

7. Iso 9000 and ISO 14000

ISO 14000

ISO 14000 is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.

ISO 14000 is similar to ISO 9000 quality management in that both pertain to the process of how a product is produced, rather than to the product itself. As with ISO 9000, certification is performed by third-party organizations rather than being awarded by ISO directly. The ISO 19011 audit standard applies when auditing for both 9000 and 14000 compliance at once.

The requirements of ISO 14001 are an integral part of the European Union's Eco-Management and Audit Scheme (EMAS). EMAS's structure and material requirements are more demanding, foremost concerning performance improvement, legal compliance and reporting duties.

Brief history of environmental management systems

In 1992, BSI Group published the world's first environmental management systems standard, BS 7750. This supplied the template for the development of the ISO 14000 series in 1996, by the International Organization for Standardization, which has representation from committees all over the world (ISO) (Clements 1996, Brorson & Larsson, 1999). As of 2010, ISO 14001 is now used by at least 223 149 organizations in 159 countries and economies.

Development of the ISO 14000 series

The ISO 14000 family includes most notably the ISO 14001 standard, which represents the core set of standards used by organizations for designing and implementing an effective environmental management system. Other standards included in this series are ISO 14004, which gives additional guidelines for a good environmental management system, and more specialized standards dealing with specific aspects of environmental management. The major objective of the ISO 14000 series of norms is "to promote more effective and efficient environmental management in organizations and to provide useful and usable tools - ones that are cost effective, system-based, flexible and reflect the best organizations and the best

organizational practices available for gathering, interpreting and communicating environmentally relevant information".

Unlike previous environmental regulations, which began with command and control approaches, later replaced with ones based on market mechanisms, ISO 14000 was based on a voluntary approach to environmental regulation (Szymanski & Tiwari 2004). The series includes the ISO 14001 standard, which provides guidelines for the establishment or improvement of an EMS. The standard shares many common traits with its predecessor ISO 9000, the international standard of quality management (Jackson 1997), which served as a model for its internal structure (National Academy Press 1999) and both can be implemented side by side. As with ISO 9000, ISO 14000 acts both as an internal management tool and as a way of demonstrating a company's environmental commitment to its customers and clients (Boiral 2007).

Prior to the development of the ISO 14000 series, organizations voluntarily constructed their own EMS systems, but this made comparisons of environmental effects between companies difficult and therefore the universal ISO 14000 series was developed. An EMS is defined by ISO as: "part of the overall management system, that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving and maintaining the environmental policy" (ISO 1996 cited in Federal Facilities Council Report 1999).

ISO 14001 standard

ISO 14001 sets out the criteria for an environmental management system. It does not state requirements for environmental performance, but maps out a framework that a company or organization can follow to set up an effective environmental management system. It can be used by any organization that wants to improve resource efficiency, reduce waste and drive down costs. Using ISO 14001 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved. ISO 14001 can also be integrated with other management functions and assists companies in meeting their environmental and economic goals.

ISO 14001, as with other ISO 14000 standards, is voluntary (IISD 2010), with its main aim to assist companies in continually improving their environmental performance, whilst complying with any applicable legislation. Organizations are responsible for setting their own targets and performance measures, with the standard serving to assist them in meeting objectives and goals and the subsequent monitoring and measurement of these (IISD 2010).

The standard can be applied to a variety of levels in the business, from organizational level, right down to the product and service level (RMIT university). Rather than focusing on exact measures and goals of environmental performance, the standard highlights what an organization needs to do to meet these goals (IISD 2010).

ISO 14001 is known as a generic management system standard, meaning that it is relevant to any organization seeking to improve and manage resources more effectively. This includes:

single site to large multi-national companies

high risk companies to low risk service organizations

manufacturing, process and the service industries; including local governments

all industry sectors including public and private sectors

original equipment manufacturers and their suppliers.

All standards are periodically reviewed by ISO to ensure they still meet market requirements. The current version of ISO 14001 – ISO 14001:2004 is under review as of April 2012.

Basic principles and methodology

Plan – establish objectives and processes required

Prior to implementing ISO 14001, an initial review or gap analysis of the organization's processes and products is recommended, to assist in identifying all elements of the current operation and if possible future operations, that may interact with the environment, termed environmental aspects (Martin 1998). Environmental aspects can include both direct, such as those used during manufacturing and indirect, such as raw materials (Martin 1998). This review assists the organization in establishing their environmental objectives, goals and targets, which should ideally be measurable; helps with the development of control and management procedures and processes and serves to highlight any relevant legal requirements, which can then be built into the policy (Standards Australia/Standards New Zealand 2004).

Do – implement the processes

During this stage the organization identifies the resources required and works out those members of the organization responsible for the EMS' implementation and

control (Martin 1998). This includes establishing procedures and processes, although only one documented procedure is specified related to operational control. Other procedures are required to foster better management control over elements such as documentation control, emergency preparedness and response, and the education of employees, to ensure they can competently implement the necessary processes and record results (Standards Australia/Standards New Zealand 2004). Communication and participation across all levels of the organization, especially top management is a vital part of the implementation phase, with the effectiveness of the EMS being dependant on active involvement from all employees (Federal Facilities Council Report 1999).

Check – measure and monitor the processes and report results

During the check stage, performance is monitored and periodically measured to ensure that the organization's environmental targets and objectives are being met (Martin 1998). In addition, internal audits are conducted at planned intervals to ascertain whether the EMS meets the user's expectations and whether the processes and procedures are being adequately maintained and monitored (Standards Australia/Standards New Zealand 2004).

Act – take action to improve performance of EMS based on results

After the checking stage, a management review is conducted to ensure that the objectives of the EMS are being met, the extent to which they are being met, that communications are being appropriately managed and to evaluate changing circumstances, such as legal requirements, in order to make recommendations for further improvement of the system (Standards Australia/Standards New Zealand 2004). These recommendations are incorporated through continual improvement, plans are renewed or new plans are made, and the EMS moves forward.

Continual Improvement Process

The core requirement of a continual improvement process (CIP) is different from the one known from quality management systems. CIP in ISO 14001 has three dimensions (Gastl, 2009):

Expansion: More and more business areas get covered by the implemented EMS.

Enrichment: More and more activities, products, processes, emissions, resources etc. get managed by the implemented EMS.

Upgrading: An improvement of the structural and organizational framework of the EMS, as well as an accumulation of know-how in dealing with business related environmental issues.

Overall, the CIP-concept expects the organization to gradually move away from merely operational environmental measures towards a strategic approach on how to deal with environmental challenges.

Benefits

ISO 14001 was developed primarily to assist companies with a framework for better management control that can result in reducing their environmental impacts. In addition to improvements in performance, organizations can reap a number of economic benefits including higher conformance with legislative and regulatory requirements (Sheldon 1997) by adopting the ISO standard. By minimizing the risk of regulatory and environmental liability fines and improving an organization's efficiency (Delmas 2009), benefits can include a reduction in waste and consumption of resources, and operating costs. Secondly, as an internationally recognized standard, businesses operating in multiple locations across the globe can leverage their conformance to ISO 14001, eliminating the need for multiple registrations or certifications (Hutchens 2010). Thirdly there has been a push in the last decade by consumers, for companies to adopt better internal controls, making the incorporation of ISO 14001 a smart approach for the long term viability of businesses. This can provide them with a competitive advantage against companies that do not adopt the standard (Potoki & Prakash, 2005). This in turn can have a positive impact on a company's asset value (Van der Deldt, 1997). It can lead to improved public perceptions of the business, placing them in a better position to operate in the international marketplace (Potoki & Prakash 1997; Sheldon 1997). The use of ISO 14001 can demonstrate an innovative and forward thinking approach to customers and prospective employees. It can increase a business's access to new customers and business partners. In some markets it can potentially reduce public liability insurance costs. It can serve to reduce trade barriers between registered businesses (Van der Deldt, 1997). There is growing interest in including certification to ISO 14001 in tenders for public-private partnerships for infrastructure renewal. Evidence of value in terms of environmental quality and benefit to the taxpayer has been shown in highway projects in Canada.

Conformity Assessment

ISO 14001 can be used in whole or in part to help an organization, for profit or not-for-profit, better manage its relationship with the environment. If all the elements of ISO 14001 are incorporated into the management process, the

organization may opt to prove that it has achieved full alignment or conformity with the international standard, ISO 14001, by using one of four recognized options. These are:

1. make a self-determination and self-declaration, or
2. seek confirmation of its conformance by parties having an interest in the organization, such as customers, or
3. seek confirmation of its self-declaration by a party external to the organization, or
4. seek certification/registration of its environmental management system by an external organization.

ISO does not control conformity assessment; its mandate is to develop and maintain standards. ISO has a neutral policy on conformity assessment. One option is not better than the next. Each option serves different market needs. The adopting organization decides which option is best for them, in conjunction with their market needs.

Option 1 is sometimes incorrectly referred to as 'self-certify' or "self-certification". This is not an acceptable reference under ISO terms and definitions, for it can lead to confusion in the market. The user is responsible for making their own determination. Option 2 is often referred to as a customer or 2nd party audit, which is an acceptable market term. Option 3 is an independent third-party process by an organization that is based on an engagement activity and delivered by specially trained practitioners. This option was based on an accounting procedure branded as the EnviroReady Report, which was created to help small and medium-sized organizations. Its development was originally based on the Canadian Handbook for Accountants; it is now based on an international accounting standard. The fourth option, certification, is another independent third-party process, which has been widely implemented by all types of organizations. Certification is also known in some countries as registration. Service providers of certification or registration are accredited by national accreditation services such as UKAS in the UK.

ISO 14001 and EMAS

In 2010, the latest EMAS Regulation (EMAS III) entered into force; the scheme is now globally applicable, includes key performance indicators and a range of further improvements. Currently, more than 4,500 organisations and approximately 7,800 sites are EMAS registered.

Complementarities and Differences

ISO 14001's environmental management system requirements are very similar to those of EMAS. Additional requirements for EMAS include:

stricter requirements on the measurement and evaluation of environmental performance against objectives and targets.

government supervision of the environmental verifiers

strong employee involvement; EMAS organisations acknowledge that active employee involvement is a driving force and a prerequisite for continuous and successful environmental improvements.

environmental core indicators creating multi-annual comparability within and between organisations

mandatory provision of information to the general public

registration by a public authority.

Changing from ISO 14001 to EMAS

Organizations applying ISO 14001 only have to take a few steps to become registered under EMAS: The two main differences involve an environmental review to identify significant environmental aspects as well as publishing an environmental statement. Apart from that, minor changes need to be made to a number of other elements during the process of becoming EMAS registered.

ISO 14001 Use in Supply Chains

There are many reasons why ISO 14001 should be potentially attractive to supply chain managers including the use of the voluntary standard to guide the development of integrated systems, its requirement for supply chain members in industries such as automotive and aerospace, the potential of pollution prevention leading to reduced costs of production and higher profits, its alignment with the growing importance of corporate social responsibility, and an ISO registered system may provide firms with a unique environmental resource, capabilities and benefits that lead to competitive advantage.

Emerging areas of research are starting to address the use of this standard to show that ISO 14001 registration can be leveraged across the supply chain for competitive advantage. By looking at ISO 14001 registered firms, information from the study compared different amounts of integration and sustainability in the

supply chain. Several research propositions and an empirical framework posit the impacts of ISO 14001 on supply chain design.

The propositions include:

- 1.ISO registration leading to more proactive environmental management including process and performance measurement related to sustainability across a supply chain;
- 2.That ISO registered plants with formal environmental management systems will have higher levels of communication required between OEMs and Tier I suppliers;
- 3.ISO registered plants with direct relationships to other registered plants in their supply chain will have higher levels of waste reduction and cost efficiency than nonregistered plants;
- 4.ISO registered plants with direct relationships to other registered plants in the supply chain will have sustainable practices and projects with better ROI than nonregistered firms;
- 5.ISO registered plants with direct relationships to other registered plants will have higher levels of customer relationship management and will be positively associated with greater expansion opportunities and image than nonregistered plants;
- 6.ISO registered plants with direct relationships to other registered plants will have fewer issues with employee health and reduced numbers of safety incidents than nonregistered plants;
- 7.ISO registered plants with a direct relationship to other registered plants will have a strong positive relationship between formal communication, training, monitoring/control systems and firm performance; and
- 8.ISO registered plants with a direct relationship to other registered plants will have higher levels of involvement and communication, which will be positively related to more internal and external integration with supply chain members.

List of ISO 14000 series standards

ISO 14001 Environmental management systems—Requirements with guidance for use

ISO 14004 Environmental management systems—General guidelines on principles, systems and support techniques

ISO 14006 Environmental management systems—Guidelines for incorporating ecodesign

ISO 14015 Environmental assessment of sites and organizations

ISO 14020 series (14020 to 14025) Environmental labels and declarations

ISO 14030 discusses post production environmental assessment

ISO 14031 Environmental performance evaluation—Guidelines

ISO 14040 series (14040 to 14049), Life Cycle Assessment, LCA, discusses pre-production planning and environment goal setting.

ISO 14050 terms and definitions.

ISO 14062 discusses making improvements to environmental impact goals.

ISO 14063 Environmental communication—Guidelines and examples

ISO 14064 Measuring, quantifying, and reducing Greenhouse Gas emissions.

ISO 19011 which specifies one audit protocol for both 14000 and 9000 series standards together.

ISO 9000

The **ISO 9000** family of standards is related to quality management systems and designed to help organizations ensure that they meet the needs of customers and other stakeholders while meeting statutory and regulatory requirements related to the product. The standards are published by ISO, the International Organization for Standardization, and available through National standards bodies. ISO 9000 deals with the fundamentals of quality management systems, including the eight management principles on which the family of standards is based. ISO 9001 deals with the requirements that organizations wishing to meet the standard have to fulfill.^[4]

Third party certification bodies provide independent confirmation that organizations meet the requirements of ISO 9001. Over a million organizations worldwide are independently certified, making ISO 9001 one of the most widely used management tools in the world today. Despite widespread use, however, the ISO certification process has been criticized as being wasteful and not being useful for all organizations.

7.1 Reasons for use

The global adoption of ISO 9001 may be attributable to a number of factors. A number of major purchasers require their suppliers to hold ISO 9001 certification. In addition to several stakeholders' benefits, a number of studies have identified significant financial benefits for organizations certified to ISO 9001, with a 2011 survey from the British Assessment Bureau showing 44% of their certified clients had won new business. Corbett *et al.* showed that certified organizations achieved superior return on assets compared to otherwise similar organizations without certification. Heras *et al.* found similarly superior performance and demonstrated that this was statistically significant and not a function of organization size. Naveha and Marcus claimed that implementing ISO 9001 led to superior operational performance in the US motor carrier industry. Sharma identified similar improvements in operating performance and linked this to superior financial performance. Chow-Chua *et al.* showed better overall financial performance was achieved for companies in Denmark. Rajan and Tamimi (2003) showed that ISO 9001 certification resulted in superior stock market performance and suggested that shareholders were richly rewarded for the investment in an ISO 9001 system.

While the connection between superior financial performance and ISO 9001 may be seen from the examples cited, there remains no proof of direct causation, though longitudinal studies, such as those of Corbett *et al.* (2005) may suggest it. Other writers, such as Heras *et al.* (2002), have suggested that while there is some evidence of this, the improvement is partly driven by the fact that there is a tendency for better performing companies to seek ISO 9001 certification.

The mechanism for improving results has also been the subject of much research. Lo *et al.* (2007) identified operational improvements (cycle time reduction, inventory reductions, etc.) as following from certification. Internal process improvements in organizations lead to externally observable improvements. The benefit of increased international trade and domestic market share, in addition to the internal benefits such as customer satisfaction, interdepartmental communications, work processes, and customer/supplier partnerships derived, far exceeds any and all initial investment.

7.2 Background

ISO 9000 was first published in 1987. It was based on the BS 5750 series of standards from BSI that were proposed to ISO in 1979. However, its history can be

traced back some twenty years before that, to the publication of the United States Department of Defense MIL-Q-9858 standard in 1959. MIL-Q-9858 was revised into the NATO AQAP series of standards in 1969, which in turn were revised into the BS 5179 series of guidance standards published in 1974, and finally revised into the BS 5750 series of requirements standards in 1979 before being submitted to ISO.

BSI has been certifying organizations for their quality management systems since 1978. Its first certification (FM 00001) is still extant and held by Tarmac Limited, a successor to the original company which held this certificate. Today BSI claims to certify organizations at nearly 70,000 sites globally.

7.3 Contents of ISO 9001

ISO 9001:2008 Quality management systems — Requirements is a document of approximately 30 pages which is available from the national standards organization in each country. It is supplemented by two other standards: ISO 9000:2005 *Quality management systems — Fundamentals and vocabulary* and ISO 9004:2009 *Managing for the sustained success of an organization — A quality management approach*. Only ISO 9001 is directly audited against for third party assessment purposes. The other two standards are supplementary and contain deeper information on how to sustain and improve quality management systems; they are therefore not used directly during third party assessment. Outline contents for ISO 9001 are as follows:

- Page iv: *Foreword*
- Pages v to vii: Section 0 *Intro*
- Pages 1 to 14: *Requirements*
 - Section 1: *Scope*
 - Section 2: *Normative Reference*
 - Section 3: *Terms and definitions* (specific to ISO 9001, not specified in ISO 9000)
 - Section 4: *Quality Management System*
 - Section 5: *Management Responsibility*
 - Section 6: *Resource Management*
 - Section 7: *Product Realization*
 - Section 8: *Measurement, analysis and improvement*
- Pages 15 to 22: Tables of Correspondence between ISO 9001 and other standards
- Page 23: *Bibliography*

Before the certification body can issue or renew a certificate, the auditor must be satisfied that the company being assessed has implemented the requirements of sections 4 to 8. Sections 1 to 3 are not directly audited against, but because they provide context and definitions for the rest of the standard, their contents must be taken into account.

The standard specifies that the organisation shall issue and maintain the following six documented procedures:

- Control of Documents (4.2.3)
- Control of Records (4.2.4)
- Internal Audits (8.2.2)
- Control of Nonconforming Product / Service (8.3)
- Corrective Action (8.5.2)
- Preventive Action (8.5.3)

In addition to these procedures, ISO 9001:2008 requires the organization to document any other procedures required for its effective operation. The standard also requires the organisation to issue and communicate a documented quality policy, a Quality Manual (which may or may not include the documented procedures) and numerous records, as specified throughout the standard.

7.4 Numbering

- 4.2 Documentation requirements
- 5 Management responsibility
 - 5.1 Management commitment
 - 5.2 Customer focus
 - 5.3 Quality policy
 - 5.4 Planning
 - 5.5 Responsibility, authority and communication
 - 5.6 Management review
- 6 Resource management
 - 6.1 Provision of resources
 - 6.2 Human resources
 - 6.3 Infrastructure
 - 6.4 Work environment
- 7 Product realization
 - 7.1 Planning of product realization

- 7.2 Customer-related processes
- 7.3 Design and development
- 7.4 Purchasing
- 7.5 Production and service provision
- 7.6 Control of monitoring and measuring equipment
- 8 Measurement, analysis and improvement
- 8.1 General
- 8.2 Monitoring and measurement
- 8.3 Control of nonconforming product
- 8.4 Analysis of data
- 8.5 Improvement

7.5 Summary of ISO 9001:2008 in informal language

The quality policy is a formal statement from management, closely linked to the business and marketing plan and to customer needs.

The quality policy is understood and followed at all levels and by all employees. Each employee works towards measurable objectives.

The business makes decisions about the quality system based on recorded data.

The quality system is regularly audited and evaluated for conformance and effectiveness.

Records show how and where raw materials and products were processed to allow products and problems to be traced to the source.

The business determines customer requirements.

The business has created systems for communicating with customers about product information, inquiries, contracts, orders, feedback, and complaints.

When developing new products, the business plans the stages of development, with appropriate testing at each stage. It tests and documents whether the product meets design requirements, regulatory requirements, and user needs.

The business regularly reviews performance through internal audits and meetings. The business determines whether the quality system is working and what improvements can be made. It has a documented procedure for internal audits.

The business deals with past problems and potential problems. It keeps records of these activities and the resulting decisions, and monitors their effectiveness.

The business has documented procedures for dealing with actual and potential nonconformances (problems involving suppliers, customers, or internal problems).

The business:

- makes sure no one uses a bad product,

- determines what to do with a bad product,

- deals with the root cause of problems, and

- keeps records to use as a tool to improve the system.

7.6 Certification

ISO does not certify organizations itself. Numerous certification bodies exist, which audit organizations and, upon success, issue ISO 9001 compliance certificates. Although commonly referred to as 'ISO 9000' certification, the actual standard to which an organization's quality management system can be certified is ISO 9001:2008. Many countries have formed accreditation bodies to authorize ("accredit") the certification bodies. Both the accreditation bodies and the certification bodies charge fees for their services. The various accreditation bodies have mutual agreements with each other to ensure that certificates issued by one of the Accredited Certification Bodies (CB) are accepted worldwide. Certification bodies themselves operate under another quality standard, ISO/IEC 17021, while accreditation bodies operate under ISO/IEC 17011.

An organization applying for ISO 9001 certification is audited based on an extensive sample of its sites, functions, products, services and processes. The auditor presents a list of problems (defined as "nonconformities", "observations" or "opportunities for improvement") to management. If there are no major nonconformities, the certification body will issue a certificate. Where major nonconformities are identified, the organization will present an improvement plan to the certification body (e.g. corrective action reports showing how the problems will be resolved); once the certification body is satisfied that the organisation has carried out sufficient corrective action, it will

issue a certificate. The certificate is limited by a certain scope (e.g. production of golf balls) and will display the addresses to which the certificate refers.

An ISO 9001 certificate is not a once-and-for-all award, but must be renewed at regular intervals recommended by the certification body, usually once every three years. There are no grades of competence within ISO 9001: either a company is certified (meaning that it is committed to the method and model of quality management described in the standard) or it is not. In this respect, ISO 9001 certification contrasts with measurement-based quality systems.