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Matela, Puseletso Sylvia

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ISO 14001 ENVIRONMENTAL PERFORMANCE AS A STAND- ALONE TOOL AND BACK UP REQUIREMENT FROM OTHER ENVIRONMENTAL TOOLS FOR ENHANCED PERFORMANCE: SOUTH AFRICAN CASE STUDY.

Puseletso Sylvia Matela

A dissertation submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in fulfilment of the requirements for the degree Master of Science in Engineering

Johannesburg, 2006

DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Science in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university

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ABSTRACT

Despite benefits claimed by organisations on ISO 14001 such as improved environmental performance and gaining of business advantage, there are disputes that the standard does not lead to improved environmental performance. The purpose of the study was to establish environmental performance of ISO 14001 in South Africa; and environmental management tools that can back up ISO 14001 standard for enhanced performance. The study was based on questionnaires, interviews and documents.

The outcome of the study was that ISO 14001 is implemented in South Africa mainly to gain business advantage whilst aiding in improved environmental behaviour. Benefits obtained from ISO 14001 certification by organisation include environmental awareness and responsibility by employees across the board, more organised data management, reduced environmental costs, no environmental liabilities and gaining good reputation with the public, government, insurers and other stakeholders. However the issue of costs is considerably a limitation for companies to register for ISO 14001. The environmental management tools mostly implemented are those closely associated with ISO 14001 such as Environmental Auditing, Environmental Performance Indicators and Environmental Reporting. Other tools such as Design for Environment, Life Cycle assessment, Extended Producer Responsibility, and Eco-Mapping are not popular in South Africa which can imply missed opportunities. Strategic incorporation of these Environmental management tools into ISO 14001 include simplicity, innovation, use of incentives, industrial associations and benchmarking, new thinking, education, building on existing business practices and broadening the use of ISO 14001 standard.

DEDICATION

To my husband and our son.

ACKNOWLEDGEMENTS

I would like to cordially thank my supervisor for his patient guidance in carrying out this research, all the respondents that gave the required information; without them this study would have not been a success. I am grateful to my uncle's family which made my studying in Johannesburg a lot smoother. I thank my sister Linyanes for her ever-ready assistance, my aunt for editing this report, and to my entire family for their support; mom, I love you. Above all, I would like to thank the Lord my God for giving me strength and persistence to carry out this study.

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ABBREVIATIONS AND ACRONYMS

ABB	Asea Brown Boveri
BCSD:	Business Council on Sustainable Development
BSI:	British Standard Institutes
BVQI:	Buerau Veritas Quality International
CAIA	Canadian Archaeological Institute at Athens
CC:	Corporate Citizenship
DfE:	Design for Environment
EMS:	Environmental Management System
EMAS:	Eco-Management and Audit Scheme
ICC:	International Code Council
IE:	Industrial Ecology
ISO:	International Standards Organisation
IWMSA	Institute of Waste Management of Southern Africa
KPGM:	Klein Pit Marwick Goodlign
NQS:	National Quality Standard
LCA:	Life Cycle Assessment
OHSAS:	Occupational Health and Safety Assessment Specification
PWC:	Price Waterhouse Coopers
SABS:	South African Bureau of Standards
SAGE:	Strategic Advisory Group on Environment
SGS:	Schweiz Vereinigung fur Quallats and Management System
SMME:	Small, Medium and Micro Enterprises
UNCED:	United Nations Conference on Environment and Development
UNEP:	United Nations Environment Programme

WCED: World Commission on Environment and Development

WICEM: World Industry Conference on Environment Management

WTO: World Trade Organisation

CHAPTER 1: INTRODUCTION

1.1 Study background

ISO 14000 series is a system of 20 separate Environmental Management Standards (EMS) designed to help organisations establish management processes for controlling and improving their environmental performance. The most important ISO 14000 standard is the EMS specification standard ISO 14001. It provides a framework for establishing or improving an EMS and is the only standard of the ISO 14000 series that can be used in certification (Babakri, Bennet and Franchetti, 2003). All other standards in the series serve supporting functions to maximize the effectiveness of the ISO 14001 (Warries, 2004). ISO 14001 outlines guidelines that can be implemented by almost any type of organisation in any country and is designed primarily to improve environmental management (Rondinelli and Vastag, 2000). However, ISO 14001 does not establish performance standards on its own, the amount of environmental performance improvement depends on the strength of a company‘s environmental policy and domestic environmental policy regime (Babakri, Bennet and Franchetti, 2003). Thus its adoption does not in itself guarantee optimal environmental outcomes (SABS, 2004).

Ghissellin and Thurston (2005) and Rondenelli and Vastag (2005) are some authors whose studies indicate that ISO 14001 is registered by the companies not with the main purpose of improving environmental performance, but is seen mainly as marketing tool for improving corporate image. Conway (1996) also states that ISO 14001 itself does not ensure environmental protection and sustainable patterns of development. Rukato (2000) reports that ISO 14001 as an expensive and time consuming system; after the long and costly registration process of ISO 14001, companies may become complacent and not pursue the environmental improvement performance as intended by EMS (Ammenberg and Sundin ,2005). There are also concerns that it is “broad and ambiguous” as it requires environmental improvements without indication of how this can be achieved (Ghiesellini and Thurston, 2005). Moreover, there is no universal measurement for environmental progress which does not give provision for companies to compare their environmental performance. Nonetheless, if the system is well designed, planned properly, and implemented

correctly it can give a company a commercial advantage in the market place by reducing the bottom line costs (Batts, undated).

There are reports from companies that indicate that ISO 14001 provides operational efficiency, employee awareness, managerial awareness and commercial competitive benefits for them; it has become an international benchmark by which corporations can voluntarily develop, assess and improve their environmental practices (Rondinelli and Vastag, 2000). The usefulness of ISO 14001 is further affirmed by the fact that because it may be costly for registration, some companies have decided to "align" with the standard without formally registering it (Ofori, Gang and Briffett, 2002). The extent of the application depends on factors such as the environmental policy of the organisation, the nature of the activities, products and services and the location and the conditions in which it functions.

In summary, ISO 14001 is based on the assumption that improvement on environmental management leads to improved performance (Curkovic, Sroufe and Melnyk, 2005). It is founded on the simple "Plan-Do-Check" framework; the adoption of EMS alone does not assure that the company will attain environmental sustainability (Rondinelli and Vastag 2005). The true commercial value associated with the standard can only be achieved when it is made in consistence with the company's strategic decisions (Curkovic, Sroufe and Melnyk, 2005).

For sustainable development it is beneficial to implement an environmental management system that delivers real environmental and socio-economic benefits to the company and at the same time improves its image (Batts, undated). ISO 14001 works best where there is a balance between voluntary, regulatory, economic and other environmental management tools, thus a more comprehensive standard is required for ISO 14001 to enhance its effectiveness (Warries ,2004). In South Africa ISO 14001 can be viewed as useful only if it helps the country move towards the vision of the new management approach of integrated and sustainable management of the environment, (Rukato ,2000).

Even though there is a revised ISO 14001: 2004 version, which emphasises improved "environmental performance" as the standard's main goal, it also does not equip the

user with how to carry out the environmental performance, it also depends on the assumption that good environmental management will result in improved environmental performance. Therefore the literature written on ISO 14001:1996 on environmental performance still applies even for ISO14001:2004. Moreover, due to its recentness not much has been written on ISO 14001:2004 and the points outlined in the literature review still remain significantly relevant.

This study highlights limitations and benefits of ISO 14001. It suggests that for ISO 14001 to enhance environmental performance more, it needs to be complimented by other environmental management tools; it should include in its requirements the synergistic and strategic use of other environmental management tools such as Design for Environment, Industrial Ecology, Life Cycle Assessment, Extended Producer Responsibility and other tools that cover environmental aspects of products or processes in a sustainable manner.

1.2 The rationale of the study

Despite the fact that ISO 14001 is so widely used worldwide by companies that claim to be environmentally responsible, and consequently its users mostly commend it for its benefits in operational, attitudinal and managerial improvements in environmental issues, there is also a lot of uncertainty and critical literature that shows that the standard is not effective in terms of environmental performance improvements. The critical authors reckon that companies get registered for the standard only because it provides a business advantage in terms of "improved corporate image" or for being seen as "responsible citizens". This study is therefore useful to establish the South African situation of the standard implementation in these regards. This kind of analytical study has not been done in view of South African experience regarding environmental performance by the standard. The study is therefore valuable and timely especially with the first revision of the standard just done in 2004. Furthermore, a study on the environmental management tools and strategies that could be used to back up to ISO 14001 registered companies in South Africa has not been carried out.

1.3 The goal of the study

The goal of the study is to determine the environmental performance of ISO 14001 registered companies in South Africa and how this performance can be enhanced sustainably through strategic and synergistic incorporation of other environmental management tools into ISO 14001.

1.4 The objectives of the study

1. To determine the motivation, benefits and costs for ISO 14001 registration by companies in South Africa.
2. To establish awareness on environmental management tools by ISO 14001 registered companies in South Africa.
3. To determine how environmental management approaches or tools are used by ISO 14001 registered companies in South Africa so as to establish how to compliment the standard with these environmental management tools to ensure that organisations are not put out of business due to environmental responsibilities.

1.5 Context, Scope, Assumption and Methodology of the study

The study was carried out with South African registered companies by South Africa National Standards ISO 14001. It was done in the context of business advantage and environmental performance improvement by ISO 14001 with focus on the incorporation of environmental management tools used by companies.

The scope of the study was to look at the registered ISO 14001 organisations in South Africa and their understanding and approaches on environmental management tools that can improve the standard's environmental performance.

The study was carried out with an assumption that there is a clear understanding of ISO 14001 implementation and its purpose for improved environmental performance with companies that took part in the study.

Methods used to obtain the objectives were structured questionnaires, interviews and documents reviews. Limitations and uncertainties of the methods and their effects were considered.

1.6 Definition of Terms

ISO 14000: a system of 20 separate Environmental Management Systems designed to help organisations to establish management process for controlling and improving their environmental performance.

ISO 14001: the ISO 14000 standard that was developed as the only specification or registration standard for organisations which wish to improve their environmental performance.

ISO 14001 registration/certification: the two words are used interchangeably in the report to refer to the attainment of a certificate for fulfilling all the requirements of ISO 14001 by organisation as specified by the standard.

EMS: the structure and framework used to manage environmental impacts on a continuous basis, in this study; it refers to structures and /or frameworks developed by companies.

Environmental management tool: tools with specific characteristics that have been systematically developed with the specific purpose of addressing certain environmental issues in a sustainable manner.

1.7 Outline of the Research study

This study is structured in five chapters;

Chapter 1 gives the introduction of the study in terms of background information, the rationale, the goals and the objectives of the study, the context, scope and methodology employed to achieve the objectives, and lastly the definition of terms.

Chapter 2 reviews the literature on the ISO 14001 standard; its background information, limitations and the benefits experienced on the standard implementation, an overview of the ISO 14001 situation in South Africa and the environmental management tools that can be used to back up the ISO 14001 standard.

Chapter 3 is on the methodology; it is made up of the techniques and approaches employed; it considers the validity and reliability of the methods used and consequently the data collected.

Chapter 4 presents the data collected from the methods used above in an organised and analysed form. The discussion of the data findings ends this chapter.

Chapter 5 presents the conclusion drawn from the results analysis and recommendations that can be employed to achieve the objectives of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section presents literature pertaining to ISO 14001 and ISO 14001 environmental performance. It firstly comprises of an overview of the ISO 14001 standard; its use, history, ISO 14001 features, the standard development, characteristics and certification requirements, the new version of ISO 14001 in comparison to the former one. Secondly, it presents the literature that contends that ISO 14001 is not effective in terms of environmental performance against the views that the standard is very useful in terms of improved operational, attitudinal and managerial benefits which consequently leads to improved environmental and business advantage in companies. Thirdly, a brief overview of ISO 14001 implementation in South Africa is discussed, and lastly, the environmental management tools that can be used to compliment the standard for increased performance are looked at.

2.2 ISO

ISO is the world's largest developer of standards; it is a network of the national standards institutes of 151 countries, with one member per country, the system is coordinated by a Central Secretariat in Geneva, Switzerland, (Irivier, 2004).

ISO standards contribute to making the development, manufacturing and supply of products and services more efficient, safer and cleaner and render trade between countries easier and fairer (Quality Network ,1996). They are useful to all types of industrial and business organizations, governments and other regulatory bodies, trade officials, conformity assessment professionals, suppliers and customers of products and services in both public and private sectors, and to people in general as consumers and end users.

2.2.1 ISO 14000 History of development

ISO is a federation of non governmental organisations established in 1947 to develop international standards, improve international communication and corporation and facilitation of exchange of goods and services (Conway, 1996).

According to Irivier, (2004) the ISO 14000 series appeared around the General Agreement on Trade and Tariffs (GATT) negotiations at the Rio Summit on the Environment held in 1992. Whilst GATT focuses on the need to reduce non-tariff barriers to trade, the Rio Summit concentrated on commitment to environmental protection worldwide (Quality Network, 1996). The ISO 14000 EMS is believed to have evolved as a natural adjunct to the ISO 9000 Quality Management Standard, (Ofori, Gang and Briffett, 2002). Irivier (2004) states that environmental field observed a steady growth of national and regional standards, after the quick acceptance of ISO 9000, and increase of environmental standards around the world, ISO assessed the need for international environmental management standards. Strategic Advisory Group on the Environment (SAGE) was formed in 1991 to:

- Promote a common approach to environmental management similar to quality management.
- Enhance organizations' capability to attain and measure improvements in environmental performance.
- Facilitate trade and remove trade barriers.

SAGE made recommendations for ISO to proceed with the environmental standard and by 1992 the technical committee was formed to execute this. On 1st June, 1993, ISO technical committee 207 (TC 207) held its first plenary meeting. It was directed to establish environmental standards in five areas of environmental management systems, namely; environmental auditing and associated environmental investigation, environmental labelling, environmental performance evaluation and life cycle assessment. Consequently TC 207 was divided into five sub committees for each category of the standard and one sub committee to cover the terms and definition of the standards. Additionally, a working group reporting directly to TC 207 was formed to deal with the environmental aspects of the product standards (Conway, 1996).

2.2.2 Features of ISO standards

According to Irivier, (2004) the following are the features of ISO 14000 standards:

Equal footing: Every ISO full member stands the right to take part in the development of any standard judged to be important to its country's economy.

Voluntary: As a non-governmental organization, ISO has no legal authority to impose implementation of its standards.

Market-driven: ISO develops only those standards with market need. The work is carried out by experts from the industrial, technical and business sectors which have asked for the standards, and will subsequently put them to use.

Worldwide: ISO standards are technical agreements which provide the framework for compatible technology worldwide.

2.2.3 ISO membership

Irivier, 2004 states that membership of ISO is open to national standards institutes most representative of standardization in their country with one member in each country in the following categories:

- **Full members**: also known as "member bodies", is a national standards body which is the most representative of standardisation in its country. Each member has one vote regardless of the size or strength of the economy of the country concerned.
- **Correspondent members**: these are countries which do not yet have a fully developed national standards activity. They pay reduced membership fees and are entitled to participate in any policy or technical body as observers, with no voting rights.
- **Subscriber members**: are institutes from countries with very small economies that nevertheless wish to maintain contact with international standardization.
- **Liaison members**: are international organisations with the stake or experience in the area, such as United Nations Environmental Programme of World Wide Fund.

Conway (1996) indicates that member countries are given the choice to participate in any of the ISO technical committees. Subsequently, member countries will select the sub committees and the working committees they will participate in. Countries are also given the choice as voting members ("P") or non voting members ("O") but are free to change their status at any time. If a country chooses to be a "P" member it must agree to support the work of the technical committee or sub committee it is participating in , this is primarily through agreeing to send a country delegation to meetings and supporting certain other activities or hosting events. Liaison ("L") members can participate but do not have the "voting right" All member countries are responsible for creating national committees which will support their work within the ISO.

2.2.4 Criteria for ISO standards development

The ISO's work results in international agreements that are published as international standards (Conway, 1996). International Standards are developed by ISO technical committees and subcommittees through three main phases:

1. An industry sector expresses a need for a standard to the national member body (Irivier, 2004). The latter proposes the new work item to ISO secretariat in Geneva. The secretariat then reviews the proposal and opinion of member countries to determine the level of support for work to begin on the proposed standard. If the decision is to proceed, the Secretariat will assign the issue to the existing technical committee, or establish a new technical committee necessary. However, if the existing technical committee accepts work on the proposed new standard, it can decide to establish a separate technical committee that will report to it or create a sub committee to complete the work (Conway, 1996). When this has been formally agreed, the technical scope of the future standard is defined in working groups of technical experts from countries interested in the subject matter (Irivier, 2004).
2. When the agreement has been reached on technical aspects to include in the standard, a second phase of negotiations of detailed specifications within the standard by countries is entered into (Conway, 1996).

3. After the phase of negotiations, the final phase of formal approval of the resulting draft ISO International Standard is done which is then followed by the publication of the agreed text. (Irivier, 2004).

In summary, draft standards generally move through three stages: namely; an initial document stage, a draft international standard stage, and a final draft international standard stage. Ballots of "P" members are taken at each of these stages; the sub committee votes the initial document, the technical committee votes on the draft international standard, and the ISO members' countries votes on the final draft international standard stage. Decision making in the ISO is taken on the consensus votes. If any "P" members oppose the standard it cannot move forward, although the country can decide to abstain (Conway, 1996).

Country delegations to TC 207 meetings include government officials and rarely involve public interest groups. Consensus decision making has encouraged the ISO to avoid controversy and has tended to reinforce the relative homogeneity of participating groups (Conway, 1996).

2.2.5 History of ISO 14001 Standard

EMS have been around in an informal manner for over 50 years but first the formal EMS only date back to the British Standard 7750 , which was published in 1992, it was shortly followed by its international successor , ISO 14001 in 1996 (Ofori, Gang and Briffett, 2002). Below is the table of events that led to development of ISO 14001 standard.

Table 2.1: Itinerary of events that led to ISO 14001 developments

Year	Event
1972	United Nations Conference on Human Environment was held in Stockholm and UNEP was launched
1974	WCED was established for reassessing the environmental impact in the context of development
1984	To improve its public image, the Chemical industry launched "Responsible Care Programme"
1987	WCED published a landmark report "Our Common future" which introduced the term "Sustainable Development" and urged the industry to develop effective environmental management systems
1987	Montreal Protocol on control of substances that deplete the ozone layer
1989	Adoption of Basal Convention on Control of Trans-boundary Movement of Hazardous waste and their disposal
1990	The International Chamber of Commerce developed the Business Charter for Sustainable Development
1991	ICC Business Charter was launched during the Second WICEM
1991	The UNCED established the Business Council on Sustainable Development (BCSD) which approached the ISO to develop EMS standards.
1991	ISO established SAGE, which after conducting feasibility study recommended formation of an ISO technical committee for developing uniform international standard on EMS.
1992	UNCED also referred as the Earth Summit held in Rio-de-Janeiro considered how the world can move towards sustainable development and adopted Agenda 21, a "global consensus and political commitment at the highest" level on how governments, enterprises and non-governmental organisations can co-operate to solve the crucial environmental problems of our time which threaten human life and society.
1992	Adoption of Convention on Biodiversity to ensure conservation of biological diversity and its sustainable use.
1992	United Kingdom brought out BS 7750 the first standard on Environmental Management System.
1993	On the recommendation of SAGE, a technical committee (ISO/TC/207) on Environmental Management was set up to develop ISO 14000 series of international standards on environmental management systems over a wide range of topics related to environmental management.
1993	European Union introduced the EMAS on voluntary basis.
1995	The WTO encouraged development of the ISO 14000 series of international standards as the "level playing fields" as required by international trade agreements.
1996	ISO 14001 standard was brought out by ISO

Source: Parivesh (2001)

2.2.6 ISO 14001 characteristics

The adoption of ISO 14001 as frameworks for integrating corporate environmental protection policies, programmes, and practices is growing among both domestic and multi-national companies around the world (Morrow and Rondinelli, 2002). There were over 66 000 companies and organisations having EMS certifications in 113 countries around the world as at December 2003 (Department of Environmental Affairs and Tourism, 2004).

ISO 14001 is the only standard in the ISO 14000 series against which an organization's EMS can be certified. It is the cornerstone of the ISO series standards and is a specification as compared to guidance document. It is written in normative language such as 'shall' rather than as 'should'. This means that if an organisation decides to comply with ISO 14001, then all of the clauses no longer become optional (Rukato, 2000). It provides a framework for the organization for identification and addressing of the significant environmental aspects and related impacts of its activities, products and services. ISO 14001 requires that the organization adheres to all relevant legislation and makes a commitment to continual improvement. However, the ISO standard does not set specific environmental performance criteria nor does it establish absolute requirements for environmental performance. These are defined by the applicant organisation (Irivier, 2004).

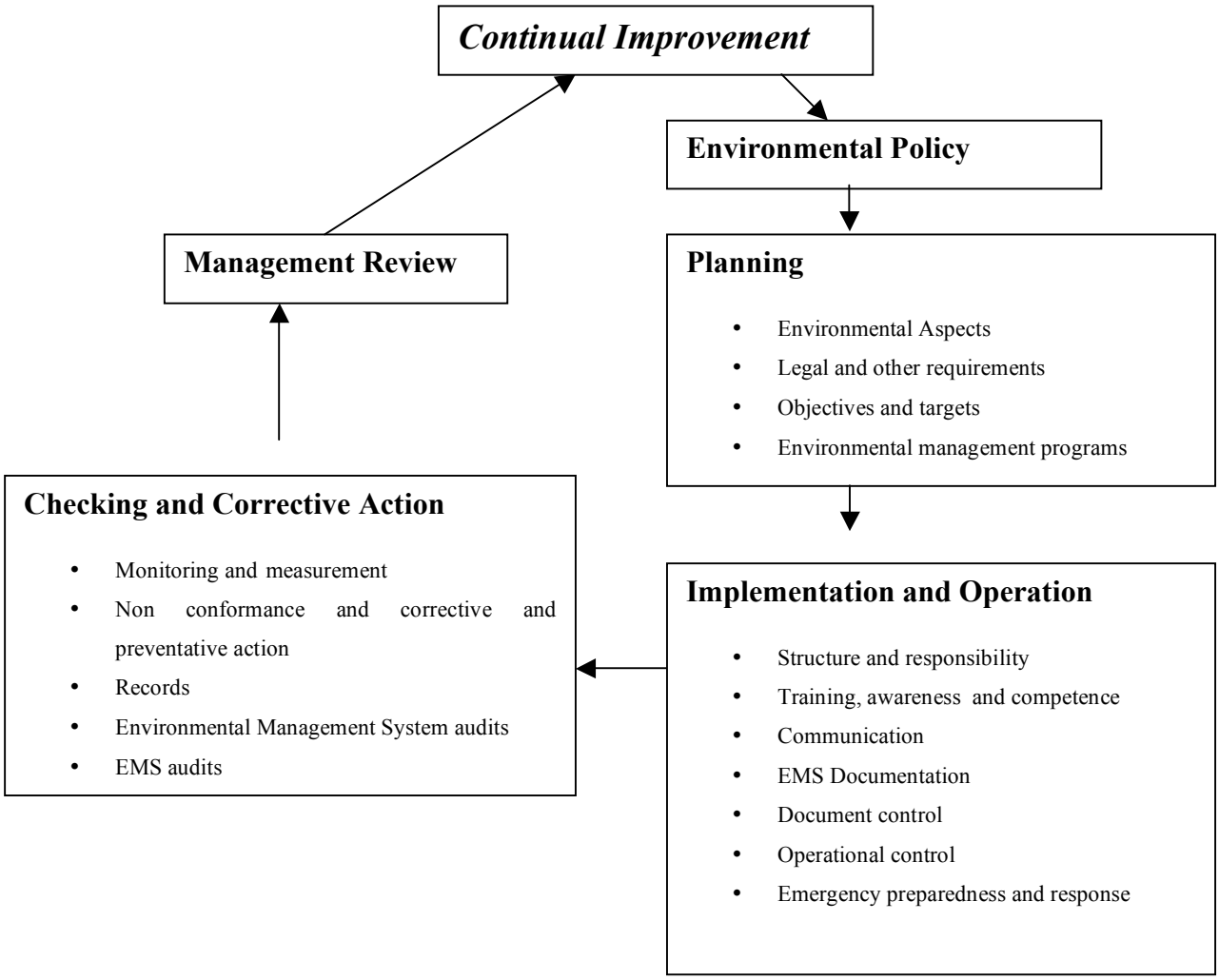
Currently there are no legal requirements for ISO 14001 to be implemented, thus, the standard is voluntary, though the natural progression of environmental management enforcement and compliance suggest that future legal controls on commerce and industry may include the requirement for ISO 14001 to be part of a mechanism to measure and monitor legal compliance (Department of Environmental Affairs and Tourism, 2004).

2.2.7 ISO 14001 certification requirements

According to Rondinelli and Vastag (2000), ISO 14001 is based on a simple "plan-do-check" framework. It consists of the EMS specification and 17 clauses of general requirements in five categories. Each clause of which is written to apply to a variety

of organisations and therefore is not specific or descriptive (MacDonald, 2005). The standard strives for "continual improvement" as shown in the diagram below;

Figure 2.1: Environmental Management System Model:



Source: Quazi et al / Omega 29 (2001) [page 527]

2.2.8 Assessment and Certification to ISO 14001

According to Irivier (2004), the assessment and certification of ISO 14001 takes place in three stages as shown below:

Stage 1: Selection of a third party accredited certification body (external auditor) for EMS assessment who reviews the documentation and carry out an initial audit of the

site. This looks at the company's evaluation of environmental effects and ascertains that targets set for the management programme are measurable and achievable.

Stage 2: This is a full audit to ensure that records and working practices demonstrate that the company is following its procedures. Following a successful audit by an accredited certification body, a certificate of registration to ISO 14001 is issued. This represents preparedness for working towards improving the environment. It also gives a competitive edge to the company's marketing and enhances its image in the eyes of customers, employees and shareholders.

Stage 3: After a successful audit and the issue of a certificate, there are surveillance visits (usually once or twice a year) to ensure that the system continues to work.

2.2.9 ISO 14001: 1996 to ISO 14001: 2004

It is part of the rules of published ISO standards to be reviewed every five years to ensure that they are still applicable and relevant. The review process determines whether the standards are still satisfactory and can continue for a further period; if found to be no longer necessary they can be cancelled or withdrawn, amended or revised to ensure they meet the ongoing needs (National Standards Authority of Ireland, 2003). With ISO 14001 the overall objective and requirements of the revised standard, ISO 14001:2004 are essentially similar to the former standard, ISO 14001:1996 with slight changes (Certified Environmental Management, 2005). Jorgensen, Remmen and Mellado (2005) summarise these minor changes in ISO 14001 as follows;

- Improved coherence with ISO 9001:2000.
- More focus on complying with regulation and other environmental provisions.
- Objectives must be measurable and not qualitative.
- Registrations are moved to a joint paragraph.
- The management review is described, point by point.

Below is the table of changes on ISO14001:1996 to ISO 14001: 2004 as tabulated by Capaccio Environmental Engineering (2004).

Table 2.2: Changes from ISO 14001:1996 to ISO 14001:2004

ISO14001:2004	Overview of Change
General Requirements and Environmental Aspects	Rearticulated for clearer meaning, with enhanced terminology.
Environmental Policy, Operational Control, Emergency Preparedness and Response	Updated to reflect terminology enhancements and clarification of the requirements.
Legal and Other Requirements	Provides clarification to the requirements and divides the requirement into sub paragraphs, allowing for ease of understanding.
Objectives, Targets and Programme(s)	The addition of Programme(s), is an instinctive addition to the specification, bringing together the key activities of the system.
Resources, Roles, Responsibility and Authority	The title is updated and includes terminology enhancement for clarification of the requirements.
Competence, Training and Awareness	The title is updated and includes an emphasis on demonstrating competence and training documentation.
Communication	This section includes the addition of "internal" communication in addition to external communication (similar to OSHAS 18001 Health & Safety Management System or HSMS standard)
Documentation	The “Environmental Management System Documentation” has been updated and re-titled to “Documentation” and includes a clearer intent of the significant environmental aspects documentation.
Control of Documents	The title is updated and includes enhanced clarity to the requirement, allowing for ease of understanding.
Monitoring and Measurement	A re-write of the paragraph for clearer meaning and the addition of calibration.
Evaluation of Compliance	The revision adds “Evaluation of Compliance” as a separate requirement within the Environmental Management System. The emphasis on compliance requires developing a documented process that includes evaluating and maintaining the results of periodic evaluations of compliance with applicable legal requirements.
Nonconformity, Corrective Action and Preventive Action	Provides clarification and restructures the requirement into sub paragraphs, allowing for ease of understanding.
Control of Records	Updated title, with a restructure of the paragraph and terminology for ease of understanding with an emphasis on control of conformity records.
Internal Audit	Updated title and an emphasis on independent auditors.
Management Review	Management Review process is updated to include the identification of inputs and outputs. The addition of identifying inputs and outputs aligns ISO14001:2004 to ISO 9000:2000, moreover, the revision clarifies the description of the information that needs to be collected and reviewed by top management.

2.3 ISO 14001 Environmental Performance

This section presents the critical review of ISO 14001 environmental performance; both the benefits and the limitations of the standard are discussed, it is carried out through two main sections; ISO 14001 environmental performance overview and ISO 14001 characteristics in environmental performance terms.

2.3.1 ISO 14001 environmental performance overview

International standards assist corporations to harmonise and simplify their environmental management practices in a coherent framework and thereby reduce the need for multiple registrations, permits and requirements under different national or local regulations (Rondenelli and Vastag, 2000). ISO 14001 is a set of guidelines through which an operation can establish or strengthen its environmental policy, identify environmental aspects, define environmental objectives and targets. It also implements a programme to attain environmental objectives and targets, monitor and measure effectiveness, correct deficiencies and problems as well as review its management systems to promote continuous environmental performance improvement (Morrow and Rondenelli, 2002).

According to Morrow and Rondinelli (2002), ISO 14001 has become the dominant international standard for assessing environmental management processes; the growth of EMS as a process for integrating corporate environmental policies and programs has been quite rapid over the past decade. There were over 66 000 companies and organisations with ISO 14001 certification in 113 countries around the world as at December 2003. This number is expected to grow steadily (Ammenberg and Sundin 2005). The significant environmental performance of ISO 14001 is further affirmed by the fact that whilst certification to the ISO 14001 is an important goal, many organisations who cannot afford registration only “align” to it without formally certifying (Ofori, Gang and Briffett, 2002). Morrow and Rondinelli, (2002) reported that big automobile manufacturers such as Toyota and Daimler-Chrysler are requiring all of their manufacturing facilities around the world to register for ISO 14001 and encourage and assist their suppliers to do the same. The two authors go on to give testimonies from companies on the benefits of ISO 14001 as follows:

- International Business of Machines (IBM) discovered that ISO 14001 certification increased awareness and participation in environmental activities by employees and contractors who did not previously know much about the corporation's environmental policy or their role in supporting it. It also made the environmental management "system dependent" rather than "person dependent" by improving documentation of important requirements, procedures and processes.
- Asea Brown Boveri (ABB) automation claimed certification allowed it to communicate more effectively its environmental achievements to its present and prospective customers and adopt environmentally beneficial procedures earlier than originally planned. It also increased employee morale.
- Another study of Alcoa's Mt Holly plant found that three years after certification four sets of positive impacts were observed; improvement in employee awareness, operational efficiency, managerial awareness and operational effectiveness and procedural improvements.
- In the cross section of German companies surveyed by Federal Environmental Agency, EMS is said to have helped companies with a reason to take time to comb through Germany's complex and extensive environmental laws or regulations so as to determine their position of compliance. Prior to EMS, the mangers did not know if the firms were violating laws or regulations because it had never taken time to check, and the knowledge from EMS enabled the managers to easily adapt to the relatively frequent changes.

Ammenberg and Sundin (2005) back up the above observations by stating that the requirements to review procedures after occurrence of an emergency situation has brought substantial benefit to help take preventative measures that might not have been taken if the requirement to review procedures was not in effect.

However, there are concerns that the fact that companies may need environmental management certification to compete in the global marketplace could easily overshadow the purpose for environmental management. According to Sohal and Zutshi (2005) citing Sissell (2000), page 43, "ISO 14001 is kind of hollow", and Pullin (1998) page 28, indicates that ISO 14000 "blocks the way for other routes that might deliver real performance improvement and sustainable industrial development.

A comprehensive analysis of European Industry by Ghiesellini and Thurston (2003) reported that the performance of companies with ISO 14001 was not significantly better than those without it. Emilsson and Hjelm (2002) indicate that ISO 14001, except for committing to continual improvement and compliance with applicable legislation and regulations, the standard does not establish absolute requirements for environmental performance; organizations engaged in similar activities, with widely different environmental management systems and performance can all comply with ISO14001 (Irivier, 2004). In the worst case scenario, a study on fourteen companies on air emission analysis indicated that in two cases certification of EMS coincides with the worsening of the environmental impacts (Ghiesellini and Thurston, 2005).

Public interest groups have been said to develop an unpleasant attitude towards ISO 14001 because the certification to the standard does not let stakeholders to determine whether an organisation is being eco friendly or not. In Europe one interest group is said to have accused ISO 14001 of trying to weaken European environmental standards already in place. This accusation is based on the possibility for ISO 14001 being used as a "smokescreen" by companies that really have no interest in environmental improvement, but which just want to make sure their environmental issues are under control (Rukato, 2000).

On a further note, Llomaki and Malanen (2001) cited in Ghiesellini and Thurston (2005) found that companies do not develop EMS because of the genuine concern about environmental issues but rather because of external stakeholder and marketing considerations. "Improving corporate image" or being seen as a "good corporate" citizen is the main reason why EMS is implemented by organisations (Sohal and Zutshi, 2005). Some companies simply want a "plaque" on their walls and will choose ISO 14001 to meet the minimum criteria with no real intention of making environmental performance improvement (Batts, undated). This attitude can make environmental issues be easily overlooked after a successful ISO14001 certification. This disinterest is further proven by that much as industry and industrial association representatives favour the idea of offering incentives to companies implementing ISO 14001, they are not in favour of the "polluter pays" principle, the saying being that it is too complicated (Rukato, 2000). Nonetheless this is contended by Morrow and Rondinelli (2002) on ISO 14001 motivation for registration study; a survey on 33

companies in the business and institutional furniture industries the strongest motivation (83%) to adopt ISO 14001 was to prevent potential negative environmental impacts. In another survey by the Multi-state working group of 50 private and public facilities that developed EMS, the strongest (figure not stated) motivators were to integrate pollution prevention programs, while in 214 manufacturing companies in Pennyslavia the strongest motivator for ISO 14001 was commitment to environmental improvement (91.9%). Ammenberg and Sundin (2005) also show that certification is not merely a meaningless label implants for good environmental performance as external registration requires managers of certified facilities to develop or upgrade EMS, create strengthened environmental management programs to international standards, in addition to establishing procedures for monitoring and correcting negative environmental impacts as well as to train employees in good environmental management practices.

To strengthen this further Sohal and Zutshi (2005) state that one of the most effective methods for ensuring that a company does not become complacent after registration is to integrate certain elements of the EMS with other management systems. SABS (2004) recommends that in order to achieve environmental objectives, the environmental management system should encourage organisations to consider implementation of the best available techniques where appropriate, and where economically viable.

2.3.2 ISO 14001 characteristics in Environmental Performance Terms

This part outlines both the positive and negative aspects of ISO 14001 in terms of its environmental performance through looking at the standard characteristics.

1. The 'management' nature of the standard: ISO 14001 is a 'management' standard not 'performance' standard (Department of Environmental Affairs and Tourism, 2004). According to Curkovic, Sroufe and Melnyk (2005) the standard was designed to achieve a full integration of environmental and business management and to enable companies to take a more pro-active approach towards managing environmental issues beyond compliance. Therefore the scope of ISO 14001 excludes test for pollutants, setting limit values regarding pollutants and effluents, setting environmental performance levels, and standardisation of products. The assumption

used on the standard is that better environmental management will lead to improved environmental performance.

Morrow and Rondinelli (2002) state that many multi national corporations have designed, certified and implemented EMS under ISO 14001 because it provides a harmonised standard for managing the company‘s environmental impacts. ISO 14001 also needs a system of implementation and operation with a clear structure of responsibility for environmental management, programs for training, awareness and competence among all employees, internal and external communication of EMS, a system of environmental management documentation, in addition to procedures for operational controls of environmental impacts and emergency preparedness and response, a system for checking and corrective action that includes monitoring and measurements, and reporting non conformance. It has audits and reviews through which senior management reassesses the suitability, effectiveness and adequacy of the environmental management system at suitable intervals to assure continuous improvement.

However, Ghiesellini and Thurston (2005) show that “the commitment to continuous improvement is intended for the EMS itself not for the actual environmental performance”. ISO 14001 does not in itself state specific environmental performance criteria SABS (2004). It lacks guidelines for setting objectives and targets, the degree of employee, suppliers and other stakeholders’ involvement, and lack of guidelines on how to accomplish “continuous improvement” element (Zutshi and Zohal, 2004). EMS certification does not in any way indicate achievement of specific levels of environmental performance of an organisation’s activities, products, and services. If one company has a high level of performance and another has a low level of performance, both can get certified, yet there is no assurance that they are both environmentally responsible, only that they have the systems and controls in place to achieve whatever levels of performance they set for themselves (Rukato, 2000).

2. Identification of rigorous environmental baseline: The environmental aspects form the heart and the foundation of the standard, they determine the shape and focus of the entire EMS and form the basis for establishing environmental objectives, targets and programs and a starting point to help the organisation to evaluate its

environmental performance, they also determine the activities that should be controlled by documented procedures and instructions and the personnel who should be given special environmental training (Zobel and Burman, 2004). But Batts (undated) says that the definition of aspects and impacts in the ISO 14001 is not very clear, for instance, those responsible for seeking ISO 14001 registration may have health and safety background and are more used to considering hazards and risks hence likely to be inclined to health and safety issues.

3. **Measurement of progress**: According to Morrow and Rondinelli (2002) the benefits associated with EMS such as increased efficiency remain difficult to quantify, nonetheless, this standard makes it easier for companies to develop voluntary EMSs and for shareholders, government regulatory agencies, insurance companies, and financial institutions to assess the company's commitment to improving environmental performance and reducing risks. In the context of the EMS results can be measured against the organisation's environmental policy, environmental objectives, environmental aspects and other environmental performance requirements.

On the other hand, Warries (2004) states that although ISO 14001 requires an organization to measure and track its environmental performance there is no universal measure for comparative assessment of different environmental impacts. Certification implies that companies meet regulatory mandates and go beyond legal requirements to achieve continuous environmental improvements but there is no way of verifying that such improvements actually occur (Ghiesellini and Thurston, 2005). Some people have also stated that they believe ISO14001 does not lead to environmental improvements because it does not have the same external reporting and verification requirements as EMAS[1] (Batts ,undated), it only requires firms to disclose their environmental policy to the public (SABS ,2004). If poorly interpreted, many companies may end up being less sensitive to community concerns (Rukato, 2000).

[1] An EMAS is the European standard similar to ISO 14001 in its components and requirements. The difference is that companies seeking EMAS registration must report environmental effects and legal requirements at the site while ISO makes ISO certification voluntary (Accamail Web based e-mail service ,2005)

Warries (2004) further states that ISO 14001 does not signal to the market that a product has been produced with environmental sensitivity and consumers might not identify or understand the advantages of ISO 14001. Thus, it would be very difficult for consumers to put a value on a resource. Due to this lack of definition of precise environmental variables for monitoring purposes, the resulting data may not provide companies, policy-makers, and the public with accurate information they can use to make comparative judgements about organizational environmental performance issues. Warries goes on to suggest that in order to provide firms with a competitive business advantage, applicable government agencies and relevant industry actors should require EMS to clearly define a procedure for the assessment of environmental performance.

4. **Subjectivity of the standard**: Unlike regulation , ISO 14001's voluntary approach gives companies the flexibility to develop EMS that are appropriate to their operations , characteristics, location and levels of risk (Morrow and Rondinelli,2002). Ofori, Gang and Briffett (2002) indicate that ISO 14001 requires an organisation to consider environmental impact when setting objectives and targets, commit to continuous improvement of environmental performance and pollution prevention and comply with applicable legislative and regulatory requirements of the location. They reckon this flexibility is a necessary feature due to a wide range of companies that may want to participate in ISO 14001 who have different environmental and economic conditions; it allows companies and countries to set environmental performance objectives and targets suitable to their needs, it also avoids trade implications of dictating specific environmental performance requirements across national boundaries in an extra territorial fashion. This approach eliminates potential trade irritant that could arise from schemes not providing for domestic verification procedures and imply foreign verification of compliance with the voluntary standard. Quazi (2004) states that the standard is non-prescriptive and is meant to be complementary to national regulatory regimes and not intended to replace or duplicate any country's regulatory systems.

However, Ammenberg and Sundin (2005) describe these features as 'broad and ambiguous' and Conway (1996) states that though this flexibility is a necessary feature, it also means that environmental performance objectives and targets may not

receive attention. Goals and objectives may be based on consensus which may compromise environmental performance improvement. Implementation also primarily relies on management incentives that may be ineffective (Rondinelli and Vastag, 2000). Leaders of the company are seldom interested in protecting the environment at any cost, they rightly want to know if ISO 14001 is good for financial health of their companies and if they can afford to be environmentally responsible and remain in business, therefore the lucrative issues are the ones normally addressed (Batts ,undated). Consequently, SABS (2004) recommends that ISO 14001 requires the senior management to make it part of their long term business plan.

5. Documentation system: Improved documentation leads to improved environmental management; as with all environmental management tools, accurate data are of paramount importance, checking methods and systems are needed in EMS to ensure that the information being used is accurate and will not corrupt or distort management decisions which can have wider implications for the operation (Ammenberg and Sundin, 2005). The EMS requires more and better record keeping and documentation which lead to improved controls. In one study of five German energy and gas companies reported by Morrow and Rondinelli (2002), all the employees interviewed reported that improved documentation and increased efficiency were the primary motivation for developing and registering their EMS. Verbendnetz Gas executives saw EMS as the beneficial way to make the firm's documentation on environmentally related material and personnel expenditures more comprehensive. In a further case ISO 14001 helped Middle Germany Energy Provider standardise environmental procedures for data collection and record keeping and allow uniformly reported information to flow back to the company environmental coordinator.

Ofori, gang and Briffett (2002) report that proper documentation helps organisations monitor and keep records so that an outside party can observe and report that the system is working. Companies with transparent environmental documentation are normally the ones willing to be transparent in their environmental management (Morrow and Rondinelli, 2002). Moreover, EMS can also then become cross checking mechanisms for the data and plans submitted to the authorities. Many international buyers insist on evidence of certified EMS and procedures being in place before they

even consider doing business with overseas suppliers, in some cases they can even commission supplier audits to check that the systems are in place; such assurance can come from document trails (Ammenberg and Sundin, 2005). Thus, inadequate documentation leads to inconsistency as to when or how environmental activities were conducted, making it difficult to identify problems (Morrow and Rondinelli, 2002),

However, Ghiesellini and Thurston (2005) have concerns that, ISO 14001 specifies establishment of seventeen different procedures to cover its whole spectrum, which must be maintained and reviewed periodically. They reckon that these get the resources diverted gradually from the real issues of environmental performance improvement to maintaining the documentation system. The standard implementation also requires management of vast quantities of data on continuous basis; these include checklists, aspects and issues registers, audits and the accurate management of related targets and objectives (Morrison, 2004).

6. Product/ process life cycle perspectives: Even though ISO 14030 is the standard that is intended for Life Cycle Assessment and ISO 14001 can only implement LCA as its support system, the lack of inclusion for LCA in ISO 14001 does not entice companies to actively research innovative and lucrative solutions to environmentally sensitive components of their operations; ISO 14001 does not suggest any 'Design for the Environment' practices, meaning that the implementation of ISO 14001 does not require the companies to re-think its links with suppliers and distributors, nor does it push them to re-design their products to reduce their environmental impacts. These increase the likelihood that ISO 14001 certification will not lead to innovative changes in production processes (Warries, 2004).

7. Implementation Costs: ISO 14001 is a voluntary standard; companies will implement it if they are confident that the potential costs of certification are less than the benefits resulting from the business opportunities that the standard will ultimately provide those (Warries, 2004). There are unresolved questions about how viable it is for developing countries and small and medium size companies to participate in ISO 14001. Small, Medium and Micro Enterprises (SMMEs) are particularly more in a position of not affording the certification costs even though the cumulative environmental impacts of SMMEs are significant (Rukato , 2000). There are fears that

ISO 14001 may be trade barriers to some companies and countries; some developing countries may not afford the implementation for certification of ISO 14001, a situation which would preclude their goods from entering the export market in developed countries (Rukato, 2000). However no process is without challenges and obstacles and similarly no benefit is without cost, similarly ISO 14001 has costs attached with its implementation and certification (Zutshi and Sohal, 2004).

It takes most companies 8 to 19 months to obtain ISO 14001 certification (Babakri, Bennette and Franchetti, 2003). SABS (2004) states that the high cost and lack of other available resources such as human resources, and specialised skills, organisational infrastructure , technology and financial resources to be invested are the greatest challenge for implementing the ISO 14001. Substantial maintenance costs can also be expected given that facility registration to ISO 14001 must be renewed every 3 years (Conway, 1996). The cost of implementing ISO 14001 with one plastic producer with facilities in Texas, Delaware, and Louisiana estimates the cost of implementing ISO 14001 and gaining official certification to be over $100,000 per facility (Environmental International LTD, 2003). It therefore makes it vital that companies strategise to reduce these costs.

Babakri, Bennette and Franchetti, (2003) have cited that the cost of ISO 14001 certification could be reduced by network of organisations that share and document information about how to implement the procedures necessary for ISO 14001 certification. An example is that of European government agencies that helped in cost reduction by providing technical assistance to firms seeking to adopt the standard, and in Germany, the chamber of commerce and industry association have published detailed information and case studies of companies that implemented the standard and provide an extensive list and contact details for further information. Jorgensen, Remmen and Mellado (2005) report that ISO 14001 is not necessarily established independently of already existing management systems , and in some cases it is possible to comply with ISO 14001 by adapting existing management system elements. Ofori, Gang and Briffett (2002) also indicate that an option that companies might take to lower costs is by “self declaring” participation in ISO 14001 rather than becoming ISO 14001 ‘registered”, however, this option may have negative

implications for market access if ISO 14001 becomes an important requirement for access to their markets or any future markets in the case of emerging sectors.

According to Zutshi and Sohal (2004), though it is difficult to quantify by giving a dollar value benefits such as improved corporate image, better workplace environment, and increase in employees morale from the standard, if environmental management does not increase the value of the company, commodities markets will not finance the management strategy and the company will be pushed out of the market. It is therefore important for any company to be able to convince the financial institutions of the profitability of its environmental management. Pollution prevention programs can save companies money by improving efficiency and reducing the cost of energy, materials, fines and penalties, and EMS certification can increase investor confidence in company and give it international competitive advantages (Morrow and Rondinelli, 2002). They further observed that companies have reported financial benefits from ISO 14001 certification; Ford Motors claims to have saved millions of dollars and has reduced substantially its environmental impact as the results of ISO 14001 adoption for its plants worldwide, Honda Transmission Manufacturing of America facility in Ohio reduced environmental and safety incidents significantly thereby saving it money, cost savings are also seen in waste and waste water, recycling, improved energy consumption and adoption of reusable packaging.

2.4 ISO 14001 in South Africa

South Africa has re-entered the global market and pressures are being brought to bear on industry to conform to internationally accepted business standards, including those dealing with environmental issues (SABS, 2004). The country would be unwilling to be denied access once again, especially for environmental reasons (Rukato, 2000). EMSs are common integrated components of international commerce and trade and EMS registration must form part of a business process in any international trade in the 21st century (Department of Environmental Affairs and Tourism, 2004). South Africa is increasingly participating in the global marketplace where competition is more complex than simply giving the best price (Ammenberg and Sundin, 2005). South African companies trading internationally have indicated that having sound, auditable environmental systems in place is an advantage of doing business with European and

American companies. There is also an increasing emphasis on environmentally acceptable developments and operations in today's marketplace and some aid institutions are already giving priority to companies that can demonstrate commitment to environmental care when awarding contracts (Kotze, 2000).

Investors, insurance companies , international and commercial banks are also becoming increasingly careful of the risks and liabilities they may acquire from financing a client company that does not show appropriate environmental risk management. There is also growing emphasis within southern markets themselves on the importance of good environmental management practices. Nevertheless, some South African sectors feel there is no need to do more than simply comply with legal requirements (Rukato, 2000). South Africa's response to ISO 14001 has been slower than from developed countries mainly because; South African consumers and clients are not very environmentally discerning, and do not place environmental demands on their suppliers (Rukato ,2000). However the country has gradually adapted the standard and a lot of companies have registered for ISO 14001 to improve their environmental performance.

Organizations registered to ISO 14001 must have their compliance with the standard verified by a third party which is registered with an accrediting agency. To ensure conformity, the ISO Committee on Conformity Assessment has provided guidelines for accreditation bodies such as ISO Guide 62 to encourage consistency in certification criteria (Rukato, 2000) and to prevent the various accreditation bodies interpreting the standard too narrowly and for their own interests. Organisations seeking registration may also make use of these guidelines to establish what registration bodies will be looking for when establishing the conformity of their EMS with the standard (Rukato, 2000). Each country adopting ISO 14001 is allowed to develop its own scheme for accreditation of registrars, certifiers and approval of training programs offered to auditors seeking certification (Conway, 1996). In South Africa, ISO 14001 is mainly administered by the South African Bureau of Standards and a specially convened national committee. SABS serve fourteen different sectors with EMS; a list is attached as appendix 2.

In 1996 when the South African Bureau of Standards (SABS) launched the standard, they were the only ones to offer local certification services but the list of competitors with a national presence now includes British Standard Institutes (BSI), Buerau Veritas Quality International (BVQI) , Dekra, Klein Pit Marwick Goodlign (KPMG), National Quality Standard (NQA), Price Waterhouse Coopers (PWC) and Schweiz Vereinigung fur Quallats and Management System (SGS) However, SABS still remain the largest certifiers, with 245 ISO 14001 certifications by September 2004 (KPGM, 2004)]. It remains the most used for practical reasons such as easy access to the SABS, the SABS knowledge of local context, and the fact that SABS has certified many of the local ISO 9000 systems. (Rukato, 2000). The Department of Trade and Industry and the Department of Environmental Affairs and Tourism are the two most relevant departments in dealing with ISO 14001 (Rukato, 2000). SABS has published National guidelines to aid with the implementation of the standards. South Africa is the full member of ISO.

ISO 14001 has had a significant impact on the Corporate Citizenship agenda among large companies in South Africa and continues to grow in influence. While compliance with SABS IS0 14001 is voluntary in South Africa, legislation has been promulgated for sound environmental management to organizations (SABS, 2004).

The SABS ISO 14000 series challenges companies to take stock of their impact on the environment; establish its own objectives and targets; commit itself to effective and reliable processes for the prevention of pollution and the continual improvement; and include employees in the process of accepting responsibility for the company's performance with regard to the environment within the constraints of finance and technology (Jacka, 2005). The South African standards authority lists a number of advantages of implementing a formalised EMS based on SABS ISO 14000 including important aspects such as improving access to capital; satisfying investor criteria and even improving cost control (Jacka, 2005).

With European companies being the largest trading partners of South African products and also having the highest demands for ISO 14001 certification South African products may become uncompetitive on the European market (Rukato, 2000). Environmental pressures like this being brought on South African companies may

have negative impacts on the country's export sector. If this trend proceeds, government may have to intervene in order to facilitate the flow of South African goods on the international market (Rukato, 2000).

It is significant for those that intend using ISO 14001 for commercial purpose to bear in mind that ISO 14001 is only useful to a company if it adds the value to the profit margin. South African companies still have to focus on the issue of value drivers and should be taken more seriously as companies get more experience in costing environmental management activities. (Rukato, 2000). In Europe, unlike South Africa environmental legislation has been strict for a long time with various government initiatives to help the industry performance improvement initiatives can easily bring instant cost savings; energy consumption for example, can often be reduced through fairly low cost technology upgrades, making the benefits of voluntary measures such as ISO 14001 more tangible (Rukato ,2000).

Properly designed environmental initiatives can create incentives to reduce production costs or add value by innovation and increasing efficiency. There therefore is a need to make decisions on which options are suitable and sustainable for South Africa and start implementing them.

2.5 Environmental Management tools that can back up ISO 14001

Industries are presently faced with a number of challenges to maintain competitiveness and productivity while at the same time create minimal environmental impact (Zutshi and Sohal, 2004). The adoption of an EMS alone does not assure that the company will attain environmental sustainability. For a company to act in environmental improvements, sufficient incentives are needed, often in the form of economic benefits (Ammenberg and Sundin, 2005). Many managers warned that ISO 14001 certification can result in non-value added costs if it is pursued only for its marketing or regulatory appeal. The true commercial value associated with ISO 14001 can only be achieved when it is made in consistence with a company strategic direction (Curkovic, Sroufe and Melnyk, 2005).

Efforts to reduce industrial pollution have been focused mostly on developing environmental institutions and legal frameworks largely by establishing command and

control regulations. However, formal regulation by itself has not proven to be effective in reducing industrial pollution (Babakri, Bennet and Franchetti, 2003), hence why a number of environmental management tools that can be applied to various types of organisations to enhance EMS environmental effectiveness are recommended.

This section looks at some of such environmental management tools; it takes cognisance of technological and organisational complexity and limitations in the implementation of these tools and also suggests that each company should strategically plan for their implementation according to its operations and resources. These tools are therefore recommendable to back up ISO 14001 since they are compatible with the standard since it also bears this flexibility feature. This study does not suggest instant full swing of these tools implementation; it acknowledges that each company will implement the tools at different paces and scales. It is also worth noting that this section does not mean to imply that these are the only tools in the market, the continuous evolvement of environmental protection field is considered, other environmental management tools can be of great use as long as they effectively address all the three facets of sustainable development. It would therefore not be practical to try and cover all environmental management tools in this study. Some environmental management tools also have linkages and overlaps and have common characteristics. However, one tool would be more appropriate than another according to the organisation characteristics and operations.

The section is divided into three main sections: broad objectives for good environmental performance, the environmental management tools that can be applied mainly by companies to address these objectives and environmental management tools that can be implemented by both the companies and the regulatory bodies.

2.5.1 Good environmental Performance Objectives

i. Eco-efficiency

The World Business Council on Sustainable Development defines eco-efficiency as a management direction that enables business to become more productive and environmentally responsible through reducing the use of energy and resources and

minimizing waste (Conway, 1996). It is also defined by SABS (2004) as the ratio of value added per environmental impact added; that is, the ratio between an economic performance indicator and environmental performance indicator, respectively.

Usually the increased efficiency relates to obtaining more products in the same amount of time, reducing the volume of product waste produced and using fewer resources to produce more of the products. This is also beneficial in that all the eliminated waste does not have to be managed through some kind of treatment and/or disposal. Sufficient industrial monitoring is an essential part of an industry's management and is a prerequisite for improving industrial efficiency. Monitoring relates to aspects such as composition and flow of raw materials input, energy input, composition and flow of product output, output of liquid, solid and gaseous waste materials and heat release (E-textile, undated).

ii. Pollution prevention

Pollution prevention is a concept whereby "anticipate and prevent" is regarded as more effective and efficient strategy for addressing environmental problems than "react and cure." There are many strategies that are intended to carry out pollution prevention. It is one of the underlying principles of environmental protection.

iii. Cleaner Production

Cleaner production is the practical application of knowledge, methods and means, so as to provide the most rational use of natural resources and energy, and to protect the environment. It is the conceptual and practical approach to reducing environmental impact from human activities through a better use of resources, methods, technologies and, above all, management of processes and activities. Cleaner Production is applicable to products, processes and services at various points in the activity line between thinking of the need for and designing a product and the disposal of that product at the end of its life cycle. Cleaner Production, with focus on *prevention* and *reusability*, is therefore a win – win approach (Natural Logic, undated). Cleaner Production should be an essential part of any comprehensive EMS at an enterprise or national level. In many cases, the adoption of Cleaner Production improvements can reduce or eliminate the need for end of pipe investment and therefore can have both environmental and economic benefits (Babakri, Bennet and Franchetti, 2003).

2.5.2 Environmental Management tools for companies

i. Life Cycle Assessment (LCA)

Life cycle assessment is a conceptual approach to account for the environmental impacts of a product, process or service throughout the lifecycle. It is a concept or method used to evaluate the environmental effects of a product or activity holistically. It includes identifying and quantifying energy and materials used and waste produced, assessing their environmental impact, and evaluating opportunities for improvement. LCA happens in four generic stages, namely; initiation, inventory, impact and improvement. LCA is particularly intended to result in decisions that result in conservation of resources, increased energy conservation and decreased waste generation, better industrial processes related to providing resource-based products, and fewer problems in final disposal [Barbeau et al, undated). It is incorporated into ISO 14000 as ISO 14040/43. Life Cycle thinking could function as an important complement to EMS by contributing a better understanding of which flows of materials and energy are most important (Ammenberg and Sundin, 2005).

ii. Industrial Ecology

The goal of industrial ecology is to link the inputs and outputs within and across industries, forming "closed-loop" flows of material and energy, thus minimizing the use of virgin resources and producing less or zero waste (Conway (1996). It aims to change the linear nature of the industrial systems, where raw materials are used and products, by-products, and wastes are produced, to a cyclical system where the wastes are reused as energy or raw materials for another product or process. Identifying and tracing flows of energy and materials through various systems is vital to industrial ecology. This concept, sometimes referred to as *industrial metabolism*, can be utilized to follow material and energy flows, transformations, and dissipation in the industrial system as well as into natural systems. By quantifying resource inputs and the generation of outputs and their fate, industry and other stakeholders can attempt to minimize the environmental burdens and optimize the resource efficiency of material and energy use within the industrial system. The challenge of industrial ecology is to reduce the overall negative environmental impacts of an industrial system that provides some service to society (Certified Environmental Management, 2005).

iii. Design for Environment (DfE)

DfE involves systematic consideration of environmental objectives and factors during the design stage of developing new products, services or production processes. The aim of DfE is to reduce the environmental impacts of producing and consuming products from the beginning, and over their entire life cycle. (Barbeau et al, undated). Because it offers new insights with product and business focus, DfE can be a powerful tool to make firms more competitive and more innovative, and consequently more environmentally responsible. DfE provides an organized structure through seven systematic strategies into which companies can integrate most features of sustainable development (National Research Council, 2003) as below:

1. New concept development
2. Physical optimisation
3. Optimise material Use
4. Optimise production techniques
5. Optimise distribution systems
6. Reduce Impact during use
7. Optimise end-of-life systems

iv. Eco-mapping

According to Engel (1998), the range of tools to help Small and Medium Enterprise is constantly growing but a lot of these tools are considered too heavy and complicated by smaller companies and micro enterprises. But there are tools that are simple and inexpensive that can contribute to improved environmental performance. The results of a quick and visual environmental review can be equivalent to expensive scientific studies conducted by consultants. Eco-maps do not cost anything and are visual and easy to use tools which enable employees to get involved in environmental management of the company. It is a collection of information which shows the current situation using pictures. The maps can be used by many different types of companies; from manufacturing and service companies to large structures. They have the following attributes:

- Helps in learning about collecting data
- Support for training and communication
- Forms the basis of environmental documentation of the company
- Everyone in a company can participate without having written procedures and instructions
- Defines a method which allows a company to prioritise problems
- Useful for all stakeholders.

v. Eco-controlling

According to Sturn (1997), eco-controlling is based on the basic process of financial controlling. The concept is specifically designed to link environmental strategy with the financial and strategic targets of top management. It therefore focuses on the improvement of eco-efficiency. It corresponds to methods of financial and strategic controlling. The concept can be divided into:

- Objectives and targets: If objectives and targets are anticipated correctly, the expenditure needed to achieve these targets may be a wise investment particularly once the competitors are forced by cost drivers and /or legislation to improve environmental performance. The sooner the company starts to evaluate alternatives to end of pipe solutions, the higher the return of the investment will be.
- The recording of environmental data and environmentally induced financial information. Since the managers typically have extensive experience with accounting and the management of economic information, similar methods of recording and analysis of ecological information can be applied for analysis of environmental accounts. Recording starts once the specific accounts for the company have been set up. In an analogy of cost centres and cost barriers, environmental impact added centre and environmental impact added carriers are identified.
- Performance Evaluation: collecting data about the corporate environmental impacts and environmentally induced financial impacts helps to calculate eco-efficiency, and to measure how well the operations of the firm contribute to or detract the sustainable development. Environmental indicators are put in the context of economic performance.

- Value based environmental programs: environmental activities should be taken not only by the reduction of the harm done to the environment, but also by the contribution to increased shareholder value. For setting up programmes environmental protection is brought into harmony with the interest of investors. To attain this program should be analysed by potential costs and benefits to ensure that the program provides a positive economic return.
- Internal and external communications: internal communication addresses issues such as the role of the environmental strategy for the success of the company, or progress towards the set targets. External communication of the company can be done through environmental reports. The content of the report should reflect the specific situation of the firm as well as the information needs of the stakeholders addressed. Site specific data is important for neighbours, local authorities and employees working in a specific site, consolidated, company wide data are more relevant for shareholders, customers and top management trying to position the company.

vi. Environmental Performance Indicators

Generally, an indicator can be defined as a parameter or a value derived from parameters which gives information about a phenomenon. They have specific meaning and are developed for a certain purpose. There are two major functions of indicators:

- They reduce the number of measurements and parameters which normally would be required to give an "exact" presentation of a situation. As a result, the size of a set of indicators and the amount of detail contained need to be limited.
- They simplify the communication process by which the information of results of measurement is provided to the user.

Indicators should therefore be regarded as the presentation of "the best knowledge available". As indicators are used for different purposes it is necessary to define general criteria for the selection of indicators. OECD (1993) have used three basic criteria; namely; policy relevance, analytical soundness and measurability. The ultimate aim is to improve the performance of businesses and monitor performance

with measures which are transparent and verifiable, and therefore meaningful to business managers as well as to external stakeholders. While the emphasis is on areas under direct management control, recognition is given to relevant issues like suppliers upstream and of product use downstream of a company's activities.

Indicators fall into two groups, based on the eco-efficiency formula which brings the economy and ecology dimensions to relate product or service value to environmental influence:

A. **Generally applicable indicators** which can be used by virtually all businesses. As well as being more or less universally relevant, these indicators relate to a global environmental concern or business value and methods for measurement are established and definitions accepted globally.

B. **Business specific indicators** are those more likely to be individually defined from one business or one sector to another. These indicators are not necessarily less important than the first group except are merely less widely applicable. Judgment depends on the nature of an individual business (Verfaille, 2000). A company's eco-efficiency performance profile includes both types of indicators.

Indicators for product/service value include:

- Quantity of goods or services produced or provided to customers.
- Net sales.
- Those relating to the environmental influence in product/service creation are:
    i) Energy consumption
    ii) Materials consumption
    iii) Water consumption
    iv) Greenhouse gas emissions
    v) Ozone depleting substance emissions.

The following additional indicators could become generally applicable if current efforts to develop global agreement on measurement methods are successful:

- Additional financial value indicators
- Acidification emissions to air
- Total waste

For ISO 14001, Environmental Performance Indicators are used for measuring integration of environmental management systems and continuous improvement. ISO 14031 includes guidelines for establishing indicators and suggestions for different indicators (Zobel, 2002).

2.5.3 Environmental management tools for companies and regulatory bodies

i. Full cost accounting

Full cost accounting is a concept which describes how goods and services should be priced to reflect their true costs; it includes both environmental and social costs. Depending on the type of accounting system involved it can thus relate to national, financial, or managerial cost accounting. Full cost accounting makes natural resources factored into calculations of a country's GDP; natural resources can be redefined as assets on company ledgers; and environmental costs built into a product's cost. Externalities are costs not borne by the responsible entity, for instance, the ecological impacts of climate change resulting from automobile emissions are not included in the price consumers pay for petroleum (Conway, 1996).

ii. Extended Producer Responsibility

Extended producer responsibility is a relatively new tool designed to reduce waste from consumer goods and its impact on the environment. This concept is such that manufacturers take some responsibility for the environmental impacts of their products throughout their life-cycles. This could be through approaches like where the producer sells the service only and maintains ownership of the product (Conway, 1996). This would prompt manufacturers to play a role beyond the point of sale or warranty by, for example, designing products that produce less waste, use fewer resources, and contain more recycled and less toxic components. This also ensures that environmental benefits realized at the end of life are not negatively transferred elsewhere in the product life stream.

Ways to achieve this include:

- Manufacturer bearing the environmental liability, thus the producer is responsible for environmental damage caused by the product through regulations.

- Economic responsibility of costs for collection, recycling, resource recovery, or final disposal of products are borne by product consumers and producers through measures such as deposit- refund systems and advanced disposal fees.
- Physical responsibility – collection and management of the products are the responsibility of the producer.
- Providing public information and education regarding the EPR program for their products.

Adapted from Recycling Council of British Columbia (2005)

iii. Eco-Management and Audit Scheme (EMAS)

EMAS are very much like EMS except that they provide environmental performance information to the public. An initial review of the significant environmental effects at the site is used to draw registers of significant environmental issues and all the relevant environmental legislation to which the site must comply. A public environmental statement is required of all participating sites, both after the initial environmental review and then at three years intervals to report on progress against environmental objectives. This statement must be validated by an accredited environmental verifier and it includes;

- A description of the company's activities at the site.
- An assessment of all the significant environmental issues of relevance to the activities concerned.
- A summary of the figures on pollutant emissions, waste generation, consumption of raw material, energy and water, noise and other significant environmental aspects.
- A presentation of the company's environmental policy, programme and management system implemented at the site considered.
- The deadline set for submission of the next statement; and the name of the accredited environmental verifier.

Adapted from EMAS (undated)

iv. Environmental Auditing

The main element of the Environmental Auditing Programme is an emphasis on the "partnership" approach to environmentally satisfactory operation. The Environmental Auditor conducts site inspections to identify areas of concern for consideration by the business operator, and target dates for works required are agreed to after negotiation. The auditing program has been used as a conduit for the dissemination of information on new responsibilities. Encouragement is provided for business to examine the environment beyond the premises which they occupy and report any potential environmental harm to Environmental Health Officers so that immediate action may be taken. The auditor determines if any operations on the site pose danger of polluting the natural environment, in which case the auditor continues with an environmental audit of the site. If not, this is the end of the inspection. Any issues that may harm the environment due to operations or practices are discussed with the operator at that time.

A report that includes a schedule of works on any matters requiring attention and any works that need to be undertaken to ensure that the premises comply with the relevant legislation of the environmental audit is sent to the operator detailing all the matters discussed during the inspection. In the event that a business is found to be operating in an environmentally sensitive manner, the operation is awarded a certificate of recognition

Adapted from Blacktown City Council (2005).

v. Community based Environmental Protection (CBEP)

CBEP is a term for a holistic and collaborative approach to environmental protection. It brings together public and private stakeholders within a place or community to identify environmental concerns, set priorities, and implement comprehensive solutions. Often called a place-based or ecosystem approach, CBEP considers environmental protection along with social needs, works toward achieving long-term ecosystem health, and fosters linkages between economic prosperity and environmental well-being. Through CBEP, communities create a vision of environmental health and quality of life and pursue activities compatible with that vision. Core principles of CBEP are

- Focus on a definable geographic area.

- Work collaboratively with a full range of stakeholders through partnerships.
- Assess the quality of the air, water, land, and living resources in a place.
- Integrate environmental, economic, and social objectives and foster local stewardship of all community resources.
- Use the appropriate public and private, regulatory and non regulatory tools.
- Monitor and redirect efforts through adaptive management.

Adapted from EPAl (1999).

vi. Environmental Reporting

Environmental reporting is the term commonly used to describe the disclosure by an entity of environmentally related data, verified or not, regarding environmental risks, environmental impacts, policies, strategies, targets, costs, liabilities, or environmental performance, to stakeholders as an aid to enable their relationship with the reporting entity. This is done through annual reports, stand-alone corporate environmental performance report, site-centred environmental statement, some other medium like staff newsletter, video, CD-ROM, website.

A good environmental report clearly acknowledges and explains the environmental impacts of an organisation's operations and products, and publicly demonstrates the organisation's commitment to reduce them accordingly. Greater transparency may include an increase in the number of customers who consider, respect or share the same values and being placed on 'preferred suppliers' lists of companies that consider environmental responsibility upstream to their own operations.

Adapted from Accamail Web based e-mail service (2005).

vii. Other EMS

There are two types of ISO standards; namely; normative and informative. Normative standards specify requirements that must be met and are audible for certification. Informative standards are a type of standard that only provide guidance. As such they are not requirements for certification and therefore are not audible. ISO 14001 is the only normative standard. All other standards serve a supporting function for maximisation of ISO 14001 effectiveness. (A list of ISO 14000 standards is attached

as appendix A). These standards need to be strategically incorporated into ISO 14001 for its enhancement. The ISO 14000 standard groups are as follows:

- Environmental Management Systems (14001, 14002, 14004)
- Environmental Auditing (14010, 14011, 14012)
- Evaluation of Environmental Performance (14031)
- Environmental Labelling (14020, 14021, 14022, 14023, 14024, 14025)
- Life-Cycle Assessment (14040, 14041,14042, 14043)

Adapted from ISO (Undated)

2.6 Summary

This chapter has been vital to show how the research study came around; the previous work or studies that were carried out on ISO 14001 directed the research approach. Looking at the general background information on the standard, its environmental performance, the ISO 14001 situation in South Africa and the environmental management tools that can enhance the standard performance all formed a good foundation upon which the study was pursued.

CHAPTER 3: METHODOLOGY

3.1 Introduction

After the literature review the next step is to look at the methodology that can be used to achieve the research objectives. The research used multiple approaches and techniques to collect the data that would be relevant for achieving the research objectives. The use of multiple methods was useful to increase reliability and validity of the data. Besides using the literature reviews as the basis for the data collection, three techniques were used to collect the data, namely; structured questionnaire, interviews and documentations. The main questions were based on the motivations for ISO 14001 standard registration, views on ISO 14001 environmental performance and the use of environmental management tools by ISO 14001 registered companies. The sample was based on companies registered with SABS for ISO 14001 and willingness to respond by company representatives. However, a target of not less than 20 responses was set as the lowest limit for structured questionnaire, two to four for interviews, and not less than ten documentation on articles written on South African companies registered with ISO 14001. The results were: 23 responses from the questionnaire, two interviews and thirteen documents.

3.2 The study objectives

The following objectives serve as guidance to the research methodology:

1 To determine the motivation and benefits for ISO 14001 registration by companies in South Africa.
2. To establish awareness by ISO 14001 registered companies in South Africa on environmental management tools.
3. To determine how environmental management approaches or tools are used by ISO 14001 registered companies in South Africa so as establish how to compliment the standard use with other environmental management tools to ensure that organisations are not put out of business because of environmental responsibilities.

3.3 Approach and method

The data used comes from a survey from several literatures written on environmental performance of ISO 14001 registered companies. Both original and secondary data were employed. Primary data was used through structured questionnaire and interviews while secondary data was through the documents. The approach used on the data was both qualitative and quantitative. The use of questionnaires for survey was executed for quantitative strategy of the study. Qualitative strategy was incorporated through the use of interviews and documents. The interviews and documents were also used to compliment and verify further the results obtained from the questionnaires. Thus some field work was carried out through interviews; from there the bulk of the data collection was through desk work from literature researches in the library, the internet and electronic mail surveys.

3.4 Validity and Reliability

According to Yin (1994) cited in Zobel and Burman (2002), the data validity and reliability is increased by multiple sources of data. For the study this was achieved through literature reviews, structured questionnaires, interviews and documentation studies. However, the limitation associated with this is that it is not easy to achieve full reliability as research process is largely influenced by the author's frame of mind.

3.5 Description of research techniques

A brief description of the three techniques used is given as below:

3.5.1 Questionnaire: the questionnaire involved a quantity or information type of questions, category, multiple choice and open ended questions. It was based on the literature searches done on the study. Initially as many as possible questionnaires with a covering letter were emailed to companies to cater for non-responding by companies. 85 of these were sent to the email addresses obtained from the SABS website. The results from this were very poor; only four (response rate of 4.7%) responses were obtained and 33 emails returned by Yahoo administrator for some internet technical reasons, then the telephone numbers of companies obtained from the SABS website were used to ensure that the email addresses were up to date (some were not) and to get an agreement that the questionnaires would be filled up, about 33% of the calls

were rejected with the common reason that the potential respondents were busy especially with the audits. It was important to make further follow ups to ensure that emails went through because some people did not get the emails sent to them, and in the same manner about five people claimed to have sent back responses (two of these never sent them again) which did not reach the author's email address given to them. Apparently there was a technical problem with the emails, two people indicated they did not receive their emails from Yahoo and an alternative Hotmail address had to be set up. This made the survey take longer than anticipated; almost triple the time. Another telephone follow ups were done where there was no common understanding on the answers given. Eventually 23 responses were obtained from this survey. The questionnaire sent to companies is attached as appendix C.

3.5.2 Interviews: Two personal interviews of about an hour each were carried out. The interviewees were an ISO 14001 Consultant and a Senior Environmental Auditor. This was a good representation because the two individuals are not only involved in their companies but also in other companies both as a consultant and an auditor, making the coverage broader. Though the interviews were guided by pre- prepared questions as shown in appendix D ,the questions were open ended which encouraged the respondents to bring up a lot of information, including that which could be overlooked.

3.5.3 Documents: The documents from the internet were used to compliment the primary data collected through the questionnaires and interviews; these were articles on environmental performance of ISO registered companies in South Africa. They were useful to confirm, modify or contradict the finding from the questionnaires and interviews. They also helped in allowing focusing the attention of the analysis and interpretation. Moreover, this research cannot be conducted in isolation of what has been done and reported on. Thirteen documents were used which were on companies that are ISO 14001 registered in South Africa even though several of these companies have partnerships internationally.

3.6 Sampling and selection

The sampling was done across all the fourteen sectors of ISO 14001 registered companies by SABS. Ideally, two companies from each sector would suffice and was the target so as to cover the entire spectrum of EMS registered organisations, but with the shortcoming of lack of responses, this pattern could not be adhered to. Eventually a purely random sampling approach was the most suitable alternative which depended on the "willingness" to fill up the questionnaire or be interviewed. For the interviews individuals from companies that had not been involved in questionnaires surveys were called and asked for an appointment; of the nine called seven had business commitments and only two respondents could be found who fortunately represented quite a wide spectrum. For documents suitable South African documents were found through surfing the internet.

3.7 Data Processing and Analysis

The collected data was entered into a computer in a form of a database to facilitate the handling of vast amounts of data. To present the data in an easier to read and visually attractive representation and to have an organised set of results, Microsoft Excel and Microsoft Word were the two main programmes used to process and analyse the results.

3.8 Summary

The methodology chapter was important to give the reader a clear picture of how the study was done; the techniques and approaches that were implemented and how the samples were determined. Thus it was a procedure used to come about the results.

CHAPTER 4: PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

After the methodology the next step is to present the results that were obtained from these methods. This chapter presents the results obtained from the three methods outlined in the previous chapter to achieve the research objectives after the data analysis. The results are presented in three main categories; those obtained from the questionnaires, those from interviews and the results from the documentations used. Each of these categories fundamentally comprises the following points: the respondent companies' background information, ISO 14001 environmental performances as perceived by the ISO 14001 registered companies in South Africa, issues on environmental management tools used. The fourth section which is on discussion of the results forms the last part of the chapter.

4.2 Results on Questionnaires

4.2.1 Company Profile information by type of industries

Of the fourteen industries served by SABS as in appendix 2, nine industries were covered in the random sampling as shown in the table below (categorisation adapted from SABS). One respondent was unwilling to disclose the information on his/her company.

Table 4.1: Interviewed companies' profile

Industry type	Description of operations involved	Responses	%
Civil and building	-manufacture of cement. -milling gypsum rock to powder and manufacture of gypsum ceiling and partition board. -manufacture light weight pre painted metal roofing tiles and accessories.	3	13
Automotive	-manufacture of automotive glass. -manufacture of harnesses for motor industry.	2	9
Chemicals, Petrochemicals and explosives	-chemical manufacturing. -supply laboratory chemicals and consumables.	7	30
Cosmetics and pharmaceuticals	-manufacture of raw materials for detergent, toiletry and cosmetics.	1	4
Electro technical	-application engineering and manufacture control and protection systems for electrical power networks, power line carrier protection systems and associated coupling equipment -nuclear industry, irradiation of isotopes and silicon for electronic industry.	2	9
Information security management	-general engineers. -ISO 14001, Occupational Health and Safety Assessment Specification 18001 consultant, auditor and training.	2	9
Mechanical engineering	-steel making -repairs of mechanical seals and associated components	2	9
Metallurgical Engineering	-iron ore mine. -open cast mining –production of ferro vanadium.	2	9
Timber and forest	manufacture of wood preservatives, disinfectant, creosote and road tar binders.	1	4
Unknown	-	1	4

4.2.2 Respondent Profile

The respondents were of very high profile, mainly the senior management and one respondent was the sole owner of the company. The categorisation of the respondents and the proportions of responses by positions are shown in the table below.

Table 4.2: Respondents profile

Positions	Responses	%
1. Environmental systems coordinator	5	22
2. SHEQ/SHERQ/risk controller	7	30
3 EMS manager /ISO administrator	2	9
4. Management representatives/Plant manager	2	9
5 Quality system/Quality assurance manager	3	13
6. Position Logistics manager	1	4
7. QHSE manager	1	4
8. Sole owner of company	1	4
Unwilling to disclose	1	4

4.2.3 Place of consumption

On the issue of the place of the product consumption given by three options; *locally only, exportation only and both exportation and locally consumed*, the responses were such that 22% of the companies sell their products locally only and 4% of the companies produce their products for exportation only while 74% of the companies consume their products both locally and for exportation.

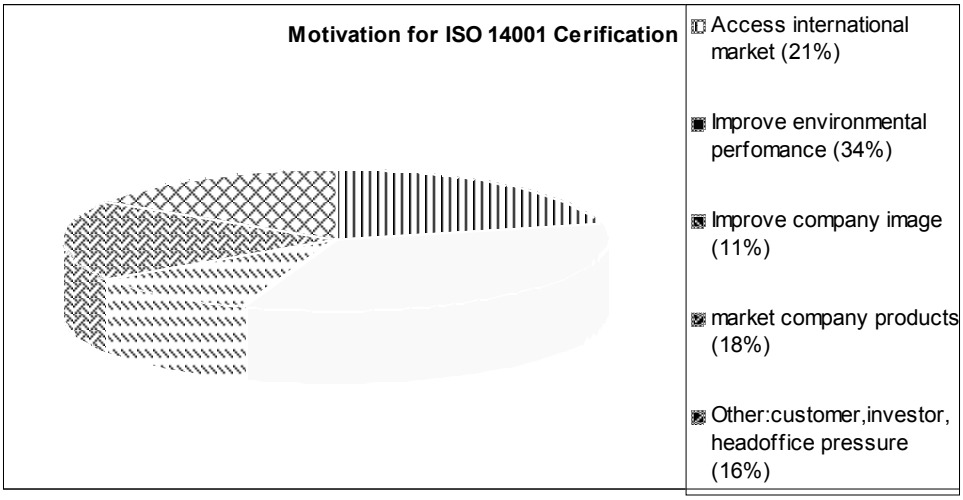
4.2.4 Motivation for companies certifying for ISO 14001

The respondents were asked for motivation for ISO 14001 registrations and were given five motivational reasons to select from and the results from the 23 are as shown in the table and representative pie chart below. The proportions are by frequency of motivation reasons; most respondents choose more than one reason.

Table 4.3 Motivation for ISO 14001 certification

Motivation for certification	Frequency
Access international market	8
Improve environmental performance	13
Improve company image	4
market company products	7
Other; customer, investor, & head office pressure	6

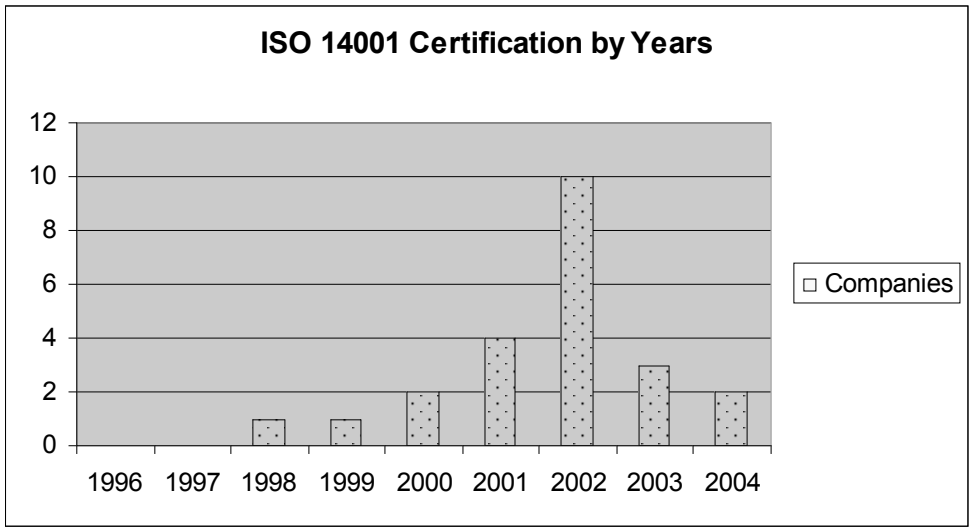
Figure 4.1: Motivation for ISO 14001 certification



4.2.5 Time to obtain Certification

Time for certification was categorised into three; 0-6months, 7-12months and over a year. 22% of the respondents took between 0-6 months to obtain their ISO 14001 certificates, 35% took between 7 to 12 months and the remaining 43% took more than a year. Below is the bar chart that represents the years at which respondents companies got certified. 43 % got certified in 2002 alone only as compared to 57% that got certified in the other eight years.

Figure 4.2: ISO 14001 certification years



4.2.6 Cost of Certification.

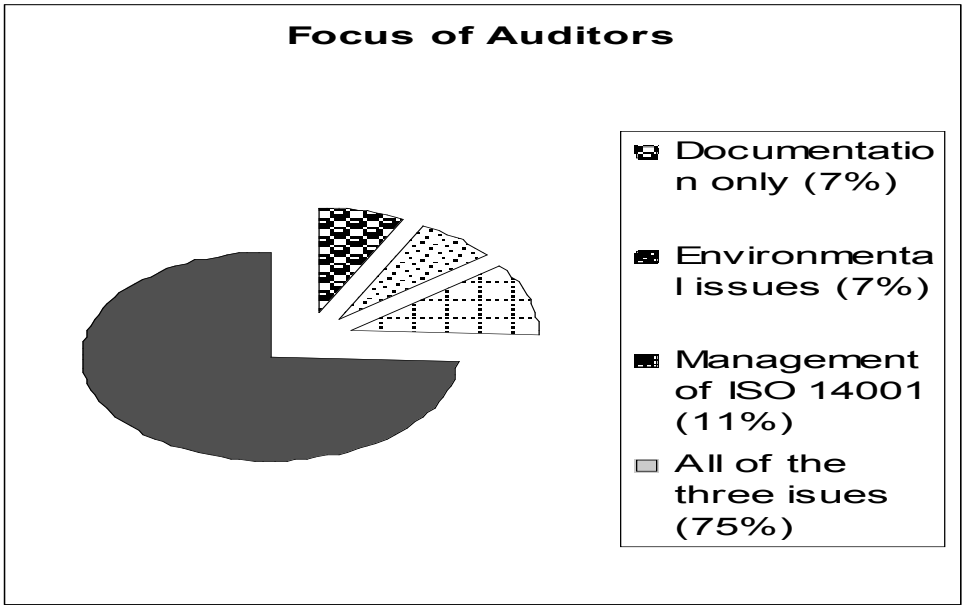
This was an open ended question on which each respondent gave estimate figures of the ISO 14001 certification costs. The range of the costs for certification was from R7 000. 00 to R184 000.00, otherwise the highest cost for certification is R250 000.00 for the response that added other associated costs besides certification such as getting a consultant to bring the company to the point of registration, the actual assessment and registration by SABS and updating of the legal register by an environmental lawyer. The mean value of all given costs is R62 647.00. The median is R30 000 and the mode is R12 000, R20 000, and R26 000. In response to whether ISO 14001 increase of the company financial value, 52 % thinks it does, 26% said it does not and 22% was not sure if it does or not. However, 100% of the respondents think that ISO 14001 contributes to environmental performance without compromising the financial performance of the company, but on the follow up to confirm this by re–asking the respondents by telephone, of the five that were asked, two indicated that environmental improvement required by ISO 14001 is pretty expensive, bringing this percentage to 60%.

4.2.7 Focus of auditors

The question on the feeling on the auditors' focus when doing ISO 14001 auditing gave the respondents the choice of four options and responses were as shown in the

chart below. The respondents clearly do no feel that auditors focus on one issue as shown by 75% below.

Figure 4.3: Focus of auditors on ISO 14001



4.2.8 Documentation issues

On the feeling of the respondents about the amount of documentation required for ISO 14001 implementation, 4% of the respondents think that the documentation is unnecessarily too much, 96% reckon it is sufficient or reasonable to address ISO 14001 implementation issues, and nobody thinks it is not sufficient to address the ISO 14001 implementation. One response commented that there is a bit of paper work that needs to be kept up top date; checklists, surveys, risk assessment etc, however, all of these help the ISO 14001 system running and up to date. Another comment indicates a great deal of documentation aid in the monitoring of the impact their processes may have on the environment and it is beneficial to have these as a guide and an indication to the efficiency of ISO 14001 systems.

4.2.9 Other ISO 14001 standards employed

This was an open ended question on other ISO 14000 standards employed in South Africa; 87% of the respondents do not know or apply the other ISO 14000 standard except the ISO 14001, the 13% which applies the other ISO 14000 standards apply the, ISO 14010, ISO 14011, ISO 14012 and ISO 14040, with all 13% applying ISO

14011, one quarter of the 13% also applying ISO 14012 and two quarters applying ISO 14010 and one quarter indicating ISO 14040. One respondent indicated that he/she is not even aware that there are other ISO 14000 standards except ISO 14001. Even though ISO 9000 (Quality Management Standard) was not indicated in the study questions, a significant number of respondents seemed to be more inclined to mentioning it, eight (35%) responses mentioned the standard, and another Standard OHSAS 18001 was mentioned by three (13%) responses.

4.2.10 Association of companies

65% of the companies do not have any industrial associations or environmental associations whilst the remaining 35% have industrial associations in the form of

1. Association of cementations producers
2. Institute of Waste Management of Southern Africa (IWMSA)
3. Local Environment Forum
4. Catchment's Management Forum / Department of Water Affairs and Forestry forum
5. Parow Industria Improvement Waste Management
6. District Waste Management Club
7. Canadian Archaeological Institute of Athens (CAIA)
8. Vaal Air Pollution Committee
9. International partnership

The benefits got from theses associations as per respondents are summarised as

- Learning from the experience of others through industry environmental committee
- Increasing knowledge and keep abreast with latest developments and trends so that respective companies can amend activities to be environmentally progressive.
- Learning much about waste management,
- Helping in self assessment from CAIA and can be sure to comply with standards.

4.2.11 Environmental performance

This section discusses the environmental management tools that are known by the respondents, those applied by the respondents companies and how they are applied, it considers the problems encountered during this application and their possible solutions.

i) Environmental management tools application

From a list of environmental management tools that are given, the responses by awareness and those that are implemented by respondents companies were given as in the table below. Other tools that came from the respondents are shown on the "others" row in the table. The results are such that one respondent may have opted for more than one environmental management tool.

Table 4.4: Environmental management tools awareness and application by ISO 14001 registered companies

Sustainable Environmental tool/approach	Aware ness by frequency	Awareness of respondents by %	Use by company frequency	Use by company %
Life Cycle Assessment	8	35	1	4
Eco efficiency	3	13	3	13
Cleaner Production	9	39	7	30
Community Bases Environmental Protection	4	17	1	4
Environmental controlling	4	17	1	4
Environmental Auditing	16	70	11	48
Environmental Reporting	12	52	9	39
Extended Producer Responsibility	5	22	2	9
Environmental Performance Indicators	12	52	8	35
Eco Mapping	4	17	1	4
Industrial Ecology	2	9	1	4
Pollution Prevention	15	65	9	39
Full Cost Accounting	3	13	1	4
Design for Environment	5	22	0	0
Others: -Aspects and Impacts Studies	1	4	1	4
-Fish bone diagrams	1	4	1	4
-Triple Bottom Line Reporting	1	4	1	4
-Achiever Plus	1	4	1	4
-Environmental Manag. Program	3	13	3	13
-Responsible Care	1	4	1	4
None	5	22	N/A	22

N.B. All tools have a one respondent from a consultant who reckons applies all tools according to company need; therefore this one response is not necessarily a guarantee that the tool is implemented.

ii) How the environmental management tools are applied by companies

This part was done by respondents in a manner that more than one tool could be mentioned as used by the company, but when it came to how almost all the respondents did not specify for which tool it was hence an assumption had to be done by the author according to the activity or principle that was in application to come to the conclusion of the type of the environmental management tool. Due cognisance that the tools may overlap in their application was taken.

a) Environmental Performance Indicators

- ✓ Key indicators identified at risk assessment phase of ISO 14001 and reported on.
- ✓ Various data monitored and analysed e.g. waste, emissions and other environmental complaints received.
- ✓ Contribution to landfill.
- ✓ Electricity and water consumption.
- ✓ Number of spillages.
- ✓ Number of illegal findings.
- ✓ Findings by SABS auditors and other auditors.
- ✓ Monitoring effluent emission and employee health.
- ✓ Number of incidence reports, , measurement of processes such as water quality discharged to sewerage.
- ✓ Stack emissions, vapour releases, water usage and disposal (quality & quantity), groundwater monitoring, regional strategic assessments, waste generation and disposal measurements, environmental projects and costs, environmental incidents.
- ✓ Air pollution, energy usage, water usage and effluent quality.
- ✓ Welding gas consumption
- ✓ Paper usage and copper waste.

b) Environmental Auditing

- ✓ Done externally by SABS and National Occupational Safety Association, & trained internal auditor.

- ✓ Internal & external audits done on frequent basis.
- ✓ Internal audits performed twice a year and legal compliance annually.
- ✓ Through ISO 14001audited by 3rd party.
- ✓ Environmental Lawyer appointed to compile register of applicable legislation, another legal consultant do annual legal audits of EMS, a legal electronic updating service and a management representative ensures management is aware of applicable legislation at all times in case of audits.
- ✓ Used to manage and maintain all related documentation which forms part of the EMS.
- ✓ Assign specialist in various areas and ensure all level involvement and conduct self audits.
- ✓ Part of ISO 9000:2000 management system
- ✓ Internal audits according to a planned schedule based on ISO 14011 and 14001.
- ✓ Have sampling surveys, lighting surveys, noise surveys every 2 years, have regular scheduled external & internal audits for ISO 9000,ISO 14001& OHSAS 18001 which monitor efficiency, documentation etc

c) Cleaner Production

- ✓ On going activity enhanced by the Environmental Management Programme of ISO 14001.
- ✓ Use air filtration systems.
- ✓ Effluent treatment for chemical waste.

d) Environmental Reporting

- ✓ Use of community liaison forms, websites and annual report.
- ✓ Reports issued twice per year at management review meeting and environmental performance communicated to stakeholders via forums and media.
- ✓ Monthly graphs.
- ✓ Incident Reports.
- ✓ Reporting based on incident and accident statistics and pollution prevention by implemented management programmes.

e) Pollution prevention

- ✓ As part of Environmental Management Programme.
- ✓ Incorporated into all processes via ISO 14001 procedure.

f) Environmental Management Programs (mentioned by respondents)*

- ✓ Environmental projects raised and managed.
- ✓ Identify potential environmental concerns by aspects and impacts studies; identify existing environmental concerns through environmental audits and environmental incidents reports.
- ✓ Waste separation, environmental training, flood water control.
- ✓ Action team reviews and prioritise findings and come with actions, implementation of actions by team, update aspects and impacts study.
- ✓ Do trends according to procedure and report monthly accordingly. Also follow operations and training detailed in Environmental Management Program.
- ✓ Procedures and management participation.

g) Industrial Ecology

- ✓ Raw-production (products and by products)- use of by products to make other products.

h) Life Cycle Assessment

- ✓ All inputs, outputs must balance up to disposal.

iii) Financial Performance of the environmental management tools

This was concerned with how the above environmental management affected costs; 21% of the respondents reckon that environmental management tools help increase the financial performance of their companies, another 21% says it reduces the performance and 56% is unsure of how this is affected. The following comments also came up in terms of financial issues related to implementation of ISO 14001;

- It is only external auditing and annual report that has direct costs.
- It is corporate responsibility to establish continuous improvement.

- It does not affect the bottom line; instead it assists in minimising waste generation.
- Since ISO 14001 introduction in 2002, the financial position strengthened and Environmental Management Plans made business sense; reduction in water, fuel, electricity usage and continuous monitoring of progress with resulting corrective and preventative action paid handsome dividends.
- There is a price to be paid.
- It does affect the bottom line, but must be compared to potentially higher clean up cost in future plus the possibility of directors going to jail hence why it is worthwhile investment.
- Yes, the man hours cost alone is astronomical.
- We are assembling not manufacturing and no waste is generated, hence no costs.
- This is budgeted for in this management so it is part of our operations- do not suffer.
- It cost a great deal of money in the form of consultants.
- Cost/annual fees are too much to maintain certification.
- Initially it is costly but in the long run it is a benefit; it has long term strategic advantage and short term disadvantage.
- Everything is in the hands of the company, if the company complains about costs or documentation; it is because they brought it on themselves.
- ISO 14001 has definitely added significant value to the company, not just in terms of image but also ensuring that we are responsible corporate citizens.

(iv) Resource availability and problems encountered

This part was concerned on the resources available to implement ISO 14001 and these environmental management tools and the problems encountered during their application. The results of these as given by the respondents are shown in the table below:

Table 4.5: Resources availability and problems encountered in ISO 14001 implementation

Resources Available	Percentage of Responses	Problems Encountered	Percentage of Responses
Skilled Manpower	43	Lack of skilled Manpower	34
Sufficient Funds	43	Lack of finances	13
Suitable Technology	26	Lack of suitable Technology	17
Top Management Support	78	All the three above	9
Others	0	Others: -Lack of understanding and interest -Difficult to justify the resources that are not production related	4 4
		No problem encountered	30%

On the issue of problems counteraction 31% were unknowing in that regard, 30% did not respond as they reckon they do not encounter any problems, and the remaining 39 % gave the potential solutions as:

- Train employees on their impacts on environmental issues.
- Senior management must also focus on environmental issues; people do what is important to their bosses.
- More commitment by top management in providing required resources.
- Involve more personnel in implementing.
- Train personnel auditors in environmental issues.
- Contact relevant people/ network for guidance, use correct materials and machinery.
- More training in multi skills.
- Educating workforce brings about new opportunities; understanding the impact of their daily activities on the environment broadens their views on how they can contribute to responsible environmental care at work and at home.

4.2.12 ISO 14001 in community relations

Though this area was not the main focus of this study, nonetheless it was important to have a rough picture of how ISO 14001 has helped in community relations as an integral part of sustainable development, besides environmental performance has replications on the community relations one way or another, however, it was not analysed in depth, it was a matter of whether ISO 14001 benefited the community or not and 70% of the responses reckon ISO 14001 helps in improving community relations and the remaining 30% think it does not and one respondent indicated that there are no communities around to form relationships.

4.3 Results on Interviews

4.3.1 Introduction

Two personal interviews were taken with two individuals whom though working for certain companies, have a wide exposure to other companies as well: one was the consultant who helps companies get certified for ISO 14001, and the other was a senior environmental auditor; these two individuals are representative of a wide spectrum of South African companies' views. This served for verification and further information that may not have come up in the questionnaires. According to the interviewees this is the situation;

One respondent referred to the standard as a "conformance based standard" not "performance based standard" and the other referred to it as "management standard" not "performance standard." The standard therefore does not say anything about the amount or type of pollution: they both indicated that companies can get certified for ISO 14001 and still have pollution taking place as long as it is within the legal requirements of South Africa or as long as they have a management plan of how they intend to deal with that pollution. There need to be analysis of risk and the most significant risk solution measures found. The standard implementation in South Africa is based on legal requirements that makes the companies comply with Environmental Impact Assessment and Environmental Management Program but does not state the procedure; it is really in the hands of the companies. Consequently, the companies

that are not in compliance with the legislation or their environmental management plan can have their certification taken away. Thus ISO 14001 work more as the tool to ensure conformance to environmental law especially since the government does not have sufficient resources to enforce the law or police the contraveners. *"In the past companies could have easily got away with non compliance but not with the ISO 14001 in place"* stated one respondent. There was a mention of an organisation that recently lost its certification.

4.3.2 Motivation

In terms of motivation for getting certified companies get interested in environmental measures if it saves them costs and they see that their business opportunities increase. Companies would like to increase their public image and be seen as environmentally and socially responsible.

4.3.3 Time taken for certification

For the time taken to attain the certification it can go for up to four months for small companies and up to a year for big projects of about 50 senior staff members. This is because it needs regular meetings to be held, inspections, incident reporting and training of staff repeatedly, the less the time taken the less the perfect the ISO 14001 results, hence why consultants encourage their clients to commit to longer time to have more time for change of attitudes.

4.3.4 Benefits

One of the most important benefits of ISO 14001 is education and awareness, unlike in the past where environmental management was for certain environmental officers and a few people around them, ISO 14001 now involves staff across all levels from the floor to the top, everybody understands and is aware of environmental implications of an activity he/she undertakes. Without ISO 14001, traditionally the responsibility of the environment was of the management and a few people around them, now it is a shared responsibility and increased awareness and capacity building in environmental matters and consequently environmental responsibility is becoming a culture.

4.3.5 Environmental management tools used

In response to the actual environmental performance and its tools, it was shown that the environmental damage needs to be weighed versus the economic benefit of an operation. Furthermore, there was an indication that environmental issues will always be secondary to main business and will therefore be allocated resources in the secondary manner, especially because it can be very expensive; an example was that of air pollution mitigation device which could cost up to R2.4 million. It was also indicated that one cannot take the First World class countries such as European standards and tools and apply them in the Third World countries like South Africa, the contextual issues should be considered; for instance if the standards and tools applied in power generating company in Europe are applied in Electricity Services Commission (ESCOM) then electricity would be very expensive for South Africans. What needs to be done is to show that the country is doing the best it can, using international "Best Practices". It was clear that other ISO 14000 standards are not implemented in South Africa to a significant degree.

Furthermore, the big level of environmental issues is solved at EIA level, so ISO 14001 must not be looked at as a pollution prevention tool, thus it is up to the government level to decide how pollution prevention takes place. For example, waste management as stipulated by the government that hazardous, recyclable, and general waste must be separated is typically what is interpreted by ISO 14001 auditors.

4.3.6 Problems with environmental management tools and their counteraction

The problem is with the resources and skills but companies need to provide for them, it is their responsibility, they need to put effort to these, "*it would neither be unfair nor right for a company to claim that it has not got enough resources to clean its act but continue to harm the environment for the nation*", said one respondent. From another perspective there was an indication that no costs are actually incurred except certification cost, and as such not expensive, this is besides educating the staff which is an integral exercise of any operation.

4.3.7 Community relations

In terms of community related issues, this came up as a quite complex issue because at times the communities are not sufficiently informed, and could claim something without proper information to their claim, a lot of pollution in South Africa such as mine dumps is historical and the law is not retrospective; besides, the companies responsible may no longer exist and there was no technology or law to clean up at the time of pollution, so to say that ISO 14001 can help in community relations is quite a complex issue except for the fact that if companies take care of the environment it can result in social responsibility. Therefore if a company has in place a pollution management plan and a going monitoring program it can get certified no matter if it has a conflict case with the communities or not as one respondent company currently is.

4.4 Results on Documentation

4.4.1 Introduction

Thirteen documents that discuss environmental issues of the ISO 14001 certified companies in South Africa were used to further cross check the results given by the questionnaire and the interviews. From the documents, it is clear that some environmental protection measures were already in place even before the ISO 14001 certification by companies. This makes it virtually impractical to draw a line of the environmental improvements brought upon by the ISO 14001 registration; however, the essence of this study is to establish if companies certified for ISO 14001 are environmentally responsible. The analysis of the documents was made in the context of the ISO 14001 companies and the way they are implementing their environmental protection measures in order to establish the approaches and the tools implemented by these companies. The documents used were reports, newsletters, news paper, press releases articles that comprise mainly types of issues covered in questionnaire. They include comments made by very high senior members of these companies such as Vice President of one Drilling Services and global co-ordinator of one industry-leading achievement.

4.4.2 Motivation

Some motivational reasons included in the documents are

- This standard enables a company to manage its environmental impacts while adhering to the requirements not only of the standard itself but also of international norms, legislation and regulations. It also forms the foundation for continuous improvement in environmental performance.
- Being ISO 14001 certified means that experts agree that the company is world class in terms of environmental management and that processes are in place which allow the monitoring and controlling of those factors which may affect the environment.
- The incorporation of this internationally recognised standard is a benchmark which enables organisations to measure progress in the environmental field. ”*A desire to improve competitiveness was the major motivation for certification, although the need to deal with supply chain pressure and environmental and social criticism of the industry were also important”*, it was said.
- Companies want to demonstrate their credentials as good managers. Certification has enabled them to talk with international friends, national stakeholders, and even the local neighbours.
- One company reckons is a global player, and its customers is in more than 16 countries now have the assurance that it is acting responsibly in terms of the environment.

4.4.3 Benefits

Environmental and financial benefits that were highlighted in the documents include

- ISO 14001 standard has yielded numerous benefits in terms of improved financial and environmental performance.
- Provided assurance of responsible environmental management.
- Recognition and limitation of liability.
- Due diligence with an auditable paper trail through which issues are identified and mitigated.

- Concomitant adherence to other standards.
- Pro-activity that leads to cost saving.
- Demonstrable commitment to continual improvement.
- Reduced operating costs, improved efficiencies and, ultimately, increased profits.
- On top of the recycling and waste management programme adopted, significant improvements in job-site organisation, record keeping and safety are seen. These benefits will certainly translate into efficiency and cost improvements in the long run which, in turn, will add value to the services.

4.4.4 Environmental management tools used

The environmental management tools are used by the referred companies in the documents, even though the wording may not exactly refer to the tools per se, the principles were used as the basis of the environmental management tools and are referred to in the following ratings; (these ratings were roughly estimated according to the rate/weight at which the environmental tool/approach were considered in the documents at a scale of 1 – 10: based on a number of articles referring to the tool).

The rate of consideration for these environmental tools as shown below:
Environmental Auditing: 8
Pollution prevention: 7
Eco efficiency: 10
Life Cycle Assessment: 4
Industrial Ecology: 5
Community Based Environmental Protection: 1
Environmental Performance Indicators: 9
Design for Environment: 5
Environmental management Program: 2
Cleaner Production: 1

Some points that were highlighted in the documents that underlie the use of the above environmental management tools are shown below.

Waste:

- Management systems implemented as part of ISO 14001, seek to minimise the amount of waste ultimately disposed of by landfill.
- In essence, ISO 14001 focuses on improving the management of environmental performance by limiting waste, reducing energy consumption and eliminating environmental damage.
- Reducing waste, preventing pollution and improving processes and procedures to continuously improve environmental performance is an important part of ISO 14001.
- Reduction of waste by using waste products in the production of value added products. Boiler ash, for example, is used as a raw material for the production of bricks, while waste oil is dewatered, chemically treated, refined and filtered for re-use in various grades of base oils.
- Operations are focused on improving the quantification, collection and recycling of waste material. Used oil, paper, steel, oil filters, batteries, old conveyor belts and tyres are being recycled by reliable contractors while slimes dams and slag heaps are being reworked where feasible. Repair of damaged wooden pallets for reuse on site.
- Increase in the proportion of waste materials which are re-used and recycled.
- Optimizing waste management and cutting waste and electricity consumption at automotive systems

Water

- Sound water management, is adapted from integrated cradle to grave approach, the quantity of water purchased by each operation is taken as the first level yardstick to assess water consumption from billed water sources.
- Managing water qualities, effluents and discharges, water consumption and recycling.
- Continuous assessment of discharges and regular reports are submitted to the relevant regulatory authorities.
- Electrical conductivity is a typical measure of water quality. According to the South African Water Quality Guidelines for Domestic Water, electrical

conductivity in the range of 0 to 300 is not expected to cause any health effects.

- The majority of operations do not discharge at all and wherever possible, water is recycled; this reduced raw water use by 33 percent in one company.
- Managing water and reducing effluent; in another company this had the significant impact on the amount of effluent generated, reducing levels by as much as 70%, while the activated sludge plant which came on stream improved the quality of effluent, treated sewage water accounts for more than half of the total water use.

Air quality/emissions

- Measurement of the total release of greenhouse gas from fuel combustion, and of methane emitted in low concentrations from underground. Carbon dioxide, nitric oxide, sulphur dioxide have been identified as emissions from the following sources; trucks, locomotives and blasting agents.
- Dust control measures are in place as per approved environmental management programmes. It is determined by the extent of airborne emissions around operations and these emissions are monitored using deposition gauges and high volume PM10 monitors. The processing plants have all implemented major engineering projects to improve air quality in and around their operations. This achieved a major improvement in air pollution as a result of the installation of pollution prevention equipment such as the 'LiquiCell' unit by one company.
- Reducing air emissions conversion from a sulphur-based pulp digesting process to caustic soda-based one, significantly reduced odour emissions. A scrubber in the Soda Recovery plant also helps to reduce particulate emissions.

Energy

- A sustainable energy and energy efficiency associated with existing technology is strived for.
- Energy is recovered at the soda recovery plant by burning organic matter which concentrates the liquor being fed to the reactor.

General Management

- Preventing accidental or uncontrolled spillages and mitigating the impact of environmental emergencies.
- Implementing systems for environmental control and improvement which include the clear definition of responsibilities and objectives.
- Globalization and environmental protection: cross-border environmental protection in all phases of a product's life cycle is important.
- Management Systems: Environmental Management Programmes as required by the Minerals Act and each operation is required to establish an EMS consistent with ISO 14001. Environmental performance at all operations was assessed by regular internal reviews and by system of compliance while a number of external audits were carried out. Policy to aim for continual improvement in environmental performance and, where possible, to prevent pollution at source, taking into consideration business objectives, employees and the local community.

Communities

- Running extensive educational programmes within operations and surrounding communities. There has also been establishment of Environmental Liaison Forums, as well as liaison committees by one company where interested parties and the affected public can discuss, debate and resolve issues.
- In addition to Adult Basic Education and Training courses, community has been trained in apprentices from other companies at the Centre for Learning and Growth. The focus on upliftment extends to the community around and working with the operation, outsourcing various types of work from small business entrepreneurs is one of the approaches.
- The local community collect ash generated from the boilers to make bricks.

From another angle, according to Mail and Guardian Newspaper Online on "National-Valley of Death" article, the community launched a legal action against one of the ISO 14001 certified companies, the South African's steel giant Mittal Steel, and the area around it has been declared as a "pollution hot Spot". The community around claim to have pollution induced ailments such as kidney failure from high levels of

cadmium, they claim to have cancers, and skin infection and their livestock do not survive the pollution. A research group also reckons that the steel company has turned an area into a wasteland. According to the general manager of the steel company, the company would spend R960 million on "environmental Improvements Projects", the completion date for the master plan on these projects is from 2005 to 2007. The Minister of Environmental Affairs and Tourism has also admitted that the legal requirements have not forced industries to clean up hence will strongly implement the "polluter Pays Principles" The issue on the court case against Mittal Steel recently came up on SABC 3 news at 7:00 pm on Tuesday the 2nd August 2005.

Compliance

- Development of procedures to minimise land disturbance; rehabilitation and eventual decommissioning at the South Africa mines takes place in accordance with environmental management programmes approved by the Department of Minerals and Energy (DME).

Noise:

- Operations monitor every blast, and any noise and vibration non-compliances are reported to the relevant regulators and stakeholders. Blast techniques have been refined to reduce their impact and consultative forums are in place to discuss any noise concerns.

4.4.5 Problems with ISO 14001

Pitfalls and challenges involved include:

- The benefits are less tangible than other measurables, and persuading employees that ISO 14001 is critical to business can be difficult.
- The process of obtaining ISO 14001 certification bears a cost, however obtaining certification is easier than maintaining it.
- Precluding a high level of turnover of environmental personnel and lean environmental department's specialisation is critical in maintaining certification.

4.4.6 Recommendation of problem counteraction

The following recommendations were highlighted in the documents;

- There is much still to be done if certification is to become capable of effectively addressing the 'messy' social issues generated by companies, and by enterprises that are not the biggest and the best.
- Certifiers and development agents should continue to learn and improve the focus of their services.
- Going "beyond legislation and international standards" by making use of every means at our disposal to limit operation's impact on the environment
- Through self regulation (like ISO 14001), industries perform better in self regulation, than to be forced by pollution legislation. In a research by J.C Engelbrecht (undated) in South Africa, the responses showed that companies significantly performed better after certification than before even though they operated against the same environmental legislation. Thus certification improves environmental performance significantly in South Africa.

4.5 Discussion of Results

This section discusses the results got from the survey in the following order; firstly, the company and the respondent profile, secondly, motivation for ISO 14001 registration by South African companies followed by the time and the period for certification of ISO 14001 in South Africa, then the cost of certification followed by focus of auditors when dealing with the standard, the documentation, ISO 14001 support by organisations, associations joined by companies, environmental management tools applied with the associated benefits and limitations, and lastly a glance at relevant community matters is taken.

The study covered a very wide spectrum of industries; very close to the fourteen types of industries covered by SABS (presumably SABS covers entire spectrum) which was assumed to be significantly representative of the South Africa industry. From the sampling covered the highest response that came up is that of chemical manufacturing, an industry which is potentially very dangerous due to its ability to pollute through all the three media (land, water and air) even in small amounts.

Some industry sectors that were not covered in the questionnaire survey came up in the documents which further validate the conclusion and recommendations drawn from this survey.

The respondents that filled the questionnaire were individuals of very high profile, which means that their effect trickles down to lower ranks of staff broadening the coverage further. The people who work *directly* with environmental issues were the highest proportion; they are Environmental Systems Coordinators, EMS Managers and ISO Administrator who covered 31% of the respondents of the surveys; these are the people who are usually able to make environmental decisions of the company. The next highest proportion (30 %) was the Safety, Health, Environment, Risk and Quality Managers in an integrated fashion. This is also a good representation since the four issues are closely related; for instance, air pollution can harm the safety of the workers and their health thereby putting their lives at risks and rendering the quality of work lowered. Otherwise all the other respondents are people who can affect the environmental performance of a company one way or another even though they may be involved in other issues. From the perspective that people can 'make or break' the success of any business, this study can be regarded as a success, because of the high credibility of the respondents in the environmental affairs.

In discussion to the actual responses to the standard, less than half (34%) came up with the environmental performance as motivation to get for ISO 14001 certification. The other reasons that comprised the remaining 66% include access international market, improvement of company image, market products, and customer or investor requirement. These ultimately sum up to business motives as the main reason why companies mainly get certified for ISO 14001. This is in line with the findings in the interviews and documents that companies get certified for their corporate image, the environmental performance is a secondary issue. Companies want to promote their image and be seen as good managers, "*being certified implies that experts agree that the company is world class in environmental management and that the processes are in place which allow the monitoring and controlling of those factors which may affect the environment,*" stated Ford Motor Company of Southern Africa. Nonetheless, the companies acknowledge that the standard benefits them in improved environmental

performance. The results of the interviews and documents were in consistence with the findings of the questionnaire results.

Looking at the time for certification; the least proportion of the companies take the least time 22% (0-6 months) to get certified for the standard, the less takes 35% (7-12 months) and most take more than a year 43%. This means that even in South Africa the standard certification takes a considerable amount of time which could render the core purpose of the environmental performance improvement in companies complacent after a long time as sated by Ghiesellini and Thurston (2005). This is because companies' core purpose is on the business matters. However, this could also be a good sign since the more the time taken the more effective the standard to culture the environmental performance improvement by organisations. From the years that registrations took place perspective, South Africa seems to be a country that does not embark on new tools with great enthusiasm, the ISO 14001 standard came into effect in 1996, for two years in this sample no company registered for the standard, in 2002, for some reason, 43% of the companies got certified for the standard, this is most probably because they felt the pressure almost six years down the line when they discovered that they missed the business advantage by not having the standard certification, however, this point is a subject for further research.

In consideration to costs, unlike the other countries, the average amount to get certified for the standard is R65 000.00 a figure not very high compared such as $100 000.00 (about R600 000.00) and from the fact that ISO 14001 has become a business advantage. Nonetheless, for a response that got all the other ISO 14001 implementation costs besides the certification costs; the cost of R250 000.00 for a company to concentrate on the environmental standard before spending the money on the actual implementation of environmental protection issues can be very high. There is also a general comment that getting certified for the standard is not the major financial cost, it is the maintenance that becomes a problem as it is renewed every three years and updated as the need arises. However, the added advantage to this is that the standard does not tell companies what or how to do, but just lays general guidelines for its management requirement, as one comment rightfully showed that if the companies complain about the high expenses, it is the organisation to blame as the

standard leaves the organisation to be self regulatory. Companies are the ones who need to explore and implement cost efficient strategies.

In assessment to the focus of the auditors, the environmental issues come up as the least of the focus, and management of ISO 14001 as the most, this is in line with the literature that claim that the standard is the 'management standard' more than 'environmental performance standard'. Focus on the documentation even beats the focus on the environmental issues. But, the highest score came as the focus on all the three issues though this still does not guarantee that the environmental issues are the main focus because if the standard is the "environmental Management System" it is indeed the assumption that the environment takes precedence to everything. On the other hand, this is following the trend that the standard performance is based on the assumption that good environmental management will lead to good environmental performance.

In regard to the other findings that reckon there is a lot of documentation that is unnecessarily too much, this is not the situation in South Africa; 96% thinks that the documentation is sufficient to address the standard, SABS (2004) has stipulated that "*…the primary focus of an organization should be on the effective implementation of the environmental management system, not on a complex document control system"*. From another perspective, South Africans could be having a good understanding of the benefits of good data management and sufficient documentation.

ISO 14001 is said to be the only ISO 14000 certification standard and has other ISO 14000 standards to support it in terms of the actual environmental matters; yet, 87% of the respondents "do not know " of these standards with one comment actually indicating that he/she is not even aware there are other ISO 14000 standards. This could suggest further that the inclination is not mainly on the environmental issues of the standard but just on the certification for business advantage. From there the standard that seemed to be more of interest is the ISO 9001:2000 mostly because it is also a marketing standard as well as the OHSAS as a safety standard, and unsafe conditions could mean bad publicity for companies. On a positive note; this could be that ISO 14001 provides sufficient framework for improved environmental performance for South African industry hence there has not been any real need for other standards to be highly regarded.

In terms of the associations, a lot can be gained by companies that join the associations such as learning from other companies' experiences and knowledge and also sharing resources like the latest technologies, machinery and personnel to reduce the cost of the environmental performance improvement, though in South Africa this does not seem to be a common practice as 65% of the respondents companies do not have industrial associations or environmental associations whatsoever which could imply missed opportunities.

On discussion on the environmental management tools employment, of the list on the environmental management tools, the highest known tool is the environmental auditing (70%), because when talking about environmental issues, South Africa seemed to be more inclined to compliance, either of legislation or standards so that they are in a safe position in terms of the audits. Pollution Prevention is the second highest score (65%), probably because pollution prevention is a 'buzz word' that is used without much consideration of its actual implementation. Environmental reporting and Environmental Performance Indicators are third highest rating scores with the same percentage of respondents' awareness (52%), this could be because they go hand in hand; reporting is normally done in terms of indicators.

Cleaner Production and Life Cycle Assessment are the tools that have relatively been in existence for a while and have gained popularity of 39% and 35% respectively. Tools like Design for Environment and Industrial Ecology are more recent tools hence it makes sense that they are the least known even though they are very important tools that would address the companies concerns of taking care of the environment whilst taking care of the company bottom line. When it comes to the critical question of environmental management tools actually implemented by companies the same trend follows with the environmental auditing the highest score followed by Environmental Performance Indicators, and Cleaner Production. No company is using the Design for Environment tool as yet.

The majority of companies did not have any extra environmental management tools used in their firms. Five responses each came up with one extra tool that are obviously not popular because each tool mentioned is used only by that particular company except for the Environmental Management Plan which was mentioned by three respondents. The way that opted environmental management tools are applied in

companies seems to be common to the respondents, the most common are waste issues, water consumption and air quality, and compliance to legislation and standards in case of audits by the regulatory bodies. On tools such as Industrial Ecology where waste is turned into a feedstock and therefore a money generator, only one respondent knew the tool, and the same respondents also is the one who is aware of the Life Cycle assessment issues. A very important issue of generating money whilst taking care of the environment was not significantly addressed by all respondents.

From the financial performance perspective, the issue of increased bottom line whilst taking care of the environment is not common in South African companies; the questionnaire responses roughly gave the following results; 21% of the sample indicates that these tools help them decrease their financial costs especially in waste management issues and avoidance of legal charges, another 21% says it reduces their financial performance, whilst 56% was not sure, this could be interpreted as lack of improvement on the financial performance and unawareness thereof because of the respondents profile. It is not very practical that an operation could give an added financial value and this calibre of staff not to be aware unless cost allocation to an activity is carried out without actually expecting any financial returns. There was a comment that says ‘we are assembling not manufacturing hence no waste is generated’ came up; what about the packaging material, the power used, and the equipment and tools that are used that are subject to wear and tear? On a further remark, though the point that tools and standards may belong to the First World countries and can hardly be implemented in the Third World countries is quite valid, this can act as an innovation barrier because of the belief that this does not belong to South Africa, open mindedness therefore becomes a necessary and important factor.

On the availability of the resources to implement ISO 14001, the most opted for is top management support. Top management usually does not support endeavours unless there is a business advantage which is also in consistence with the issue that the standard is highly regarded for its business value. One comment indicated that it is difficult to justify the resources that are not production related and the environmental issues are one such example. A further comment highlights that the main problem in environmental matters is lack of understanding and interest in environmental issues; if there is understanding and interest then these other issues can be planned and catered

for by management. The counteraction of these problems is dominated by training and education, including the training of the senior management in environmental issues; if this section is trained, their knowledge, attitude, and skills can easily filter down to the lower management levels, moreover, there will be more commitment in providing required resources. The problems of environmental management in three used methods of research investigation correspond, and training and increase in awareness again comes up as the major approach that can solve the problem.

In terms of community relation issues, 70% of the sample indicate that the standard help them improve the community relations, maybe this is because when there are no adverse environmental issues that come from organizations then the community relation will not be spoiled, but there are issues other than environmental impacts that need to be looked at, such as whether the community is benefiting anything from these organizations because of their ISO 14001 certification or not (a point for further research). One comment raised showed that there are no communities around to influence them, the questions then arise; what is the understanding of the concept of communities? Are communities affected if the resources in the area are affected by taking them up in utilisation or by making them inaccessible to the people in terms of the distance? The issue of the waste generated, which could contribute to the landfill and their global emissions or downstream pollution? There was a company that is ISO 14001 certified but allegedly has a court order for being negligent in environmental affairs causing the community illness from unclean living conditions. But this situation is better explained in the interview findings whereby it is acknowledged that ISO 14001 just needs one to demonstrate how one is going to curb the environmental impacts in a management plan. It does not look at the absence or the presence of pollution, indeed this company was reported to have such a plan by the media.

4.5 Summary

This chapter has been important in the presentation of the actual situation of ISO 14001 implementation by certified companies in South Africa. It gave issues around the standard, both the positive and the negative. The theme being ISO 14001 environmental performances with consideration of associated financial issues and the environmental management tools used. From the chapter it is clear that ISO 14001

helps in improved environmental performance with South African organisations even though there are associated costs, however environmental performance will also be secondary to the companies' core business.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

From the data analysed the next step is to draw the conclusions as given by the situation on the ground. This chapter presents the conclusions drawn from the results analysis from the previous chapter; it is also based on the objectives of the study with the consideration to the literature review that was done. The recommendations that can be implemented to achieve the research objectives form another part of this chapter.

5.2 Conclusions

Companies significantly perform better in environmental issues after ISO 14001 certification than they did before. However, environmental issues will always be secondary to the core business of organisations whose primary goal is to increase products profits; in South Africa, ISO 14001 motivations for certification are dominated by improved business opportunities whereby environmental performance is seen as a factor also leading to business opportunities. Because ISO 14001 can help increase business success whilst reasonably and responsibly taking care of the environment, then it has become a beneficial tool for the South Africans industries. This is in line with authors like Morrow and Rondinelli (2002) and Ofori, Gang and Briffett (2002) whose literature highlights the environmental and business values of ISO 14001. In general, South Africa's main motivation is to get certified for ISO 14001 so as to gain business advantage in both the international and the local market. Internationally, especially Europe who are South African customers and an environmental discerning country which demands that their suppliers display environmental responsibility demand ISO 14001 certification as one of the leading tools that indicate that a company is environmentally responsible, locally, there are customers that demand ISO 14001 certification from suppliers though this is not that strict. Companies will take any measures that enhance their business success hence why ISO 14001 certification has become a popular endeavour.

ISO 14001 is also a tool that is used on companies to enforce environmental legislation and consequently the auditors look at it from that perspective. The standard

is seen as “conformance” standard not “performance” standard. There is also a clear acknowledgement that the standard was never intended to be a “performance” standard but a “management” standard which is in line with Curkovic, Sroufe and Melnyk (2005). Factors such as documentation which according to Ghiesellini and Thurston (2005) could divert resources from real environmental issues to keeping up of the documentation are not necessarily the case; South Africans are of the opinion that good and sufficient documentation leads to good management of the standard. Moreover, the indication by Morrow and Rondinelli (2002) that the measurement of the standard can be against the organisation‘s environmental policy, environmental objectives, environmental aspects and other environmental performance requirements are also true; environmental performance indicators are used by companies to assess themselves against the set objectives.

In terms of environmental management costs, the South African companies take responsibility of their actions and believe that the environmental responsibility is vital to any operation and as such should be catered for and resources allocated for environmental management at the planning phase.

The main environmental management tools known and used by South African companies is Environmental auditing, Environmental Performance Indicators and Environmental reporting; this is probably because these tools are integrated in ISO 14001 and inevitably come into effect in the certification of ISO 14001. Waste management is another perspective that ISO 14001 auditors look at the standard especially because this is part of the statutory environmental requirement in South Africa. Other tools like Design for Environment, Extended Producer Responsibility, Industrial Ecology are barely known by companies, however, their principles are being applied to a certain extent therefore could be regarded as used except that the full benefits of these tools are not attained. These tools are mainly used in the form of waste management, water and energy conservation, air quality and compliance to legislation and general management. But there is an issue of costs that makes the implementation of these tools difficult for operations.

In conclusion to other ISO 14000 standards that are supposed to serve the supporting function to ISO 14001 in South Africa, they are used at a very low rate, this concludes that ISO 14001 is not supported by these standards as designed to a significant degree

which could result in missing the full opportunities in improved environmental performances that are intended by ISO 14001.

On the issue of community relations, ISO 14001 cannot solve some community issues either because some are historical and people responsible no longer exist, or that for those who are in existence, the law is not retrospective since there was no relevant regulation at the time of pollution. Nevertheless, ISO 14001 demands that companies have a management plan that indicates how these issues will be dealt with by the present responsible entities and this can directly or indirectly improve community relations.

5.2 Recommendations

ISO 14001 should be backed up by other environmental management tools if its benefits are to be fully realised both for the environment and business. Environmental management tools are usually applicable to any type of operation and are also flexible which makes them compatible to ISO 14001. It is up to the management and the regulatory bodies to make strategic decisions for incorporating them into ISO 14001. Some strategic approaches that can be followed to enhance environmental performance of ISO 14001 without compromising the business performance of organisations are as follows;

1. **Simplicity philosophy**: South African industries need to be aware that there is no need for cumbersome and expensive environmental management tools and techniques approach, what is necessary is the innovative management tools adequate to produce the results; thus the environmental management tools need to be adequate, simple and credible; they should be simple but sufficiently credible to be accepted by the government authorities, institutional and multinational purchasers and other pressure groups and should provide relevant results and information. New ideas should be implemented strategically; for instance incremental change (1-2 years) can be initially applied, and then set a small number of achievable environmental objectives for more far reaching changes (3-5years), followed by more radical changes (10-50 years) which involves research and development more; as the more radical the change, the more the cost and time of change. For these changes, greener performance must

balance other design attributes wanted by the market; reliability, performance, competitive price, quality and value for money, hence this becomes a continuous learning process.

2 **Benchmarking and associations**: environmental improvements cannot be fully achieved by individual companies working alone. Companies should be in a position to compare their environmental performance with the analogous performance, with the objective to improve the environmental management of their business by self assessment in comparison with the best industrial practice of business in the same sector, the best in its class in terms of good environmental practice or other similar branches. Partnerships and associations should be encouraged between businesses especially in one location to share the resources and expertise in environmental issues. Formation of industrial associations to share ideas and resources is essential, for example through by- product exchanges whereby a set of companies utilise each other's by products as the feedstock rather than manage them as waste and eco-industrial networks whereby a set of companies collaborate to improve environmental, social and economic performance of companies in a region. Effective exchange of by-products may also lead to communities having cleaner environment, stronger or more efficient economy, new jobs and a good public image. Companies must find ways to talk to Non-Government Organisations, other companies and customers and other stakeholders. This partnership is also required among different levels of government, private sector, donor groups and civil society for effective development.

3. **New thinking**: cleaner technology but not with exorbitant costs should be looked at as an investment of the company because, besides being long term cost efficient in operations and avoiding the liabilities, it will give the company a good reputation with the insurers, the neighbours, the client, the authorities and green sponsors. There is also a need to rethink ways to reduce financial costs in promoting environmental management systems, for instance, one of the high costs in implementation of ISO 14001 is the training of staff, since it recommends that everybody be trained. Effective self training courses for employees could be explored and implemented. Development and promotion the use of improved

management accounting systems, techniques and practices, which facilitate a reasonable inclusion of environmental costs and benefits and favour the participation of various departments and management levels in decision making process is another approach. Contractors must be paid for the amount of energy savings, water conservation, and productivity. An efficiency design into the facility on long term basis is one new strategy considered rather than paying for the short term endeavours.

4. **Government Incentives**: the South African government should play its part by considering the implementation of incentives for environmental responsible companies. This can be through implementing "regulatory flexibility" approach in terms of for example, fewer inspections, reduced fines, and self policing as these will also free more time to take care of non-complying companies. The government can also develop common necessary framework and infrastructures for companies certified for ISO 14001 for continual environmental improvement, and in some instances basic capabilities to adopt ISO 14001; this framework can also be used by other companies seeking to adopt the standard. Economic incentives to take care of the environment whilst making money, such as fees, charges, deposit refund systems, marketable permits, subsidies, information disclosure and voluntary actions reduce cost more than traditional regulations. Financial service sector and credit schemes to direct financial resources towards projects or companies that have demonstrated good environmental performance can be developed.

5. **Education**: companies need to educate top management as a priority in staff training in environmental protection issues and secure its commitment early in the process, so that the resources and the support necessary for EMS implementation should be less difficult to obtain. A new thinking that neglecting the environment can impose high economic and financial cost is needed, while many environmental benefits can be achieved at low costs. Management should have an understanding that environmental issues must become an integral part of the general business strategy; they must be looked at as activities that can bring cash or reduce expenses for the company. Ultimately, environmental awareness by top management will make it easier to educate other role players.

The involvement of other role players is essential; for instance, the customers need to be involved in environmental policing to encourage them to 'buy smart' and make them understand that it is everybody's responsibility to maintain high standards of living by taking care of the environment, schools should be encouraged to have environmental protection programs and plant in students minds to be environmentally innovative culturally and integrate environmental management practices more systematically into the school curriculum. The training of environmental experts and industry representatives to evaluate systematically economical and managerial environmental activities in companies is another important approach. At the level of employees training material in local languages could be helpful. The auditors are other role players who must be encouraged on the importance of focusing more on the environmental issues during the ISO 14001 audits, while other issues are dealt with using other strategies and tools.

6. **Build on existing business practices:** ISO 9001 seem to be a popular standard with companies; integration of the two standards (ISO 9001 and ISO 14001) could enhance resource allocation for environmental matters and cost reduced considerably. Evaluation of alternative strategic choices and related priorities is essential; for example, looking at having an employee as a permanent environmental officer on site rather than relying on consultants so as to enable continual learning process and lower costs. The use of locally produced materials parts and services must also be encouraged because this can significantly reduce costs, especially in terms of transportation.

7. **Broaden the use of ISO 14001 standard**, including other ISO 14000 like ISO 14031/32 (Guidelines for Environmental performance Evaluation) and ISO 14060 (Guide for the inclusion of Environmental Aspects in Product Standards) and others as in appendix A could help South African companies implement ISO 14001 more effectively, and as such, help ISO 14001 encourage even more that organisations move 'beyond compliance' through continual environmental performance improvement not only as a tool to compliment the regulatory programs.

8. **Encourage innovation**: companies must make use of simple ways to make suggestions for improving the environment such as suggestion boxes, and when action or suggestion taken by the employee leads to improved economical and environmental performance of the organisation, the involved employee must be rewarded; both financial and other type of reward can be employed. Competition for innovation is another strategy that could be used to encourage innovation. Innovations should also move from corporate to product development level which can subsequently provide important information for decision making. Innovation among employees could also be encouraged by implementing incentives like 'profit sharing scheme' whereby a certain percentage of the environmental performance profit is shared between the company and the employees.

5.4 Summary

This chapter forms an important part of the study as it outlines the conclusions drawn from the existing ISO 14001 situation in South Africa. It gives recommendations as how the situation can be improved to enhance the standard environmental performance without the main business purpose of profit making being compromised. It gives the achievements of the study as a whole in terms of intended objectives.

APPENDIX A

LIST OF ISO 14000 STANDARDS

Standard	Title / Description
14000	Guide to Environmental Management Principles, Systems and Supporting Techniques
14001	Environmental Management Systems - Specification with Guidance for Use
14010	Guidelines for Environmental Auditing - General Principles of Environmental Auditing
14011	Guidelines for Environmental Auditing - Audit Procedures-Part 1: Auditing of Environmental Management Systems
14012	Guidelines for Environmental Auditing - Qualification Criteria for Environmental Auditors
14013/15	Guidelines for Environmental Auditing - Audit Programmes, Reviews & Assessments
14020/23	Environmental Labelling
14024	Environmental Labelling - Practitioner Programs - Guiding Principles, Practices and Certification Procedures of Multiple Criteria Programs
14031/32	Guidelines on Environmental Performance Evaluation
14040/43	Life Cycle Assessment General Principles and Practices
14050	Glossary
14060	Guide for the Inclusion of Environmental Aspects in Product Standards

Source: (Quality Network (1996)

APPENDIX B

INDUSTRIES SERVED BY SABS



Agriculture (Euregap Certification) Best-practice for the global production of horticultural products



Automotive (including QS9000, VDA6.1, ISO/TS 16949 and ISO 9000



Chemicals, Petrochemicals and Explosives Chemical assessment of products for certification



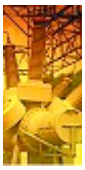
Civil and Building - system and product certification in the civil, building and construction industries



Clothing, Textiles, Leather & Footwear including Consignment Inspection



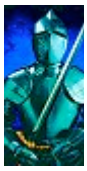
Cosmetics and Pharmaceuticals - Biological assessment of products for certification



Electro-Technical (including electrical, electronic and information technology)



Food and Beverage products - Biological ssessment of products for certification & HACCP



Information Security Management - SABS ISO/IEC 17799 Code of Practice and SABS 7799-2



Mechanical Engineering - Heavy and light mechanical engineering industry



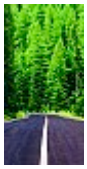
Metallurgical Engineering Well established schemes covering a wide spectrum of metallurgical products



Plumbing and Gas technology - specifications in the areas of Fluid technology



Safety, Fire engineering and related areas



Timber and Forest products - including consignment inspections and Chain of Custody

Source: SABS (2005)

APPENDIX C

STRUCTURED QUESTIONNAIRE

Name of the company……..……..

Contact Person…….Position…….

Contact number…….……...E-mail Address…….

1. Briefly describe your company's main operations…….
   ……

2 Which year did you get certified for ISO 14001……..……..…

3. What was your <u>main</u> motivation for registering for ISO 14001?
   A. To access international market
   B. To improve the company environmental performance
   C. To improve my company image
   D. To market my products
   E. Other……

4. How long did it take you to attain the ISO 14001 certificate?
   A. 0 -6 months
   B. 7-12 months
   C. More than a year

5. Roughly how much did it cost to register for ISO 14001……..

6. Does ISO 14001 increase your company's financial value

   Yes No Not sure

7. Does ISO 14001 contribute to improved environmental performance of your company without compromising the financial performance of your company Yes No Do not know

8. Are you aware of environmental management tools (Please tick the one you know if any) such as; Design for Environment; Life Cycle Assessment; Eco efficiency; Cleaner Production; Community Based Environmental Protection; Eco controlling; Environmental Auditing; Environmental Reporting; Extended Producer Responsibility; Environmental Performance Indicators; Eco Mapping; Industrial Ecology; Pollution Prevention; Environmental Reporting; or Full Cost Accounting,

9. Do you know any other tool/s except those in 8 above? Yes No
   If yes please mention it /them…….

10. Which tool/s does your company apply to its operations
    ……..……..……
    ……..…..

11. Briefly describe how the tool mentioned in 9 above is implemented by your company……
    ……..……
    ……

12. Do you think this tool/s address your company environmental issues without your company suffering the bottom line cost? Please Explain……...
    …….
    …….

13. How do these affect your company financial performance?
    A. Increases it
    B. Reduces it
    C. Not sure

14. Do you implement any other ISO 14000 standard except ISO 14001?

Yes No Do not know

15. Do you use any environmental performance indicators?

Yes No Do not know

If yes please give a brief description ……..……..

…….……..

16. Please tick the item that you think is sufficient for your company to carry out environmental performance effectively

A. Skilled Manpower
B. Sufficient funds
C. Required Technology
D. Top Management Support
E. None of the above

17. What problems do you encounter whilst implementing your environmental protection tools?

A. Lack of suitable technology
B. Lack of skilled manpower
C. Lack of finances (tool too costly)
D. All of the above
E. No problems encountered

18. How do you think the problem can be counteracted (if any)

…….

19. Is your firm part of any industrial association in its sector or any environmental association?

If yes, which one and how does that help……

……..…….

…….

20. Your products/services are consumed
    A. Locally only
    B. Exportation only
    C. Both locally and for exportation

21. What is the focus the auditor when they assess tour operations?
    A. Documentations
    B. Environmental issues
    C. Management of ISO 14001
    D. All of the above
    E. Other……..

22. What do you think of the documentation required for ISO 14001 implementation?
    A. Unnecessarily too much
    B. Sufficient / reasonable to address ISO 14001 implementation
    C. Not sufficient to address ISO 14001 implementation

23. Has ISO 14001 helped you in any way regarding community issues? Yes No
24. Please indicate any additional issues that you think need to be addressed so that ISO 14001 effectiveness can be improved in terms of sustainability.
    ……
    ……
    ……
    ……

254. Would you like to be sent a copy of this research final report? Yes No.

ONCE AGAIN THANK YOU FOR YOUR TIME AND EFFORT FOR FILLING UP THIS QUESTIONAIIRE

APPENDIX D

QUESTIONS FOR UNSTRUCTURED INTERVIEWS

1. What is your major motivation for registering with ISO 14001 and is that being achieved.

2. Do you think ISO 14001 is contributing optimally to improved environmental performance? Please explain.

3. Are you aware of any environmental management tools in the market? If yes which ones.

4. Do you implement any environmental management tools, If yes which one/s and how?

5. What kind of problems do you encounter in implementing the tool mentioned in 4 above?

6. How do you think this problem can be counteracted?

7. What do you think of the documentation associated with ISO 14001 implementation?

8. What do you think of the company‘s cost allocated for ISO 14001 and how much does it roughly cost?

9. What are the major problems associated with ISO 14001. Do you think there is enough resources and technical know how?

10. What do you think needs to be done to improve ISO 14001‘s environmental performance.

10. Please mention any other issues you would like to highlight in terms of ISO 14001 implementation in South Africa.

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