communication section requires companies to create systems of internal and external communication of its environmental aspects and EMS, it is weak in its discussion of initiating (versus responding to) external communication of a firm's significant environmental aspects.

The section describing Environmental Management System Documentation is clear, but very brief. We found that creating an electronic matrix was most helpful and effective in documenting an EMS. Again, examples should be included to help firms successfully meet this requirement.

The Document Control section is quite thorough in describing the necessary procedures for certification, however, here again examples would prevent firms from reinventing effective systems and wasting staff time.

The Operational Control section provides vague, and therefore weak, requirements for ensuring operational excellence. We think including examples of a successful operational control system would be of great value to firms seeking certification.

We found the Emergency Preparedness and Response section is largely duplicative to certain regulatory requirements in the U.S. (Business Plans, Spill Prevention,

Containment and Control Plans, etc.) under RCRA. However, this section is important for U.S. companies that are not in compliance with those requirements and for companies in other countries who may not have preventative domestic emergency plans in place.

Checking and Corrective Action – Section 4.5

This portion of the standard provides a good foundation for monitoring and measuring environmental performance within an EMS, however, more exact guidance would be helpful.

While the Monitoring and Measuring section describes a process to track environmental impacts, it is weak for two reasons—it does not provide guidelines or definitions about the severity of deviations from objectives and targets, and it also promotes curative, rather than preventative approaches to environmental evaluations.

The Nonconformance and Corrective and Preventative Action section is helpful in that it forces management to determine the importance of various environmental operations in the way of clearly defining the corrective action that will be taken should the action not be completed successfully. This section thus advocates a clear understanding of management expectations of job performance.

The section describing Records is comprehensive in stating the requirements for certification, however, we feel it is an oversight of ISO 14000 not to mention that ISO 9000 firms require essentially the same information. (Although it can of course not be assumed that ISO 9000 is already implemented prior to ISO 14001 certification, ISO 9000 certification is sufficiently wide spread to warrant a mention.) As a result many firms may create unnecessary duplicative systems, when in fact one system would have met the requirements of both ISO 9000 and 14000.

The importance of the internal EMS audits described in the Environmental Management System Audit section is critical to the successful evaluation of an EMS. The weakness of this section is the lack of guidelines for actually conducting an EMS audit. Also, in terms of the U.S., it would be helpful if this section could be expanded to include the legal implications that are involved in the auditing process.

Management Review – Section 4.6

The Management Review section is one of the most critical sections of the ISO 14001 standard, for without top management support, an EMS is not likely to be successful. While we commend ISO for explicitly including this section, we feel it gives management too much flexibility (for example the use of the phrase “at intervals that [they] deem necessary”). We feel management should formally

review a firm's EMS at least annually. Again, case studies or examples would be quite helpful in order to streamline the review process.

7. Conclusions & Recommendations

7.1 EFFECTIVENESS OF ISO 14001 STANDARD

As environmental awareness has grown across the world, there is an increasing need for international standardization of environmental terminology, management practices, and evaluations. ISO 14001 offers a good first step in creating such a common international understanding of environmental stewardship, and serves as a good "least common denominator" of voluntary commitment to environmental protection beyond regulatory compliance. Although ISO 14001 has heightened environmental awareness across the globe, the standards in the series are neither detailed nor strong enough in their current state to be the crucial international policy tool that it has the potential to be. We thus conclude that ISO 14001 should be used only as a management tool, helping companies to improve their environmental performance beyond compliance, and integrate their environmental management system effectively into their overall management structure. It is not strong enough to be used as an effective regulatory tool.

We believe that ISO 14001 provides helpful management guidelines, even if a firm is not seeking ISO 14001 certification. The standard acts as a benchmark for implementing environmental management systems. Since ISO 14001 was developed to be applicable to all business and all countries, companies should find it easier to adopt the ISO standards than more complex and specialized regional standards. Yet, the flexibility of the ISO 14001 standard may also present an obstacle, leaving companies in search of specific guidelines.

ISO 14001 successfully integrates environmental issues into a new philosophy of holistic business strategies. Instead of separating environmental issues from other business issues (accounting, purchasing, engineering, manufacturing), ISO 14001 encourages managers to consider environmental aspects and performance in all areas of a business. In general, ISO 14001 provides a flexible framework for a solid management system. Also, ISO 14001 improves internal communication and environmental education within a company.

7.1.1 STRENGTHS AND WEAKNESSES OF ISO 14001

While we feel that ISO 14000 in general, and ISO 14001 in particular, make significant contributions to improving environmental management globally, there

are specific elements we believe offer important guidelines for corporations to improve the management of environmental impacts. The following list includes some of the most helpful requirements of the standard:

- Defining a company's corporate environmental policy
- Identifying environmental aspects and performance
- Setting regular objectives and targets for managing environmental performance
- Creating a thorough employee training program
- Providing documentation/record guidelines
- Requiring regular management reviews to ensure top management commitment and involvement as well as system improvements

In general, there is not enough financial or environmental performance data to evaluate the overall effectiveness of ISO 14001 in achieving significant environmental improvements. Even without adequate data, we feel sections of the standard are ineffective, and believe that substantial revisions are necessary in the following areas:

- Defining terms (e.g., environmental aspects)
- Requiring public communication of environmental actions and performance
- Interpreting and applying the standard globally
- Clarifying the EMS auditing criteria and process
- Requiring financial environmental indicators and reports (environmental cost accounting, cost benefit analysis, etc.)
- Standardizing environmental performance indicators

We developed management tools to address some of these weaknesses. These tools are included in sections that follow.

7.1.2 ENVIRONMENTAL EFFECTIVENESS

While ISO 14001 aims to help corporations better monitor their overall environmental performance, the results of our research suggest that the choice of metrics is primarily compliance-driven. Consequently, policy-makers and the public do not have the necessary information to make comparative judgements about organizational environmental performance issues.

The results of our survey of ISO 14001 certified firms in the U.S. show some evidence that adopting the standard has improved organizations' environmental performance, but the degree of improvement appears to be only slight. This is probably due to the short time period that certification has been possible. ISO 14001 was not adopted until 1996, and few U.S. organizations had completed the certification process by the end of 1998.

7.1.3 STAKEHOLDER IMPLICATIONS

Corporate Perspectives

Overall, we found that most firms have benefited from implementing ISO 14001. Our study suggests that principles of sound environmental management may help to improve overall business management and efficiency, and might possibly lead to future market opportunities. We found that the most popular incentives for corporations to seek ISO 14001 certification are to better manage their environmental impacts and to gain competitive advantages. Contrary to popular literature, our questionnaire results did not indicate that financial costs (nor any other commonly proposed constraints) actually served to inhibit implementation of an ISO 14001 EMS.

With respect to ISO 14001's effectiveness in improving corporate commitments to regulatory compliance, pollution prevention, and continuous improvement, we feel the standard takes the significant first steps in identifying these important concepts globally. Our corporate questionnaire response data suggests that ISO 14001 is fairly effective in improving environmental management practices in the U.S. We found that 37% of the certified firms that responded to our questionnaire reported an increase in their regulatory compliance, 76% of the respondents reported an increased commitment to pollution prevention, and 86% of managers increased their commitment to environmental stewardship. (These figures probably underestimate compliance and commitment, since we asked about changes since ISO 14001 certification rather than absolute measures of compliance or environmental activities.)

NGO Perspectives

As a whole, the NGO sector is skeptical about the role of ISO 14001 in the future. Most NGO's believe that corporations have a social responsibility to operate in an environmentally safe manner. They believe this responsibility can be realized through sound business practices—which could include implementing *voluntary* EMSs. However, they are quick to point out what they believe to be serious

problems with ISO 14001. First, they stress that the development of the standard has been biased by a disproportionate amount of industry involvement coupled with a lack of NGO involvement. Secondly, they claim that ISO 14001 should be strictly voluntary, and that combining certification with regulatory relief is unacceptable. Since ISO 14001 is a process, there is no guarantee that a certified company will exhibit improved environmental performance. And thirdly, they feel that the auditing and certification requirements are too vague, and therefore, may result in the public being misled.

Auditor Perspectives

Auditors perceive ISO 14001 in a positive light. The auditors we interviewed believed that ISO 14001 encourages environmental responsibility part of a company's overall management system and strategy. This perception was supported by data from our corporate survey that reported that certified firms experienced improved environmental performance by adopting stronger commitments to pollution prevention, increasing awareness of environmental impacts, decreasing the amount of total emissions, and increasing the amount of total recycled waste.

7.1.4 ORGANIZATIONAL EFFECTIVENESS

During the business case study and subsequent research, we found that company specific EMSs often already fulfil the predominant part of the ISO 14001 requirements. In fact, some of the respondents to our corporate questionnaire commented on the fact that their company-specific EMS was so close to ISO 14001 that it was difficult to detect significant changes in their environmental performance after implementing it.

This leads us to two conclusions. Firstly, some companies may incur substantially lower costs when implementing ISO 14001 than predicted if their existing EMSs only need minor adjustments prior to certification. Secondly, our results question the true value added resulting from an ISO 14001 EMS. Our survey data is insufficient to provide information about the relative environmental performance of certified companies versus uncertified companies, because our sample population was limited to certified companies. However, we believe that the answer to this question may significantly influence the decision to implement or not to implement ISO 14001 in companies that already have developed EMSs.

Finally, our corporate questionnaire showed that not all companies take advantage of the overlap between an ISO 14001 EMS and other management systems, such as ISO 9000. We strongly recommend companies utilize the similarities of these two systems in particular, to minimize administrative efforts. However, we also feel that

this partial duplication of management effort is a consequence of each company's implementation style--over which ISO 14001 exerts little influence.

7.2 RECOMMENDATIONS

Define Environmental Aspects and Impacts

ISO 14004 should be modified to incorporate a detailed methodology for identification of environmental aspects and an extensive set of examples. Our Environmental Impact Checklist in the Management Tools section that follows, provides a checklist that can be used by an organization to aid in identifying environmental aspects until the standard is revised.

Define Environmental Performance Indicators

To strengthen ISO 14001, a handful of general environmental performance indicators should be developed so that stakeholders (managers, employees, the public, investors, regulators, etc) can compare environmental progress over time and across companies and facilities.

Provide Public Information on ISO 14000

There is a strong need for objective public information. Much confusion surrounds the "meaning" and interpretation of ISO 14001. For ISO 14001 to succeed in the U.S., an effort must be made to educate businesses, agencies, and the public about what ISO 14001 does and does not do. Specifically, the issue of "regulatory relief" should be clarified immediately. It should be emphasized that ISO 14001 does not allow companies to lessen their environmental commitment or responsibility - a certified firm must meet all the federal, state, and local regulatory requirements as a non-certified firm. ISO 14001 promotes companies' efforts to go *beyond* compliance.

Establish Public Environmental Reporting Requirements

ISO should strengthen its reporting requirements so that firms are encouraged, if not required, to share detailed environmental information with the public. For example, we believe information on the following topics would help stakeholders to better understand the importance of environmental performance in business decisions:

- Corporate environmental policy
- Environmental programs
- General environmental trends in the business

- Estimated annual environmental expenditures and savings (cost/benefit)
- Explanation of environmental fines
- Relevant environmental regulations and consequent impacts on the business
- Potential and existing environmental liabilities, including litigation
- Future directions (new programs, new processes, etc)

In short, environmental reports can illustrate the pulse of a firm's environmental philosophy. If comprehensive, they have the ability to thoroughly describe the state of its EMS, and highlight a company's environmental successes as well as explain its environmental failures. We believe businesses should maximize this opportunity to communicate their exceptional environmental policy, programs, and performance, while honestly disclosing their potential and real environmental liabilities – though we acknowledge that such a free exchange of information, if required, may discourage firms from seeking certification.

Encourage the Use of Environmental Cost Accounting Tools

ISO 14001 should require the use of financial tools to track environmental expenditures and savings. Currently, the standard is weak in requiring any form of financial analysis. We have developed several environmental cost accounting tools (see Section7.3) to help managers determine financial indicators until the standard is properly revised.

Increase the Consistency of Auditing Criteria and Processes

The auditing standards of ISO 14000 should be clearer, more specific, and offer more binding guidelines. ISO 14001 does not currently guarantee consistency in environmental management practices between U.S. certified companies, let alone on an international level. This ambiguity weakens the standard's usefulness in providing meaningful information to customers of certified companies. This weakness should be addressed through greater conformity among auditing practices within the U.S. (and if at all possible, internationally). The standard does recommend the creation of national standard boards, such as ANSI, to oversee certification and the training of auditors through registrars. However, auditing practices differ between registrars, auditors, and national standard boards.

7.3 MANAGEMENT TOOLS FOR ISO 14001

We developed (or adapted from commonly available business management tools) the following tools for environmental managers and top management to use when designing, implementing, and evaluating their ISO 14001 EMSs.

7.3.1 INITIAL EMS ASSESSMENT – THE ISO 14001 GAP ANALYSIS

An ISO 14001 Gap Analysis matrix is a valuable document to analyze a company's existing EMS systematically for discrepancies with the ISO 14001 standard. Thus, the Gap Analysis is crucial for deciding on the feasibility of ISO 14001 certification, and setting priorities for enhancement. It is also an ideal document for tracking progress during the EMS enhancement process. As the document evolves and expands, it eventually becomes the cornerstone for the EMS documentation required by the ISO 14001 standard: a matrix that links the documents associated with the management system.

Since the ISO 14001 standard is open to interpretation, dissecting it paragraph by paragraph is very helpful in determining the explicit and implicit requirements of the standard. If possible, the Gap Analysis should be conducted by a mixed team of EHS staff and individuals familiar with but not involved in EHS management. Such a team will combine the necessary insider expertise with a critical outside perspective.

For our Business Case Study, we used a two-column table to document the analysis (see Table 7 for a sample analysis). Each row in the first column contained a paragraph of the ISO 14001 standard, using the original wording. Information in the second column described how the existing EMS meets the standard's requirements. For the initial Gap Analysis, this information listed the names of plans, procedures, and programs in place, as well as the job title of the responsible employee. During the EMS enhancement process, the Gap Analysis can be expanded into an ISO 14001 manual by adding information about the enhanced elements. For the purpose of keeping the manual clear and accessible, supporting documents such as permits, plans and training material should be linked, preferably electronically, rather than included directly.

4.2 Environmental Policy	
Top management shall define the organization's environmental policy and ensure that it:	The EHS Department created Company, Inc's Environmental, Health and Safety (EHS) Policy. The Policy is supported by the CEO and departmental managers.
a) is appropriate to the nature, scale, and environmental impacts of its activities, products, or services;	The EHS Department reviews the appropriateness of the Policy every two years.
b) includes a commitment to continual improvement and prevention of pollution;	The Policy includes the commitment to strive for pollution prevention and continuous improvement.
c) includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes;	Company, Inc.'s policy specifies a commitment to regulatory compliance.
d) provides the framework for setting and reviewing environmental objectives and targets;	The EHS Policy provides the basis for Company, Inc's annual management review of environmental objectives and targets
e) is documented, implemented, maintained, and communicated to all employees;	The EHS Department secretary documents the EHS Policy, and maintains any changes made during the management review process. The Policy is communicated to all employees through annual EHS training seminars, and the company's web site. Operational procedures comply with the Policy, hence implementation of the Policy is the joint responsibility of all employees. Employees are professionally instructed about changes in operating procedures.
f) is available to the public.	The EHS Policy has been published on Company, Inc.'s web site. *Link to*: www.company-inc.com/ehspolicy

Table 6. Sample matrix for ISO 14001 Roadmap 1 (partially based on International Standardization Organization 1997)

7.3.2 COST-BENEFIT ANALYSIS MATRIX

We believe that evaluating important environmental financial data using a cost benefit analysis matrix may help environmental managers to make informed decisions about: 1) developing EMSs, 2) pursuing ISO 14001 certification, and 3) making holistic business decisions. ***Note:*** *We discuss the use of the cost benefit analysis matrix in terms of weighing the options for seeking ISO 14001certification, but this tool may easily be applied to other environmental (as well as non-environmental) projects and programs.*

If a cost benefit analysis matrix is completed prior to determining whether or not a firm should seek certification, it will help firms to consider the financial implications associated with instituting an ISO 14001 EMS before actually doing so. Once a firm's EMS is implemented and its costs and benefits are realized, it is possible (and suggested) that the firm revisit the matrix to determine a more accurate evaluation of the profitability of their EMS. Thus an initial cost benefit analysis can serve not only as a baseline for making environmental decisions, but also as an evaluative tool for examining the profitability of environmental actions and programs.

We recommend that firms wishing to become ISO 14001 certified, or those who simply want to improve their financial understanding of a firm's environmental impacts, utilize a cost benefit analysis matrix, such as the following (see tables 7a,b and c).

Financial Impact	Estimated Amount (in thousands)	Actual Amount (in thousands)	Difference (Actual-Estimated)
SAVINGS:			
Avoided remediation			
Access to new markets			
Trade with foreign countries			
Reduction in liabilities			
Decreased insurance costs			
Reductions in energy use			
Avoided permit fees			
Fewer supply purchases (more recycling and reuse)			
TOTAL SAVINGS:			

Table 7a. Sample Matrix for Environmental Cost Benefit Analysis - Savings.

Financial Impact	Estimated Amount (in thousands)	Actual Amount (in thousands)	Difference (Actual - Estimated)
EXPENSES			
Personnel time to implement and manage ISO 14001 EMS			
Consultant Fees			
Employee Training Expenses			
Certification Fees			
Environmental Process Redesign Costs			
Permit violations			
Purchase of new supplies/components			
Legal Fees (disclosure)			
TOTAL EXPENSES:			

Table 7b. Sample Matrix for Environmental Cost Benefit Analysis – Expenses

[*Directions: Firms may modify the columns to reflect the financial impacts resulting from environmental actions (or decisions), and the magnitude of the amounts to match their individual needs. The sample matrix below shows examples of common savings and expenses.]*

Using the above answers, subtract the Total Actual Expenses from the Total Actual Savings to determine a firm's Total Profitability. Firms might also find it helpful to compute their Total Estimated Profitability by subtracting the Total Estimated Expenses from their Total Estimated Savings to compare with its Total Actual Profitability. The difference will indicate how accurately the firm was able to anticipate its profitability. If there are large discrepancies between the Total Actual Profitability and the Total Estimated Profitability, managers may wish to reflect on the types of savings and expenses that were unforeseen at the time they estimated them, and revise their environmental accounting or evaluation methods accordingly.

PROFITABILITY	Estimated Amount (in thousands)	Actual Amount (in thousands)
Total Savings		
Total Expenses		
TOTAL PROFITABILITY		

Table 7c. Sample Matrix for Environmental Cost Benefit Analysis - Profitability.

7.3.3 ENVIRONMENTAL ASPECTS CHECKLIST

The following checklist can be used by organizations during the planning phase of the ISO 14000 EMS implementation process. It is intended for use during formal and informal planning sessions to aid in the identification of environmental aspects of an organization's activities, products, and services. The checklist is modeled after those commonly used by federal, state and local governmental agencies to comply with the provisions of the National Environmental Policy Act (NEPA) or similar state laws to identify potentially significant impacts of development projects. Much as NEPA has been refined over its 30-year history, ISO 14000 will need to be refined to improve its specifications and provide better guidance to its users.

This checklist is organized to conform with guidance provided by Section A.3.1 of ISO 14001 that "[the environmental aspects identification] process should consider normal operating conditions, shut-down and start-up conditions, as well as the realistic potential significant impacts associated with reasonably foreseeable or emergency situations." Because of the wide range and complexity of business activities, products, and services, the checklist should not be considered as all inconclusive, but only as a starting point to identify potential environmental aspects for more in-depth review.

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
1) **Construction**: if any activity, product or service involves construction of new facilities or buildings, could it affect:			
a) *Raw material and resource use*: use of substantial amounts of fuel, energy, water, non-renewable natural resource, or other raw material			
a) *Land use*: loss of prime agricultural land or significant forest resources			
b) *Soil or wind erosion*: any increase in wind or water erosion of soils, either on or off-site			
c) *Geologic hazards*: exposure of people or property to geologic hazards (e.g., landslides, mudslides, ground failure, etc.)			
d) *Air quality*: creation of off-site dust problem or objectionable odors			
e) *Solid or hazardous wastes:* creation of solid waste for disposal from site grading or demolition having toxic or hazardous characteristics			
f) *Water and flooding*: changes in drainage patterns, direction and flow of surface runoff, or exposure of people or property to water-related hazards			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
g) *Plant and animal life*: change in diversity of species in area, reduction in number of unique or protected species, or introduction of new species into area			
h) *Historic or cultural resources*: alteration or destruction of archaeological site or site with unique cultural values			
i) *Noise, light or glare*: increase in existing noise levels in surrounding community or production of intrusive light or glare			
j) *Risk of upset*: exposure of surrounding community to risk of upset from fire, explosion or spill of hazardous substances used or stored on-site during construction			
k) *Traffic and circulation*: generation of additional vehicular traffic in the area, alteration of traffic flow patterns, or creation of traffic hazards to motorists, bicyclists, or pedestrians			
l) *Human health*: creation of any potential community health hazard from demolition, site grading, or other construction activities			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
2) **Startup**: could the initial or periodic startup phase of any activity, product, or service affect:			
a) *Raw material and resource use*: use of substantial amounts of fuel, energy, water, non-renewable natural resource, or other raw material			
b) *Air quality*: creation of air emissions or objectionable odors			
c) *Water quality*: creation of water effluent that will be discharged into surface or ground waters			
d) *Toxic, hazardous or radioactive waste*: creation of solid waste or effluent for discharge or removal containing toxic chemicals, radioactive materials, or having other hazardous characteristics			
e) *Risk of upset*: exposure of surrounding community to risk of upset from fire, explosion or spill of hazardous substances during startup operations			
f) *Noise, light or glare*: increase in existing noise levels in surrounding community or production of intrusive light or glare during startup operations			
g) *Recreation and aesthetics*: impact to areas of recreational opportunities or obstruction of any scenic vista or view open to public			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
h) *Traffic and circulation*: generation of additional vehicular traffic in the area, alteration of traffic flow patterns, or creation of traffic hazards to motorists, bicyclists, or pedestrians			
i) *Human health*: creation of any potential community health hazard during startup operations			
3) **Normal Operations**: during normal operations, could any activity, product, or service affect:			
a) *Raw material and resource use*: use of substantial amounts of fuel, energy, water, non-renewable natural resource, or other raw material			
b) *Air quality*: creation of air emissions or objectionable odors			
c) *Water quality*: creation of water effluent that will be discharged into surface or ground waters			
d) *Water and flooding*: if normal operations include excavation or other ground disturbance activity, will it result in changes to drainage patterns, direction and flow of surface runoff, or exposure of people or property to water-related hazards			
e) *Toxic or hazardous waste*: creation of solid waste or effluent for discharge or removal containing toxic chemicals, radioactive materials, or having other hazardous characteristics			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
f) *Risk of upset*: exposure of surrounding community to risk of upset from fire, explosion or spill of hazardous substances			
g) *Land use*: if normal operations include excavation or other ground disturbance activity, will it result in loss of prime agricultural land or significant forest resources			
h) *Soil and geologic hazards*: if normal operations include excavation or other ground disturbance activity, will it result in any increase in wind or water erosion of soils, or exposure of people or property to geologic hazards (e.g., landslides, mudslides, ground failure, or similar hazards).			
i) *Plant and animal life*: if normal operations include excavation or other ground disturbance activity , will it result in change in diversity of species in area, reduction in number of unique or protected species, or introduction of new species into area			
j) *Traffic and circulation*: generation of additional vehicular traffic in the area, alteration of traffic flow patterns, or creation of traffic hazards to motorists, bicyclists, or pedestrians			
k) *Human health*: creation of any potential community health hazard			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
l) *Human health*: creation of any potential community health hazard			
m) *Noise, light or glare*: increase in existing noise levels in surrounding community or production of intrusive light or glare			
n) *Historic or cultural resources*: if normal operations include excavation or other ground disturbance activity , will it result in alteration or destruction of archaeological site or site with unique cultural values			
o) *Recreation and aesthetics*: if normal operations include excavation or other ground disturbance activity , will it result in impact to areas of recreational opportunities or obstruction of any scenic vista or view open to public			
4) **Abnormal Operations**: during abnormal facility operations or potential emergency situations, could any activity, product or service affect:			
a) *Air quality*: creation of air emissions or objectionable odors			
b) *Water quality*: creation of water effluent that will be discharged into surface or ground waters			
c) *Toxic or hazardous waste*: creation of solid waste or effluent for discharge or removal containing toxic chemicals or having hazardous characteristics			

ENVIRONMENTAL ASPECTS	Yes	Maybe	No
d) *Community risk*: exposure of surrounding community to risk of upset from fire, explosion or spill of hazardous substances or creation of any potential community health hazard			
e) *Traffic and circulation*: during upset conditions, generation of additional vehicular traffic in the area, alteration of traffic flow patterns, or creation of traffic hazards to motorists, bicyclists, or pedestrians			

Table 8. Sample Matrix for Environmental Aspect Determination

7.3.4 ENVIRONMENTAL COST ACCOUNTING TOOLS

Managers call upon accountants to provide them with financial information to make informed business decisions. Traditionally, corporations were interested in managing their environmental (monetary) expenses, however, increasingly, firms are realizing and capitalizing on the savings that result from environmentally sound business practices.

Environmental regulations of the 70's and 80's forced businesses to install environmental protection devices to meet specific emission limits to help improve ambient environmental quality. The costs of environmental protection were therefore visible in the form of capital and operating costs for pollution control equipment and fees for regulatory noncompliance and litigation as Potentially Responsible Parties (PRPs) for hazardous waste clean ups, while the corporate benefits of environmental stewardship were more elusive and usually less tangible.

While measuring environmental benefits remains complex in the 90's, there is a growing trend toward using financial indicators to help evaluate corporate environmental performance, including the success of their EMSs. By taking a proactive view of environmental management, many corporations have experienced significant cost savings through process and product redesign and the use of innovative environmental technologies. Examples of environmental cost savings include:

- decreased purchasing costs (due to use of recycled materials)
- decreased disposal costs (due to use of safer products)
- decreased clean up costs (due to an awareness of adverse environmental impacts)

We feel it is critical for firms to understand and integrate environmental costs and savings into their overall business and decision making strategies. We propose the following tools to identify, monitor, and evaluate environmental costs and savings:

7.3.5 IDENTIFYING ENVIRONMENTAL COSTS

Environmental costs can be defined as "the costs incurred to control, assess, prevent, and correct failures from actions that potentially have an adverse impact on human, animal, or plant life[127]. These costs are sometimes difficult to identify and monitor. Table 10 contains an overview of basic environmental costs.

[127] Ansari et. al, 1997.

Potentially Hidden Costs		
Regulatory	**Up-Front**	**Voluntary**
Notification	Site Studies & Preparation	Community Outreach
Reporting	Permitting	Audits
Monitoring/Testing	Research & Development	Supplier Qualifications
Remediation	Engineering	Reports (Annual Reports)
Record keeping		Feasibility Studies
Training	**Conventional Costs**	Recycling
Inspections	Capital Equipment	Habitat & Wetland protection
Labeling	Materials	Landscaping
Insurance	Labor	
Pollution Control	Supplies	**Back-End**
Spill Response	Utilities	Decommissioning/Closure
Stormwater Management	Structures	Disposal
Waste Management	Salvage Value	Post-Closure care
Taxes/Fees		
Contingent Costs		
Future compliance costs	Remediation	Legal Expenses
Penalties/Fines	Property Damage	Natural Resource Damage
Responses to future responses	Personal Injury Damage	Economic Loss Damage
Image & Relationship Costs		
Corporate Image	Relationship with staff	Relationship with lenders
Relationship with customers	Relationship with investors	Relationship with insurers
Relationship with suppliers	Relationship with host community	Relationship with regulators

Table 9. Overview of Basic Environmental Costs.

SAMPLE ENVIRONMENTAL INCOME STATEMENT

ENVIRONMENTAL SAVINGS & COST AVOIDANCE	1998 $Million	1999 $Million	Change from 1998-1999 $Million
Energy Conservation Savings - *Fuel*			
Energy Conservation Savings - *Electricity*			
Water Conservation Savings			
On-Site Recycling			
Off Site Recycling			
Pollution Prevention Savings			
Packaging Reclamation			
Regulatory Compliance Cost Avoidance			
Remediation Cost Avoidance			
Outside investment (*function of perceived environmental risk*)			
Insurance Savings			
TOTAL ENVIRONMENTAL SAVINGS:			

Table 10a. Sample Matrix for Environmental Income Statement - Savings.

SAMPLE ENVIRONMENTAL INCOME STATEMENT (CONT.)

ENVIRONMENTAL EXPENSES	1998 $Million	1999 $Million	Change from 1998-1999 $Million
Energy Use - *Fuel*			
Energy Use - *Electricity*			
Water Consumption			
Waste Water Treatment			
Non Hazardous Waste Treatments			
Hazardous Waste Treatments			
Remediation Expenses			
Permit Fees			
Environmental Regulatory Fees			
Personnel Expenses			
Contractor/Consultant Expenses			
TOTAL ENVIRONMENTAL EXPENSES:			

Table 10b. Sample Matrix for Environmental Income Statement - Expenses.

	1998 $Million	1999 $Million	Change from 1998-1999 $Million
NET ENVIRONMENTAL SAVINGS:			

Table 10c. Sample Matrix for Environmental Income Statement – Net Balance

7.3.6 EVALUATING ENVIRONMENTAL COSTS

While it is relatively easy to compare environmental costs from year to year, we believe it is also helpful for environmental managers (as well as the public) to evaluate the types of environmental costs and the trends associated with them. For example, environmental costs may be divided into the following four categories for cost analysis:

- **Preventative Costs**: Expenses incurred to eliminate potential causes of adverse environmental impacts[128]
- **Assessment Costs**: Expenses incurred to measure and monitor potential sources of environmental damage[129]
- **Control Costs**: Expenses incurred to contain environmentally hazardous substances that are used of produced[130], and
- **Failure Costs**: Expenses incurred to remediate accidental environmental damage[131].

Managers can use these categories to analyze and evaluate individual environmental projects or their firms overall environmental costs (see table 12 and 13).

Environmental Project X	**Cost**	**Percent of total cost**
Preventative Costs	$	%
Assessment Costs	$	%
Control Costs	$	%
Failure Costs	$	%
Total Environmental Costs for Project X	**$**	**100%**

Table 11. Evaluating Environmental Project Costs

[128] Ansari, et.al, 1997.
[129] Ansari, et.al, 1997.
[130] Ansari, et.al, 1997.
[131] Ansari, et.al, 1997.

Environmental Cost Trend Analysis	% 1997	%1998	%1999
Preventative Costs			
Assessment Costs			
Control Costs			
Failure Costs			

Table 12. Analyzing Environmental Cost Trends

This type of environmental trend analysis can help to identify both successful and failing components of a company's EMS. For example, if a firm incurs a large percentage of preventative costs, it is likely that the company is aware of its environmental aspects and impacts, whereas a high percentage of failure costs might indicate a flawed system or process in need of redesign.

7.4 FUTURE RESEARCH

ISO 14000's Impact on Environmental Performance

Although the ISO 14000 EMS model is intended to foster continual environmental improvement, the standard does not establish explicit standards for environmental performance, nor is environmental performance a factor in ISO 14001 certification. While some parties believe that "the system is the solution"[132] and that better management results in better performance, many U.S. NGOs are skeptical that the standard will result in any real environmental performance improvements. We suggest the following research approach to assess whether there are observable differences in environmental performance between certified and non-certified organizations.

The tool for this comparison is the U.S. EPA's Toxic Release Inventory (TRI)[133], a database consisting of annual reports from U.S. industry on the specific amounts and types of chemicals released to the environment. The TRI is useful for this analysis, because it is extensive, transparent, accessible, and comparable, even though it is limited to toxic waste output from U.S. firms generating large quantities of toxic chemicals.

[132] World Resources Institute, 1997.
[133] U. S. Environmental Protection Agency, 1999.

The TRI information should be normalized by output, revenues, employees or other relevant measure obtained from public reports or surveys. Comparison of certified to non-certified firms would be most meaningful within the same Standard Industrial Classification (SIC), which is readily available from the Globus ISO 14001 registry of certified firms[134].

Analysis of Financial Impacts

Few of the firms we surveyed have financial or quantitative tools to measure either costs or benefits. This pattern is significant because it strengthens the argument that firms are not seeking ISO 14001 certification for merely financial gain. If this were the case, many more firms would likely have conducted cost benefit analyses prior to seeking certification. An interesting question is whether or not the firms that decided not to seek ISO 14001 certification conducted cost benefit analyses. While this question is beyond the scope of the project, we highly recommend that this type of study be conducted in the future.

[134] Globus International, 1998.

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Appendices

A1 – Business Case Study Report

A2 – Corporate Survey Questionnaire & Data

A3 – NGO Survey Questionnaire & Data

A4 –Related Projects & Web Sites

A1 - Business Case Study Report

INTRODUCTION

RATIONALE FOR CASE STUDY

The rationale for conducting a case study as part of our ISO 14000 assessment was the highly applied nature of the research project. To achieve results that are valuable to users of the standard, it was crucial to gain first-hand insights into the complexities of implementing an ISO 14001-based environmental management system (EMS). Therefore, our Bren School research team approached a local environmental consultancy, Sierra Pacific Environmental (SPE), with the proposal to implement an EMS for an environmentally proactive client, the Imation Corporation Plant in Camarillo, CA.

Imation Camarillo, a data storage tape cartridge manufacturer, had recently decided to enhance their existing EMS toward an "ISO 14001-like EMS". The enhancement was required by a Project XL[135] Covenant agreement that sought permitting flexibility on the grounds of the plant's self-imposed stringent environmental management standards (including an ISO 14001-like EMS and state-of-the-art emission monitoring equipment). During a preliminary Gap Analysis[136] in 1996, Imation Camarillo had determined to what extent their EMS met the requirements of the standard. They were now seeking environmental analysts with ISO 14000 expertise to fill the discovered gaps and implement the changes. The enhancement process would primarily require the development, refinement, and structuring of the necessary elements to create an integrated EMS in accordance with the ISO 14001 standard. Imation Camarillo's needs were closely matched by our team's objectives. Hence, SPE offered to support the project, and a partnership, that proved very rewarding for all involved, was created.

[135] Project XL is a program initiated by the US EPA to stimulate environmental excellence and leadership.

[136] A Gap Analysis in this context is a process to determine the status of a company's EMS with respect to a specific standard by means of a protocol of statements. For the Case Study, the analysis was based on the exact wording of the ISO 14001 standard.

CASE STUDY OBJECTIVES

Our research team had four major objectives for the business case study:

1. To gain an insight into the organizational feasibility of designing and implementing an EMS from a corporate perspective,
2. To understand the process of identifying and evaluating environmental impacts in order to determine a firm's environmental performance,
3. To assess the financial implications of adopting an ISO 14001-like EMS for a company operating in a highly competitive market, and
4. To identify sections of the ISO 14001 standard that demand greater clarity, with the aim to contribute to ongoing improvements of the standard.

PROJECT APPROACH

WORK SCOPE

The work scope was comprised of three major assignments:

1. Compilation of a comprehensive Site History,
2. Development, documentation, and organization of EMS elements to create an ISO 14001-like EMS,
3. Creation of an 'ISO 14000 Roadmap', to demonstrate how the enhanced EMS meets ISO 14001 requirements.

Imation Camarillo's Solvent Recovery Supervisor, the Vice-President of Sierra Pacific Environmental and our project team developed a detailed list of tasks for each assignment. The tasks, especially for assignment 2, closely followed the preliminary gap analysis of Imation Camarillo's EMS and the Project XL Covenant.

Three members our project team completed the assignments between June 29th and August 28th, 1998. Our project team collaborated with Environmental, Health & Safety (EHS) staff at Imation Camarillo (the Plant)[137], as well as corporate representatives during that time.

[137] Imation Corporation's Headquarters are located in Oakdale, Minnesota.

GAP ANALYSIS

Imation Camarillo's gap analysis provided a valuable guidance document for developing the work scope and a good starting block for the enhancement process itself. The analysis had been conducted in 1996 by environmental professionals at Imation and a team of consultants during a series of workshops. The resulting document determined how Imation Camarillo's EMS compared to the requirements of the ISO 14001 standard on a section-by-section basis. The analysis indicated relevant documents, process or personnel at Imation, wherever such information was pertinent to meeting a requirement. It also listed questions left unanswered, and highlighted the 'gaps' between the existing EMS and the ISO 14001 standard.

PROJECT TASKS

Compilation of Site History

We compiled an extensive site history for the Imation Camarillo plant. The document contains chapters on:

- Corporate History, Products & Services
- Camarillo's Plant History
- Production Processes, Support Operations & Environmental Processes
- Environmental Professionals, Programs & Plans at Imation Camarillo (including the EMS and Innovative Approaches to Pollution Prevention)
- Environmental Leadership (including Educational Collaboration, Environmental Awards and Media Coverage)

The site history provides a readily accessible reference document to EHS staff at Imation Camarillo. It will be used primarily as an information source for press releases, reports and other official publications, including publications on the World Wide Web.

Development of EMS Elements

The development, documentation, and organization of EMS elements constituted the dominant task of the project. Our project team systematically addressed every requirement stated or implied in the ISO 14001 standard on a paragraph-by-paragraph basis. We analyzed the relevant documents, processes, and procedures at Imation Camarillo for applicability, clarity of presentation, and completeness. Where necessary, we developed new elements or refined existing ones in

collaboration with the plant's EHS staff. Modifications to the management system were either implemented immediately, or clearly documented and discussed with the personnel responsible for subsequent implementation.

The enhanced EMS elements were combined to form an integrated ISO 14001-like Environmental Management System. All elements were comprehensively documented and cross-referenced in Imation Camarillo's electronic 'ISO 14000 Roadmap' database (described below).

Creation of ISO 14001 Roadmap

The Project Team integrated the enhanced EMS elements into a manageable system by use of Imation Corporation's electronic environmental database. The centerpiece of the system is the "ISO 14001 Roadmap". This document, structured as a two-column table, details the requirements of the ISO 14001 standard (quoted from the original document) in one column and provides a short statement on how Imation Camarillo's EMS meets those requirements in the second column. Supporting documents, including descriptions of applicable processes, copies of required plans, training manuals, responsibility matrices, and relevant presentations are electronically linked to the appropriate paragraph of the Roadmap.

The electronic format of the Roadmap provides three crucial advantages:

1. The design of the database is well suited for easy navigation; hence particular information within the EMS can be located fast and efficiently.
2. Since any EMS is by design an evolving system, it is particularly important that the available information can be kept up-to-date with minimal effort. All EHS staff at Imation Corporation have access to the centrally held EMS documentation, and can be notified of changes in information immediately.
3. The clear structure of the Roadmap provides a template and an example for other Imation plants seeking to enhance their EMS.

IMATION CAMARILLO'S ISO 14001-LIKE EMS[138]

ENVIRONMENTAL POLICY (SECTION 4.2)

Imation Corporation's Environmental, Health & Safety (EHS) Policy summarizes Imation's environmental principles. It particularly emphasizes a commitment to regulatory compliance, pollution prevention and continual improvement, three aspects that are fundamental to the ISO 14001 standard.

Imation's EHS Policy, which is officially supported by the CEO and Imation Camarillo's Plant Managers, is communicated to and implemented by all employees. The policy is communicated through the internal web site, EHS brochures, EHS bulletin boards and EHS training seminars. The policy is maintained by the corporate EHS office, is used by Plant Management as a framework for setting environmental targets, and helps to guide operating procedures on the work floor. The policy will soon be available to the public via Imation's web site.

PLANNING (SECTION 4.3)

The ISO 14001 standard's planning requirements consist of four major components:

1. Environmental aspects & impacts
2. Legal and other requirements
3. Objectives and targets
4. Environmental management program(s)

The four components are closely interconnected. The identified environmental aspects and impacts[139] provide the basis for setting environmental objectives and targets and identifying applicable legal and other requirements. Those requirements in turn constitute a framework for establishing the significance of environmental impacts. Finally, Imation's environmental management program designates

[138] The following account describes some aspects and noteworthy features of Imation Camarillo's EMS as perceived by the Donald Bren School Project Team. For reasons of confidentially, the descriptions given are a general overview, rather than a complete account of Imation Camarillo's EMS. They are intended to serve as a guiding example to companies intending to implement the ISO 14001 standard. This document is not a public statement on behalf of Imation Corporation or any of its plants.

[139] The ISO 14001 standard defines 'Environmental Aspect' as an "element of an organization's activities, products or services that can interact with the environment" (Section 3.3) and 'Environmental Impact' as "any change to the environment. whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services" (Section 3.4).

responsibilities and determines the means by which environmental targets will be achieved. All four components are anchored in its EHS policy.

Imation Camarillo's environmental aspects, impacts, objectives and targets are compiled in a matrix, which links each aspect with the relevant impacts and the objectives & targets set for maintaining or modifying the impact. The EMS further contains documents that describe the techniques and management tools for identifying, controlling, and evaluating environmental impacts at Imation Camarillo. These include the Camarillo Operating Procedures, Environmental Impact Reports, and regular source testing.

Environmental aspects and impacts are reviewed as part of the annual objective and target setting process. The progress towards environmental targets is tracked through a monthly environmental report issued by the Plant's Solvent Recovery Supervisor. This report details all waste streams associated with production, recycling and recovery processes, and any irregularities that occurred.

Imation Camarillo achieves its environmental goals through a suite of plans, processes and procedures. The environmental database contains a brief statement that summarizes the subject, objective and environmental relevance of certain plans, processes and procedures as well as an electronic copy of important original documents.

The environmental management programs are reviewed and up-dated on a regular basis. Some documents, such as the Camarillo Operating Procedures are up-dated virtually continuously, as they reflect even minor changes in production operations at the plant. Other documents, such as the Storm Water Pollution Prevention Plan are reviewed according to EPA requirements.

IMPLEMENTATION & OPERATION (SECTION 4.4)

The successful implementation and operation of an environmental management system calls for the continued involvement of all employees. The ISO 14001 standard therefore contains seven subsections concerning:

1. Structure and responsibility
2. Training, awareness and competence
3. Communication
4. EMS documentation
5. Document control

6. Operational control
7. Emergency preparedness and response

The project team successfully integrated these seven ISO 14001 components into existing organizational structures, for example safety training in the classroom and on-the-job, an Environmental Information Manager (EIM) database, an ISO 9000 compliant documentation system, and extensive safety procedures.

Structure & Responsibility

The team defined roles, responsibilities, and authorities relating to environmental management in Imation Camarillo's 'EMS Responsibility Matrix'. The matrix contains all responsibilities directly associated with the EMS in an order that closely follows the ISO 14001 standard. Roles and authorities are deduced from the requirements of the standard and from the demands posed by Imation's EMS. For each role or authority, a primary and (if relevant) secondary responsibility is assigned by job title at the Corporate or Plant level.

The EMS Responsibility Matrix is a comprehensive, but also complex master document. For the purpose of clear communication, a list of responsibilities sorted by job title is also available. The roles listed in the matrix and the allocation of responsibilities is reviewed as part of an annual management review process.

Training, Awareness & Competence

Imation Camarillo offers training appropriate to all levels of the organization. Awareness and competence are raised through seminars, on-the-job training, presentations, team meetings and bulletin boards. The training conducted to increase environmental awareness and competence complements the Health & Safety Training, in an effort to minimize organizational and financial impacts. A particularly creative approach to raising environmental awareness is Imation's solution to communicate their environmental policy. As a result of ISO 9000 certification, Imation Camarillo issued a credit card sized Quality Statement to all employees. The EHS Policy Statement will soon be printed on the reverse side of this card, which conveniently fits into each employee's company ID badge.

Communication

The ISO 14001 standard requires procedures for internal and external communication with regard to its environmental management system and significant impacts. At Imation Corporation, the internal communication between EHS staff at various levels and locations is greatly facilitated by a unique database: the Environmental Information Manager (EIM). The EIM houses the environmental information applicable to each Imation plant, including regulatory requirements, permits, and management plans. All EHS management staff has direct access to the

database. Corporate EHS workshops and conferences further encourage close cooperation between EHS staff.

The procedures and responsibilities for receiving, documenting, and responding to external communication are clearly identified and communicated to all involved. They are also documented in the ISO 14001 Roadmap.

EMS Documentation

The ISO 14001 Roadmap describes the key elements of Imation Camarillo's EMS, in direct correspondence to the ISO 14001 standard. The Roadmap also contains extensive links to supporting documents, such as management plans, which provide details on EMS-related procedures.

Document Control

The documents required by ISO 14001 are housed in the ISO 14001 Roadmap, in Imation Camarillo's Document Offices and in Operational Manuals located in relevant work areas, depending on the type and use of each document. Documents are up-dated in a timely manner, and the up-dated version of each document is immediately distributed. Outdated documents are concurrently removed and stored (spatially separate and clearly labeled) according to Imation Camarillo's Environmental Record Retention Policy. Responsibilities for maintaining a timely and accurate documentation system are assigned as part of the EMS Responsibility Matrix. (Document Control is based on the ISO 9000 system.)

Operational Control

Imation Camarillo's operations are determined by a management review process, which includes consideration of the plant's EHS policy, environmental aspects and significant impacts. All operations are documents as ' Camarillo Operating Procedures (COP)'. A specific COP exists, that stipulates the criteria for Environmental Authorization of a new or modified operating procedure, and all COPs pertaining to environmental aspects and impacts are identified by an (E) after the title of the COP. All COPs and their associated revisions are communicated and stored according to Imation Camarillo's documentation control system.

Furthermore, Imation Camarillo conducts a mandatory EHS training for all on-site contractors and suppliers to minimize the probability of negative environmental impacts from outside services.

Emergency Preparedness & Response

Imation Camarillo pursues a rigorous accident and incident reporting policy, conducts thorough safety training, and performs regular emergency drills. This

allows the plant to establish the precautions and improvements necessary for preventing emergencies.

In the case of an emergency, Imation Camarillo adheres to emergency procedures documented in three plans: the Contingency/SPCC plan, the Evacuation Plan, and the Business Plan. The plans are kept in electronic form on the EIM database. The Environmental Technician, as well as relevant emergency institutions, such as the local fire and police departments, also keeps hard copies of the plans.

The Environmental Technician regularly reviews the emergency procedures. Any procedural changes are communicated and, if necessary trained.

CHECKING & CORRECTIVE ACTION (SECTION 4.5)

Continual improvement is an integral part of the ISO 14001 EMS requirements. Therefore, procedures for reviewing and adjusting the system over time are necessary. The Checking & Corrective Action requirements of the ISO 14001 standard cover four areas that facilitate system adjustments, especially in the short- to medium-term:

1. Monitoring and measurement
2. Nonconformance and corrective and preventative action
3. Records
4. Environmental Management System audit

Monitoring & Measurement

Imation Camarillo's monitoring and measuring procedures are implemented in accordance with the plant's permits, policies and plans, as well as legal requirements. Monitoring data is routinely recorded for point air emissions, water discharge, hazardous and non-hazardous waste streams. Imation Camarillo has shown environmental stewardship by installing a state-of-the-art Fourier Transform Infrared Continuous Emission Monitoring System (FTIR CEMS). Monitoring data is summarized in the monthly Environmental Status Report and presented on a quarterly basis to the Plant Leadership Team[140] to assess the plant's progress toward its environmental objectives.

140 A Team composed of the Plant Manager and the Departmental Managers

Imation Camarillo has also implemented procedures to maintain the function and accuracy of its monitoring data, including a calibration standard and a Maintenance Management System.

Nonconformance and Corrective & Preventative Action

Imation Corporation is committed to preventing negative environmental impacts. Therefore, the company has implemented several procedures to ensure that environmental issues are considered from the design phase of new processes and products to the disposal of waste streams.

The EHS Manager is primarily responsible for managing issues of non-conformance at the plant, including an investigation and process correction appropriate in nature and in scope. Any procedural changes are adequately documented, and communicated and, if necessary, training is provided.

Records

Environmental records, including regulatory requirements, training records, and process information, are managed according to document control procedures and the Corporate Environmental Record Retention Policy. Responsibilities for organizing, maintaining, and storing records are assigned as part of the EMS Responsibility Matrix. Access to records may be strictly limited on a need-to-know basis, may be open to certain staff groups, or may be accessed by all employees, depending on the nature, applicability, and confidentiality of the record.

EMS Audit

Currently, Imation Camarillo has implemented a system for an ISO 9000 quality audit and a confidential, internal EHS Compliance audit. The Bren School Project Team has made recommendations on integrating the EMS audit procedures into the existing auditing system. Imation Corporation intends to review the recommendation, the auditing process and its implications.

MANAGEMENT REVIEW (SECTION 4.6)

ISO 14001 stipulates a regular management review of an EMS in order to ensure the continual improvement, suitability, and effectiveness of the EMS. At Imation Camarillo, the EMS is reviewed and evaluated on a regular basis by the plant's management and staff at the corporate EHS Office. This review addresses the appropriateness of the EHS policy and the goal setting and tracking procedures to ensure that Imation Camarillo's commitment to the environment is carefully implemented, well communicated and achieved by means of a continually improving EMS.

CONCLUSION

PROJECT FINDINGS

At the completion of the business case study, our project team concluded that:

- Imation Camarillo's EMS is ISO 14001-like, as required by the Project XL Covenant.
- Several aspects of Imation Camarillo's environmental management provide a showcase of environmental stewardship.
- The enhanced EMS is based on Imation Camarillo's existing organizational structures and uses current resources more effectively.

Imation Camarillo's EMS is ISO 14001-like, as can be determined from the ISO 14001 Roadmap. It meets or exceeds the standard's requirements with few exceptions. Our project team advised Imation Camarillo's management on the steps necessary to make the system fully ISO 14001 compatible.

We also concluded that Imation Camarillo has shown a pro-active approach to environmental problem solving. Imation Corporation is strongly committed to meeting or exceeding regulatory compliance, and the Camarillo facility in particular has repeatedly demonstrated environmental stewardship. The Plant has invested in state-of-the-art environmental technology, supported environmental education in the community and substantially contributed to Ventura County's air pollution control efforts through creation of the Ventura County Clean Air Fund.

The implementation of an ISO 14001-like EMS at Imation Camarillo was greatly facilitated by the organizational structure and resources already present. Some of the most crucial features were the visible management commitment, a closely cooperating EHS staff at the plant and corporate level, the EIM database, and the ISO 9000 quality management system.

FUTURE RESEARCH QUESTIONS

During the implementation process, we encountered several areas of ambiguity or uncertainty associated with the standard. In some cases, it was only after lengthy discussions that these uncertainties and ambiguities could be clarified, defined, or interpreted. The eight most important areas are:

- **Environmental Aspects & Impacts** – How are environmental aspects and significant impacts identified in a comparative and meaningful manner?

- **Environmental Performance** – How is environmental performance measured? How can the effectiveness of the performance indicators be evaluated? Does the standard have a visible environmental impact?
- **Motivation for Certification** – What are the primary reasons for companies to seek ISO 14001 certification?
- **EMS Cost Accounting** – What are the financial incentives resulting from certification? How do companies track environmental costs and benefits?
- **EMS Audits** – Does the EMS Audit present a (perceived) hurdle to certification? What are the legal implications and uncertainties associated with the audit?
- **Organizational Keys to Success** – How can a company gauge the extent of organizational modifications required for implementing the ISO 14001 standard.
- **Gap Analysis** – How can a company accurately assess its existing EMS and hence determine the EMS elements that require enhancement in order to comply with the standard.

Our project team decided to research these seven areas further and provide useful implementation tools and recommendations for companies seeking ISO 14001 certification as part of our report on "***The Effectiveness of ISO 14001 in the United States.***"

A2 - Corporate Survey Questionnaire & Data

CORPORATE QUESTIONNAIRE

FACILITY BACKGROUND

Facility Name: _____

Your Name: _____ Your Title: _____

Email address: _____ Phone:_____

1. Please indicate the size of your company and corporation (if applicable) by placing an X in the box that most closely corresponds to its size.

Company Size:		Facility	Corporation
	Small (Less than $10 M)		
	Medium (Between $10-$500 M)		
	Large (Greater than $500 M)		
Number of Employees:			
	Small (Under 1000)		
	Medium (1000-5000)		
	Large (Over 5000)		

2. Is your facility (or parent corporation) publicly held?

Yes	No

3. Is your facility ISO 9000 certified?

Yes	No

4. If your facility is ISO 9000 certified, how integrated are your facility's ISO 9000 and 14000 systems?

Separate systems				Highly integrated

5. Does your facility track its EMS costs using principles of environmental cost accounting?

Yes	No

6. Does your facility publish a public annual environmental report?

Yes	No

INCENTIVES FOR SEEKING CERTIFICATION

7. Please indicate how important each of the following issues were in your facility's decision to become ISO 14001 certified:

	Not Important			Important		Very Important
Environmental Performance						
Improved regulatory compliance						
Improved management of environmental impacts						
Reduced environmental risk						
Reduced pollution						
Regulatory Effectiveness:						
Greater permit flexibility						
Revised approach to regulatory inspections						
Improved compliance with government regulations						
Management Effectiveness:						
Public demonstration of environmental stewardship						
Improved internal communication among managers						
Communication with the community						
Marketing/Advertising opportunity						
Competitive Advantage:						
Increased international trade opportunities						
Access to new markets						
Increased competitive advantage						
Greater market share						
Financial Impacts:						
Decreased insurance costs						
Fewer regulatory fines						
Decreased permit costs						
Greater access to capital						
Stakeholders:						
Increased shareholder value						
Customer requirement						
Buyer requirement						
Lender requirement						

IMPLEMENTATION OF ISO 14001 EMS

8. Please indicate the level of stakeholder involvement in designing your facility's ISO 14001 EMS:

	Not Involved		Involved		Very Involved
Possible contributors to EMS Development					
Corporate Representatives					
Senior Management					
Environmental Managers					
Employees					
Customers/Clients					
Shareholders					
Community members					
Distributors					
Lawyers					
Marketing/Public Relations					
Regulatory Officials					
Other? Please describe:					

9. Please comment on the following constraints to certification:

	Serious Constraint		Mild Constraint		Not a Constraint
Management Constraints					
Lack of top management support					
Lack of personnel to implement/manage EMS					
Lack of time to implement a quality EMS					
Lack of understanding of ISO 14001 requirements					
Financial Constraints					
Design cost of ISO 14001 EMS					
Registration costs					
Annual costs of maintaining an ISO 14001 EMS					
Regulatory Constraints					
Uncertainty with regulatory agencies' utilization of EMS audit information					
Potential legal penalties from voluntary disclosure					
Lack of regulatory flexibility					

10. Please comment on how your facility's pollution prevention practices have been impacted by ISO 14001 certification.

	Decreased		No Change		Increased
Pollution Prevention					
Development of innovative technologies					
Funding for environmental Research & Development					
Use of "Design for the Environment" practices					
Creation of new Pollution Prevention practices					

EFFECTIVENESS OF ISO 14001

11. Please indicate how your ISO 14001 EMS has impacted your facility's overall performance:

	Decreased		No Change		Increased
Environmental Performance:					
Amount of total emissions					
Amount of total recycled waste					
Amount of reused waste					
Number of environmental production processes					
Number of identified environmental impacts					
Commitment to pollution prevention					
Estimated environmental risk (liability)					
Regulatory Performance:					
Total cost of regulatory fines					
Total cost of regulatory compliance					
Number of regulatory agency inspections					
Environmental regulatory compliance					
Regulatory streamlining					
Management Effectiveness:					
Management's commitment to environmental stewardship					
Communication:					
Public education and communication					
Involvement of key interested parties (stakeholders)					
Financial Effectiveness:					
Overall operating costs					
Total Insurance costs					
Increased access to capital					
Total value of outside investment					
Competitive Advantage:					
Access to new markets					
Access to international markets					
Overall competitive advantage					
Other?					
Please describe:					

LINKS TO FACILITY'S MANAGEMENT SYSTEM

12. To what degree has ISO 14001 certification modified your facility's management strategy?:

	Not at all		Some		Significant
Elements of management strategy:					
International strategy (market share, exports, etc.)					
Research and Development					
Accounting					
Marketing/Public Relations					
Purchasing					
Supplier/Distributor Requirements					
Advertising strategy					

COSTS AND BENEFITS OF CERTIFICATION

13. Did your facility prepare a cost benefit analysis prior to deciding to seek certification?

Yes	No

14. How much did it cost to design your ISO 14001 EMS, excluding initial certification costs? (Please include internal as well as external costs: i.e. employee time, process design, consultants).

Less than $50,000	$50,000-$100,000	$100,000-$200,000	Over $200,000

15. How much did it cost to initially register your facility (Certification costs)?

Less than $10,000	$10,000-$50,000	$50,000-$100,000	Over $100,000

16. Does your facility believe the overall benefits to ISO 14001 certification outweigh the costs?

Yes	No

17. Were the costs to implement ISO 14001 more or less than your facility expected?

Much Less		Expected		Much Greater

18. Please estimate the following changes in your facility's performance after obtaining ISO 14001 certification relative to before obtaining ISO 14001 certification:

	Decreased		No Change		Increased
Costs and Benefits after Certification					
Insurance costs					
Legal fees					
Regulatory fines					
Environmental liability					
Access to capital					
Market share					

19. What were your facility's total new pollution abatement expenditures before seeking certification? $ _____ After obtaining certification? $_____

20. What were your facility's total pollution abatement operating costs before seeking certification? $_____ After obtaining certification? $_____

**** Would you be willing to share your facility's name with your answers with the Multi State Working Group?**

Yes	No

CORPORATE QUESTIONNAIRE RESPONSE DATA

This Appendix contains Frequency Tables for each question of the Corporate Questionnaire. The tables display the frequency and percentage (in addition to a Valid and Cumulative Percent) of each category of responses. The possible answers are shown on the vertical axis with the frequencies on the horizontal axis.

The "Missing System" variable accounts for the number blank, or missing responses.

The value for the "Valid: Total" is the number of total responses for each question.

The "Total" listed below the "Missing System" value indicates the total number of responses plus the number of missing responses, in this case 55 total questionnaires were received.

**Please note that only the categories that contain responses are displayed in the Frequency Tables. Those categories that do not appear in the table have an implicit value of zero. For example, Question X "Total Cost of Regulatory Fines" contains

only three categories: Decreased, Slightly Decreased, and No Change. This indicates that none of the respondents chose either Slightly Increased, or Increased.

1. Size of Facility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Small (< $10M)	4	7.3	9.1	9.1
	Medium ($10-$500M)	32	58.2	72.7	81.8
	Large (>$500M)	8	14.5	18.2	100.0
	Total	44	80.0	100.0	
Missing	System	11	20.0		
Total		55	100.0		

1. Size of Corporation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Small (< $10M)	2	3.6	4.9	4.9
	Medium ($10-$500M)	7	12.7	17.1	22.0
	Large (> $500M)	32	58.2	78.0	100.0
	Total	41	74.5	100.0	
Missing	System	14	25.5		
Total		55	100.0		

1. Number of Employees (Facility)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Small (Under 1000)	36	65.5	73.5	73.5
	Medium (1000-5000)	12	21.8	24.5	98.0
	Large (Over 5000)	1	1.8	2.0	100.0
	Total	49	89.1	100.0	
Missing	System	6	10.9		
Total		55	100.0		

1. Number of Employees (Corporation)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Small (Under 1000)	5	9.1	11.9	11.9
	Medium (1000-5000)	10	18.2	23.8	35.7
	Large (Over 5000)	27	49.1	64.3	100.0
	Total	42	76.4	100.0	
Missing	System	13	23.6		
Total		55	100.0		

2. Facility (or Corporation) Publicly Held

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	61.8	63.0	63.0
	No	20	36.4	37.0	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

3. ISO 9000 Certification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	83.6	85.2	85.2
	No	8	14.5	14.8	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

4. Integration of ISO 9000 and 14000?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Separate Systems	6	10.9	13.3	13.3
	Mostly Separate Systems	10	18.2	22.2	35.6
	Mostly Integrated Systems	9	16.4	20.0	55.6
	Integrated Systems	8	14.5	17.8	73.3
	Highly Integrated Systems	12	21.8	26.7	100.0
	Total	45	81.8	100.0	
Missing	System	10	18.2		
Total		55	100.0		

5. Use of Environmental Cost Accounting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	25.5	25.9	25.9
	No	40	72.7	74.1	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

6. Publish Annual Environmental Report

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	30.9	31.5	31.5
	No	37	67.3	68.5	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

7. Improved Regulatory Compliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	10	18.2	18.9	18.9
	Somewhat Important	5	9.1	9.4	28.3
	Important	11	20.0	20.8	49.1
	Quite Important	13	23.6	24.5	73.6
	Very Important	14	25.5	26.4	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Improved Management of Environmental Impacts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	3	5.5	5.7	5.7
	Important	12	21.8	22.6	28.3
	Quite Important	23	41.8	43.4	71.7
	Very Important	15	27.3	28.3	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Reduced Environmental Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	5.5	5.7	5.7
	Somewhat Important	2	3.6	3.8	9.4
	Important	15	27.3	28.3	37.7
	Quite Important	18	32.7	34.0	71.7
	Very Important	15	27.3	28.3	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

Reduced Pollution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	5.5	5.7	5.7
	Somewhat Important	2	3.6	3.8	9.4
	Important	15	27.3	28.3	37.7
	Quite Important	22	40.0	41.5	79.2
	Very Important	11	20.0	20.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Greater Permit Flexibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	17	30.9	32.1	32.1
	Somewhat Important	13	23.6	24.5	56.6
	Important	10	18.2	18.9	75.5
	Quite Important	8	14.5	15.1	90.6
	Very Important	5	9.1	9.4	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Revised Approach to Regulatory Inspections

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	16	29.1	30.2	30.2
	Somewhat Important	9	16.4	17.0	47.2
	Important	16	29.1	30.2	77.4
	Quite Important	8	14.5	15.1	92.5
	Very Important	4	7.3	7.5	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Improved Compliance with Government Regulations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	11	20.0	20.8	20.8
	Somewhat Important	3	5.5	5.7	26.4
	Important	10	18.2	18.9	45.3
	Quite Important	14	25.5	26.4	71.7
	Very Important	15	27.3	28.3	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Public Demonstration of Environmental Stewardship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat Important	8	14.5	15.1	15.1
	Important	10	18.2	18.9	34.0
	Quite Important	15	27.3	28.3	62.3
	Very Important	20	36.4	37.7	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Improved Internal Communication among Managers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	5.5	5.7	5.7
	Somewhat Important	7	12.7	13.2	18.9
	Important	18	32.7	34.0	52.8
	Quite Important	12	21.8	22.6	75.5
	Very Important	13	23.6	24.5	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Communication with the Community

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	5.5	5.7	5.7
	Somewhat Important	12	21.8	22.6	28.3
	Important	17	30.9	32.1	60.4
	Quite Important	13	23.6	24.5	84.9
	Very Important	8	14.5	15.1	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Marketing/Advertizing Opportunity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	6	10.9	11.3	11.3
	Somewhat Important	12	21.8	22.6	34.0
	Important	12	21.8	22.6	56.6
	Quite Important	11	20.0	20.8	77.4
	Very Important	12	21.8	22.6	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Increased International Trade Opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	6	10.9	11.3	11.3
	Somewhat Important	10	18.2	18.9	30.2
	Important	10	18.2	18.9	49.1
	Quite Important	11	20.0	20.8	69.8
	Very Important	16	29.1	30.2	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Access to New Markets

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	7	12.7	13.2	13.2
	Somewhat Important	10	18.2	18.9	32.1
	Important	13	23.6	24.5	56.6
	Quite Important	11	20.0	20.8	77.4
	Very Important	12	21.8	22.6	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

Increased Competitive Advantage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	9.1	9.4	9.4
	Somewhat Important	9	16.4	17.0	26.4
	Important	6	10.9	11.3	37.7
	Quite Important	15	27.3	28.3	66.0
	Very Important	18	32.7	34.0	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Greater Market Share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	6	10.9	11.5	11.5
	Somewhat Important	12	21.8	23.1	34.6
	Important	6	10.9	11.5	46.2
	Quite Important	14	25.5	26.9	73.1
	Very Important	14	25.5	26.9	100.0
	Total	52	94.5	100.0	
Missing	System	3	5.5		
Total		55	100.0		

7. Decreased Insurance Fees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	18	32.7	34.0	34.0
	Somewhat Important	13	23.6	24.5	58.5
	Important	14	25.5	26.4	84.9
	Quite Important	7	12.7	13.2	98.1
	Very Important	1	1.8	1.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Fewer Regulatory Fines

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	19	34.5	36.5	36.5
	Somewhat Important	8	14.5	15.4	51.9
	Important	11	20.0	21.2	73.1
	Quite Important	8	14.5	15.4	88.5
	Very Important	6	10.9	11.5	100.0
	Total	52	94.5	100.0	
Missing	System	3	5.5		
Total		55	100.0		

7. Decreased Permit Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	21	38.2	39.6	39.6
	Somewhat Important	11	20.0	20.8	60.4
	Important	13	23.6	24.5	84.9
	Quite Important	6	10.9	11.3	96.2
	Very Important	2	3.6	3.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Greater Access to Capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	24	43.6	45.3	45.3
	Somewhat Important	9	16.4	17.0	62.3
	Important	13	23.6	24.5	86.8
	Quite Important	5	9.1	9.4	96.2
	Very Important	2	3.6	3.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Increased Shareholder Value

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	11	20.0	21.2	21.2
	Somewhat Important	14	25.5	26.9	48.1
	Important	8	14.5	15.4	63.5
	Quite Important	8	14.5	15.4	78.8
	Very Important	11	20.0	21.2	100.0
	Total	52	94.5	100.0	
Missing	System	3	5.5		
Total		55	100.0		

7. Customer Requirement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	12	21.8	22.6	22.6
	Somewhat Important	12	21.8	22.6	45.3
	Important	12	21.8	22.6	67.9
	Quite Important	11	20.0	20.8	88.7
	Very Important	6	10.9	11.3	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

7. Buyer Requirement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	20	36.4	38.5	38.5
	Somewhat Important	16	29.1	30.8	69.2
	Important	11	20.0	21.2	90.4
	Quite Important	1	1.8	1.9	92.3
	Very Important	4	7.3	7.7	100.0
	Total	52	94.5	100.0	
Missing	System	3	5.5		
Total		55	100.0		

7. Lender Requirement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	27	49.1	50.9	50.9
	Somewhat Important	16	29.1	30.2	81.1
	Important	7	12.7	13.2	94.3
	Quite Important	1	1.8	1.9	96.2
	Very Important	2	3.6	3.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

8. Involvement of Corporate Representatives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	8	14.5	14.8	14.8
	Somewhat Involved	12	21.8	22.2	37.0
	Involved	9	16.4	16.7	53.7
	Quite Involved	11	20.0	20.4	74.1
	Very Involved	14	25.5	25.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Senior Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	1	1.8	1.9	1.9
	Somewhat Involved	3	5.5	5.6	7.4
	Involved	17	30.9	31.5	38.9
	Quite Involved	21	38.2	38.9	77.8
	Very Involved	12	21.8	22.2	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Environmental Managers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	3	5.5	5.6	5.6
	Somewhat Involved	1	1.8	1.9	7.4
	Involved	2	3.6	3.7	11.1
	Quite Involved	8	14.5	14.8	25.9
	Very Involved	40	72.7	74.1	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	1	1.8	1.9	1.9
	Somewhat Involved	4	7.3	7.4	9.3
	Involved	18	32.7	33.3	42.6
	Quite Involved	24	43.6	44.4	87.0
	Very Involved	7	12.7	13.0	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Customers/Clients

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	23	41.8	42.6	42.6
	Somewhat Involved	19	34.5	35.2	77.8
	Involved	11	20.0	20.4	98.1
	Quite Involved	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Shareholders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	34	61.8	64.2	64.2
	Somewhat Involved	10	18.2	18.9	83.0
	Involved	7	12.7	13.2	96.2
	Very Involved	2	3.6	3.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

8. Involvement of Community Members

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	37	67.3	68.5	68.5
	Somewhat Involved	11	20.0	20.4	88.9
	Involved	6	10.9	11.1	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Distributors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	43	78.2	79.6	79.6
	Somewhat Involved	8	14.5	14.8	94.4
	Involved	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Lawyers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	29	52.7	53.7	53.7
	Somewhat Involved	14	25.5	25.9	79.6
	Involved	2	3.6	3.7	83.3
	Quite Involved	9	16.4	16.7	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Marketing/Public Relations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	24	43.6	44.4	44.4
	Somewhat Involved	14	25.5	25.9	70.4
	Involved	10	18.2	18.5	88.9
	Quite Involved	5	9.1	9.3	98.1
	Very Involved	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

8. Involvement of Regulatory Officials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Involved	37	67.3	68.5	68.5
	Somewhat Involved	5	9.1	9.3	77.8
	Involved	8	14.5	14.8	92.6
	Quite Involved	3	5.5	5.6	98.1
	Very Involved	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Lack of Top Management Support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	4	7.3	7.4	7.4
	Serious Constraint	3	5.5	5.6	13.0
	Moderate Constraint	6	10.9	11.1	24.1
	Mild Constraint	9	16.4	16.7	40.7
	Not a Constraint	32	58.2	59.3	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Lack of Personnel to Implement/Manage the EMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	2	3.6	3.8	3.8
	Serious Constraint	5	9.1	9.4	13.2
	Moderate Constraint	16	29.1	30.2	43.4
	Mild Constraint	9	16.4	17.0	60.4
	Not a Constraint	21	38.2	39.6	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

9. Constraint: Lack of Time to Implement a Quality EMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	2	3.6	3.8	3.8
	Serious Constraint	4	7.3	7.5	11.3
	Moderate Constraint	13	23.6	24.5	35.8
	Mild Constraint	15	27.3	28.3	64.2
	Not a Constraint	19	34.5	35.8	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

9. Constraint: Lack of Understanding of ISO 14001 Requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	2	3.6	3.7	3.7
	Serious Constraint	8	14.5	14.8	18.5
	Moderate Constraint	8	14.5	14.8	33.3
	Mild Constraint	13	23.6	24.1	57.4
	Not a Constraint	23	41.8	42.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Design Cost of ISO 14001 EMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Serious Constraint	3	5.5	5.6	5.6
	Moderate Constraint	10	18.2	18.5	24.1
	Mild Constraint	17	30.9	31.5	55.6
	Not a Constraint	24	43.6	44.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Registration Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Serious Constraint	3	5.5	5.6	5.6
	Moderate Constraint	14	25.5	25.9	31.5
	Mild Constraint	12	21.8	22.2	53.7
	Not a Constraint	25	45.5	46.3	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Annual Cost of Maintaining an ISO 14001 EMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	1	1.8	1.9	1.9
	Serious Constraint	2	3.6	3.7	5.6
	Moderate Constraint	15	27.3	27.8	33.3
	Mild Constraint	12	21.8	22.2	55.6
	Not a Constraing	24	43.6	44.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Uncertainty with Regulatory Agencies' utilization of EMS Audit Information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	3	5.5	5.6	5.6
	Serious Constraint	2	3.6	3.7	9.3
	Moderate Constraint	15	27.3	27.8	37.0
	Mild Constraint	15	27.3	27.8	64.8
	Not a Constraint	19	34.5	35.2	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Potential Legal Penalties from Voluntary Disclosure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	2	3.6	3.7	3.7
	Serious Constraint	1	1.8	1.9	5.6
	Moderate Constraint	18	32.7	33.3	38.9
	Mild Constraint	14	25.5	25.9	64.8
	Not a Constraint	19	34.5	35.2	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

9. Constraint: Lack of Regulatory Flexibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious Constraint	1	1.8	1.9	1.9
	Serious Constraint	2	3.6	3.7	5.6
	Moderate Constraint	13	23.6	24.1	29.6
	Mild Constraint	15	27.3	27.8	57.4
	Not a Constraint	23	41.8	42.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

10. P2 Impact: Development of Innovative Technologies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	4	7.3	7.4	7.4
	No Change	25	45.5	46.3	53.7
	Slightly Increased	21	38.2	38.9	92.6
	Increased	4	7.3	7.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

10. P2 Impact: Funding for Environmental Research and Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	7	12.7	13.5	13.5
	No Change	38	69.1	73.1	86.5
	Slightly Increased	6	10.9	11.5	98.1
	Increased	1	1.8	1.9	100.0
	Total	52	94.5	100.0	
Missing	System	3	5.5		
Total		55	100.0		

10. P2 Impact: Use of Design for the Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	5	9.1	9.3	11.1
	No Change	23	41.8	42.6	53.7
	Slightly Increased	21	38.2	38.9	92.6
	Increased	4	7.3	7.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

10. P2 Impact: Creation of New Pollution Prevention processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	6	10.9	11.1	11.1
	No Change	10	18.2	18.5	29.6
	Slightly Increased	32	58.2	59.3	88.9
	Increased	6	10.9	11.1	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Amount of Total Emission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	5	9.1	9.3	9.3
	Slightly Decreased	26	47.3	48.1	57.4
	No Change	22	40.0	40.7	98.1
	Slightly Increased	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Amount of Total Recycled Waste

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	2	3.6	3.7	3.7
	Slightly Decreased	8	14.5	14.8	18.5
	No Change	15	27.3	27.8	46.3
	Slightly Increased	21	38.2	38.9	85.2
	Increased	8	14.5	14.8	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Amount of Reused Waste

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	4	7.3	7.4	9.3
	No Change	22	40.0	40.7	50.0
	Slightly Increased	23	41.8	42.6	92.6
	Increased	4	7.3	7.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Number of Environmental Production Processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	1	1.8	1.9	1.9
	No Change	37	67.3	69.8	71.7
	Slightly Increased	14	25.5	26.4	98.1
	Increased	1	1.8	1.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

11. EMS impact on: Number of Identified Environmental Impacts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	3	5.5	5.6	5.6
	No Change	15	27.3	27.8	33.3
	Slightly Increased	29	52.7	53.7	87.0
	Increased	7	12.7	13.0	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Committment to Pollution Prevention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	2	3.6	3.9	3.9
	No Change	7	12.7	13.7	17.6
	Slightly Increased	26	47.3	51.0	68.6
	Increased	16	29.1	31.4	100.0
	Total	51	92.7	100.0	
Missing	System	4	7.3		
Total		55	100.0		

11. EMS impact on: Estimated Environmental Risk (Liability)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	3	5.5	5.6	5.6
	Slightly Decreased	17	30.9	31.5	37.0
	No Change	30	54.5	55.6	92.6
	Slightly Increased	3	5.5	5.6	98.1
	Increased	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Total Cost of Regulatory Fines

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	2	3.6	3.7	3.7
	Slightly Decreased	7	12.7	13.0	16.7
	No Change	45	81.8	83.3	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Total Cost of Regulatory Compliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	2	3.6	3.8	3.8
	Slightly Decreased	8	14.5	15.1	18.9
	No Change	33	60.0	62.3	81.1
	Slightly Increased	10	18.2	18.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

11. EMS impact on: Number of Regulatory Agency Inspections

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	8	14.5	14.8	16.7
	No Change	42	76.4	77.8	94.4
	Slightly Increased	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Environmental Regulatory Compliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	1	1.8	1.9	1.9
	No Change	33	60.0	61.1	63.0
	Slightly Increased	17	30.9	31.5	94.4
	Increased	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Regulatory Streamlining

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	2	3.6	3.7	3.7
	No Change	43	78.2	79.6	83.3
	Slightly Increased	8	14.5	14.8	98.1
	Increased	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Management's Commitment to Environmental Stewardship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Change	7	12.7	13.0	13.0
	Slightly Increased	36	65.5	66.7	79.6
	Increased	11	20.0	20.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Public Education and Communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	1	1.8	1.9	1.9
	No Change	21	38.2	38.9	40.7
	Slightly Increased	27	49.1	50.0	90.7
	Increased	5	9.1	9.3	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Involvement of Key Interested Players

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	2	3.6	3.7	3.7
	No Change	23	41.8	42.6	46.3
	Slightly Increased	25	45.5	46.3	92.6
	Increased	4	7.3	7.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Overall Operating Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	2	3.6	3.7	3.7
	Slightly Decreased	8	14.5	14.8	18.5
	No Change	29	52.7	53.7	72.2
	Slightly Increased	13	23.6	24.1	96.3
	Increased	2	3.6	3.7	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Total Insurance Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	6	10.9	11.3	11.3
	No Change	47	85.5	88.7	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

11. EMS impact on: Access to Capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	3	5.5	5.6	5.6
	No Change	44	80.0	81.5	87.0
	Slightly Increased	7	12.7	13.0	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Total value of Outside Investment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	1	1.8	1.9	1.9
	No Change	49	89.1	92.5	94.3
	Slightly Increased	3	5.5	5.7	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

11. EMS impact on: Access to New Markets

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Change	30	54.5	55.6	55.6
	Slightly Increased	21	38.2	38.9	94.4
	Increased	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Access to International Markets

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Change	28	50.9	51.9	51.9
	Slightly Increased	22	40.0	40.7	92.6
	Increased	4	7.3	7.4	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

11. EMS impact on: Overall Competitive Advantage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Change	22	40.0	40.7	40.7
	Slightly Increased	29	52.7	53.7	94.4
	Increased	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

12. Modification of: International Strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	17	30.9	32.1	32.1
	Little	16	29.1	30.2	62.3
	Some	16	29.1	30.2	92.5
	Significant	4	7.3	7.5	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

12. Modification of: Research and Development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	20	36.4	37.7	37.7
	Little	12	21.8	22.6	60.4
	Some	16	29.1	30.2	90.6
	Noticeable	5	9.1	9.4	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

12. Modification of: Accounting System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	23	41.8	42.6	42.6
	Little	18	32.7	33.3	75.9
	Some	12	21.8	22.2	98.1
	Noticeable	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

12. Modification of: Marketing/Public Relations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	6	10.9	11.1	11.1
	Little	15	27.3	27.8	38.9
	Some	21	38.2	38.9	77.8
	Noticeable	10	18.2	18.5	96.3
	Significant	2	3.6	3.7	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

12. Modification of: Purchasing System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	9	16.4	16.7	16.7
	Little	16	29.1	29.6	46.3
	Some	22	40.0	40.7	87.0
	Noticeable	6	10.9	11.1	98.1
	Significant	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

12. Modification of: Supplier/Distributer Requirments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	13	23.6	24.1	24.1
	Little	17	30.9	31.5	55.6
	Some	14	25.5	25.9	81.5
	Noticeable	8	14.5	14.8	96.3
	Significant	2	3.6	3.7	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

12. Modification of: Advertising Strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All	16	29.1	29.6	29.6
	Little	13	23.6	24.1	53.7
	Some	13	23.6	24.1	77.8
	Noticeable	9	16.4	16.7	94.4
	Significant	3	5.5	5.6	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

13. Preparation of Cost Benefit Analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	21.8	22.2	22.2
	No	42	76.4	77.8	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

14. Design Cost of ISO 14001 EMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than $50,000	21	38.2	39.6	39.6
	$50,000-$100,000	19	34.5	35.8	75.5
	$100,000-$200,000	8	14.5	15.1	90.6
	Over $200,000	5	9.1	9.4	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

15. Initial Registration Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than $10,000	17	30.9	32.1	32.1
	$10,000-$50,000	33	60.0	62.3	94.3
	$50,000-$100,000	2	3.6	3.8	98.1
	Over $100,000	1	1.8	1.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

16. Do the Overall Benefits of ISO 14001 Outweigh the Costs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	48	87.3	90.6	90.6
	No	5	9.1	9.4	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

17. Were the Costs associated with ISO 14001 what you anticipated?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Much Less	3	5.5	5.6	5.6
	Less	6	10.9	11.1	16.7
	As Expected	35	63.6	64.8	81.5
	Greater	9	16.4	16.7	98.1
	Much Greater	1	1.8	1.9	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

18. Changes in: Insurance Costs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	3	5.5	5.7	5.7
	Slightly Decreased	5	9.1	9.4	15.1
	No Change	45	81.8	84.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

18. Changes in: Legal Fees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	8	14.5	15.1	17.0
	No Change	42	76.4	79.2	96.2
	Slightly Increased	1	1.8	1.9	98.1
	Increased	1	1.8	1.9	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

18. Changes in: Regulatory Fines

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	12	21.8	22.6	24.5
	No Change	40	72.7	75.5	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

18. Changes in: Environmental Liabilites

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	1	1.8	1.9	1.9
	Slightly Decreased	27	49.1	50.9	52.8
	No Change	25	45.5	47.2	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

18. Changes in: Access to Capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	4	7.3	7.5	7.5
	No Change	45	81.8	84.9	92.5
	Slightly Increased	4	7.3	7.5	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

18. Changes in: Market Share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Decreased	3	5.5	5.7	5.7
	No Change	34	61.8	64.2	69.8
	Slightly Increased	16	29.1	30.2	100.0
	Total	53	96.4	100.0	
Missing	System	2	3.6		
Total		55	100.0		

Geographical Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	West	8	14.5	14.8	14.8
	Mid West	10	18.2	18.5	33.3
	Central	5	9.1	9.3	42.6
	Northeast	23	41.8	42.6	85.2
	Southeast	8	14.5	14.8	100.0
	Total	54	98.2	100.0	
Missing	System	1	1.8		
Total		55	100.0		

A3 – NGO Survey Questionnaire & Data

ISO 14001 SURVEY FOR NON-GOVERNMENTAL ORGANIZATIONS

Name of Organization_____ Number of National Members _____

Your Name _____ Your Title _____

Email Address _____ Phone _____

Background Knowledge

1. Please check the box that corresponds to your level of knowledge of Environmental Management Systems.

	Unfamiliar				**Very Familiar**
	1	**2**	**3**	**4**	**5**
a.) How familiar are you with Environmental Management Systems (EMS)?					
b.) How familiar are you with ISO 14001?					

ISO 14001 Policy Discussions

2a. Has your organization participated in discussions about ISO 14001?

Yes	No

2b. If Yes, how well has *your organization* been represented and consulted in the progress, development, and implementation of ISO 14001 in the U.S.?

Not At All				Very Well
1	2	3	4	5

3. In general, do you believe the NGO sector is appropriately involved in policy discussions about ISO 14001?

Don't Know (1)	Not Enough (2)	Appropriate (3)	Too Much (4)

Regulatory Innovation

4. Does your organization support regulatory innovation/reinvention in the environmental arena?

Yes	No

5a. Are you aware of any ISO 14001 related regulatory innovation programs in your community?

Yes	No

5b. If Yes, please indicate which programs:

_____

6. Is your organization interested in participating in environmental regulatory innovation programs in the future?

Yes	No

7. Please indicate the following aspects that would be helpful in supporting your organization's participation in regulatory innovation programs in the future:

	Helpful	Not Helpful	Don't Know
a.) Training programs			
b.) Educational materials			
c.) Funding (i.e. reimbursement of staff time)			
d.) Travel reimbursements			

8. In general, should regulatory agencies take the following actions to respond to ISO 14001 certified companies?:

	Yes	No	Don't Know
a.) Fewer regulatory inspections			
b.) Streamlined monitoring and reporting requirements			
c.) Individualized permitting			
d.) Greater permit flexibility			
e.) No action			

Environmental Education

9a. Has your organization been offered any educational/training materials concerning ISO 14001 by any governmental or private organizations?

Yes	No

9b. If Yes, please indicate which organizations approached yours:

_____

10. Has your organization implemented any programs designed to educate your members about ISO 14001?

Yes	No

Perceptions of ISO 14001 Certification

11. Please comment on your organization's perception of ISO 14001 certified companies in the following areas:

	Yes	No	Don't Know
ISO 14001 certified companies will demonstrate:			
a.) Improved regulatory compliance			
b.) Improved environmental management			
c.) Reduced pollution			

12. ****Would you be willing to share your facility's name with your answers with the Multi State Working Group?**

Yes	No

NGO SURVEY RESPONSE DATA

	1	2	3	4	5	Yes	No	Helpful	Not Helpful	Don't Know	# of Responses
Question #											
1(a)	3	1	2	3	1						10
1(b)	3	1	3	2	1						10
2(a)						6	4				10
2(b)	4	3	1	0	0						8
3	5	5	0	0	0						10
4						7	2				9
5(a)						2	8				10
5(b)	Region 1 Startrack										
6						5	3				8
7(a)								2	4	3	9
7(b)								3	3	3	9
7(c)								6	1	2	9
7(d)								5	1	2	8
8(a)						1	6			3	10
8(b)						2	5			3	10
8(C)						1	5			4	10
8(d)						2	4			4	10
8(e)						3	0			4	7
9(a)						3	7				10
9(b)	GT Strategies, MSWG, USEPA, CSI										
10						1	7				8
11(a)						1	3			5	9
11(b)						2	1			6	9
11(c)						0	2			7	9
12						3	4				7

A4 – Related Projects & ISO 14000 Websites

http://www.intelex.com/ (ISO 14000 implementation software)

http://www.futurepast.com/ (ISO 14000 in Russia and the Ukraine)

http://www.ecologia.org/iso14000/ (NGO ISO 14000 initiative)

http://www.quality.co.uk/ (environmental and quality management, ISO 14000, EMAS, and BS7750)

http://trst.com/ (ISO 14000 and Environmental Management Systems: A Foundation for Sustainability including ISO background, articles, books, case studies, Gap-analysis, and keys to success)

http://web.ansi.org/ (American National Standards Institute)

http://www.gemi.org/ (Global Environmental Management Initiative)

http://www.greenware.ca/ (GreenWare Environmental Systems, Inc.: ISO 14000 information, software, and training)

http://yosemite.epa.gov/xl/xl_home.nsf/all/homepage/ (U.S. Environmental Protection Agency Project XL)

http://www.isocenter.com/14000/ (ISO center, index of 14000)

http://ts.nist.gov/ts/htdocs/210/216/environ.htm/ (ISO Environmental Management Standardization Efforts)

http://www.lawinfo.com/law/ca/environmentallaw/ (The Law offices of S. Wayne Rosenbaum specializing in Environmental Law & ISO14000 Management Systems)

http://www.epa.gov/reinvent/ (U.S. EPA reinventing environmental protection)

http://www.iso14000.net/ (GlobeNet: Your complete source for ISO14000 information)

http://www.iso.ch/ (International Organization for Standardization)

http://www.calepa.ca.gov/ISO14000.htm/ (California Environmental Protection Agency)

http://www.mgmt14k.com/ems.htm/ (MGMT Alliances Inc.)

http://www.dep.state.pa.us/dep/deputate/pollprev/Tech_Assistance/Toolbox/iso14001/ (Pennsylvania Department of Environmental Protection)

http://es.epa.gov/partners/iso/iso.html/ (EPA Standards Networks)

http://www.iso14000.com/ (ISO 14000 InfoCenter)

http://sbn.envirolink.org/ (Sustainable Business Network)

http://www.globusregistry.com/cgi-bin/Home/Public/homesummary.cgi/ (GLOBUS registry)

http://www.scc.ca/iso14000/ (Standards Council of Canada)

http://www.inem.org/ (International Network for Environmental Management)

http://www.ecology.or.jp/isoworld/english/english.htm/ (ISO World)

http://www.usaep.org/ (United States – Asia Environmental Partnership)