ISO 14001: Analysis into its strengths and weaknesses, and where potential opportunities could be deployed for tomorrows Global Business

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Introduction

ISO14000 is used globally by virtually every industry sector and the purpose of this paper is to explore whether the ISO14000 series and the ISO14001 standard in particular has been beneficial as a framework for continual environmental improvement within organisations. Accordingly, its current strengths and limitations will be reviewed and opportunities for improvement identified. Finally, the paper ends with proposals for how these opportunities for improvement could enhance ISO14000 and reduce environmental impacts in the future

What is an EMS?

An Environmental Management System (EMS) is a structured framework for managing an organisation's significant environmental aspects and impacts. Some organisations have adopted the framework specified in national or international standards that set out the requirements of an EMS and have had their systems externally assessed and certified against these. Other organisations have developed their EMS in a more informal way. Whatever approach has been adopted, the elements of the EMS framework will largely be the same.

There are various EMS approaches including EMAS, BS7750, BS8555 but the global leader in terms of deployment and acceptance is ISO14001 and there are no indications that this will change for the near future. The International Standards Organisation (ISO) defines the 14001 (1) EMS as "*the part of the overall management systems that includes organisational structure, planning activities, responsibilities, practices, procedure and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy*".

The basic structure of an EMS process is depicted in Figure 1 below: -

Figure 1: The EMS Process Structure

Background to ISO14000

The origins of the International Standards Organisation (ISO) date back to 1947 (2).The aim of ISO was to develop and introduce international standards for different industry sectors. This standardisation was designed to aid companies trading across different nations to increase trade, quality, and productivity and reduce costs of goods and services. ISO has since developed over 3000 technical and non standards and this led to their most famous implemented series of standards ISO9000

ISO14000 has been in existence since 1996 (3) and was updated in 2004 with a revised and extended version. The initial concept of the ISO 14000 environment system standards was prepared in June of 1992 year in Rio de Janiero (4) after ISO recognised the need for an international standard for environmental management. In 1993, ISO established one technique committee which was attended by 50 different country representatives to prepare an international environment management system. ISO14000 evolved in a similar way to ISO 9000 in that the origins of ISO 9000 were based on BS5750, and so the foundations of ISO14000 can be traced back to BS7750. The evolution of ISO14000 is depicted in figure 2 below: -

| 1962 | 1969 | 1972 | 1987 | 1991 | 1992 | 1996 | 2004 |

- Publication of 'Silent Spring'
- Formation of Environmental Protection Agency (EPA) in the USA
- World Commission on Environment and Development (WCED)
- WCED call for industry to develop effective EMS
- ISO Establish Strategic Advisory Group on the Environment (SAGE)
- Commitment by ISO to develop an International EMS standard
- Release of BS7750 EMS
- ISO 14000 Released
- Revised version of ISO14000 released

Figure 2 Evolution of ISO14000

Initially, acceptance of ISO14000 was stronger within the Asia Pacific Economic Cooperation (APEC) than elsewhere. This organisation comprised of 18 countries, but the acceptance gathered pace quickly. By the beginning of 2000 over 10,000 ISO registrations had been completed, and by 2002 this was estimated to have exceeded 150,000 registrations (5). Its popularity has been particularly high in the USA, UK and Germany within manufacturing sectors.

ISO 14000 consists of a series of elements, and ISO14001 is the dominant feature and actual standard of the (6) of the series. It specifies a framework of control for an Environmental Management System against which an organization can be certified by a third party.

Other elements of the series include:

- ISO 14004 - guidance on the development and implementation of environmental management systems
- ISO 14010 - general principles of environmental auditing (now superseded by ISO 19011)
- ISO 14011 - specific guidance on audit an environmental management system (now superseded by ISO 19011)
- ISO 14012 - guidance on qualification criteria for environmental auditors and lead auditors (now superseded by ISO 19011)
- ISO 14013/5 - audit program review and assessment material.
- ISO 14020 - labeling issues
- ISO 14030 - guidance on performance targets and monitoring within an Environmental Management System
- ISO 14040+ covers life cycle issues

ISO14001 Description

ISO14001 is similar to ISO9001 in that it is a framework consisting of process standards, not performance standards. They both promote management systems that focus on prevention rather than corrective action.

The intention of ISO 14001 is to provide organisations of any sector, size, structure and demographic location with the assistance and framework structure that will help prevent or reduce environmental impacts as a result of an organizations processes, products and/or services.

It follows the same basic structure depicted in Figure 1.

Environmental Policy

Initially, an organisation's senior management must develop its environmental policy. The policy itself must be appropriate to the organisation itself in terms of size, scale and any environmental impacts that it may have. The policy should contain three commitments: (7) to prevent pollutions; comply with topical regulations and legislation; and finally to aim to continually improve and not stagnate. The framework of the policy should also be communicated to employees and be available to the public, though this is not a formal requirement. The policy should also be documented, implemented within the workplace, reviewed and maintained by designated stakeholders within the company.

Planning

The second element of the framework is the planning section, which is required in order to fulfil the environmental policy. The plan will enable the key internal stakeholders to deliver the policy and will answer the question of "how do we make it happen?"

The key elements of the plan consist initially of identifying the environmental aspects and impacts of the organisation. Every organisation is different so this stage it is vitally important to clarify the organisation's own fingerprint in terms of environmental aspects and impacts.

Environmental aspects are described in clause 4.3.1 of ISO14001 (8) which states that "*an organisation should establish and maintain the environmental aspects of its activities, product or service that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment*". Examples of environmental aspects are shown below in figure 3:
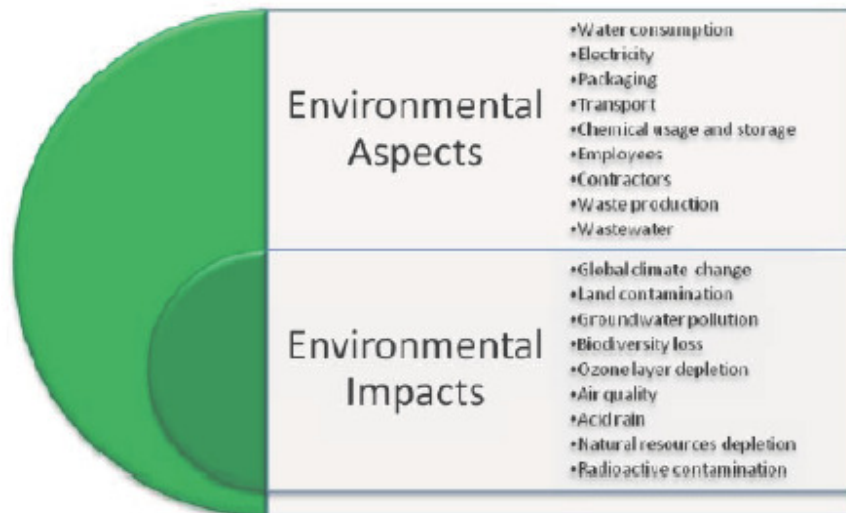

Figure 3: Environmental Aspects and Impacts

The associated environmental impacts can be defined as the environmental changes (positive or negative) that occur due to organisations activities, products and services, examples of these are also shown Figure 3.

Next the planning process requires that the organisation documents legislation that is relevant to their business. This includes acts and regulations, industry codes of practice and agreements with local authorities. This may be easy for larger organisations that have environmental employees however for SME's this may be more difficult.

The plan should also include objectives and targets which are measurable by the organisation so that status and progress can be ascertained. Finally the plan should contain an environmental management programme.

Implementation and Control

The third element of ISO14001 EMS framework concentrates on the "doing" aspect of the standard. The structure of the framework and roles and responsibilities are defined at this stage. Communications and documentation methods are then defined by the team, coupled with structured training plans and competence records. A register of the environmental aspects and impacts is developed within this stage and actions are prioritized in order of importance

Checking and Corrective Action

The forth phase of the ISO14001 EMS Framework monitors and measure progress in relation to the plan in line with the metrics defined earlier. Any environmental non conformances should be identified and corrective action taken where possible by the appropriate stakeholder. Internal audits should be scheduled, planned and conducted.

Management Review

The final phase of the ISO14001 EMS framework is comprised of the scheduled collection and review of information to senior management. This review is performed to confirm whether the EMS is still suitable for the organisation and to demonstrate its effectiveness. The results from the review including benefits and the resulting lessons learnt are also useful as part of developing continuous improvement culture within an organisation. This is sometimes defined as the adjustment phase of the Plan-Do-Check-Adjust (PDCA) cycle (9)

The Benefits of Deploying ISO14001 in Organisations

ISO14001 and its benefits to organisations are well researched. The most immediate benefits of the approach is that its correct use will lead to more efficient use of key energy types and materials (10). This in turn will lead to a reduction in the waste outputs that an organisation will produce and the consequent reduction of costs (11).

Another key benefit of ISO14001 is that it a well recognised international standard and ISO itself is well respected in general. Consumers in general who have knowledge and awareness of ISO14001 may feel assured by the standard and its ethical intentions.

ISO14001 also gives an organisation the mandate to control its environmental aspects and impacts on its own processes, products, and services. It could be said that in many circumstances nobody knows their business and resulting wastes better than the organisations themselves. This allows the internal experts to control the situation not some outside body who does not understand their business and it intricacies.

These are the obvious benefits but there are many more business improvements that a company can expect through a well planned implementation of ISO14001. Legally a company will reduce its risk of prosecution through poor environmental management practices and also the risk of insurance claims. This could also reduce resulting insurance premiums due to the reduced risk and resulting claims that will also improve relations with financial institutions.

Figure 4: Key ISO 14001 Stakeholders

To internal or external shareholders willing to invest in organizations, those who use ISO14001 will be seen to be more ethical and potentially attractive. However as the use of ISO14001 is no guarantee of environmental success (refer to weaknesses of ISO14001) this can be a bit misleading to shareholders.

Organizations may also seek to achieve ISO14001 accreditation as a means to gain or retain their market share within a particular industry sector. It could be deemed that the adoption of ISO14001 would give an organisation a green corporate image, a company which cares about their local, national and global environment. This would no doubt matter to a certain percentage of the four types of stakeholders depicted in Figure 4.

The adoption of ISO14001 would no doubt be of assistance in terms of relationships with local government who are becoming increasingly keen on suppliers having 'green' credentials and some even specify this within tender documents for new business.

Internal stakeholders (namely employees) may also gain motivation and pride in their organisation through the practice of ISO14001. It would provide environmental awareness for employees and provide them with a framework to assist in reaching company targets. The pride and knowledge gained could subsequently be passed to others in the community.

For SME's, ISO14001 could provide benefits to their relationships with external suppliers. Those which are already environmentally aware may wish to conduct business with an SME who uses ISO14001 over one which does not. For larger organisations these benefits can spread to both internal suppliers within their own organizations and external supplier bases.

The weaknesses of the ISO14001 Approach

ISO14001 has many good intentions but it has several flaws that reduce its positive environmental impact and this leads to variation and inconsistency in its success rate within organisations. These weaknesses could reduce its sustainability for the long term.

Awareness of ISO14001

There is a general lack of awareness in two key areas; these are within SME type organisations and the general public. Awareness of ISO14001 is more widespread within larger companies but much less so within smaller businesses. Research conducted in Canada (12) shows very limited awareness of ISO14001. The Canadian Federation of Independent Business (CFIB) conducted a survey which has a large response of 4,322 organisations. The CFIB represents the critical mass of Canadian business over 100,000.This showed that 73% had never heard of ISO14001

ISO14001 is a process designed for companies not for the general public however the lack of engagement is a major omission. Its integration with local communities is a missed opportunity to gain support behind the programme, it would also put more pressure on organisations to embrace ISO14001 if the general public had awareness of it and requested it for their products and services.

Lack of Transparency

The only element of ISO14001 which is made public is the environmental policy statement. The other elements including targets and audits are totally private unless a company wishes to make them public (13)

A key difference between ISO14001 and another EMS standard BS7750 is the omission of an annual environmental performance statement. This lack of transparency is a major disadvantage of ISO14001 as there is no requirement to make public any information about an organisation's environmental impact. A company could do so voluntarily if it so wished, but it may not think this prudent in case it placed them in a poor light.

Also EMAS requires that a company makes its environmental objectives are made public (14), ISO14001 does not. Again this lack of transparency does not benefit ISO14001 and could be one of the causes of the lack of public awareness of ISO14001 and subsequently could affect peoples trust in the standard.

Surely ISO would prefer consumers to make informed decisions about whom they should procure products and services from, but this lack of transparency mean companies that are less legitimate in their implementation of ISO14001 stand to benefit most. Indeed it could be viewed and is entirely possible that consumers may do business with companies who are behaving in an environmentally irresponsible and dangerous fashion without having any knowledge of the fact.

Cost of ISO14001 Implementation & Certification

Any business large or small should evaluate the benefits of certification against the costs associated with it and this includes the intangible as well as tangible costs. Many organisations do not think this through before embarking on the journey of certification.

The costs and time deployed to gain certification can vary dramatically depending on the size of an organisation and the demographics of the business and subsequent EMS. Much depends on whether a company conducts it business locally or on sites nationally and/or globally and so organisational structure may play a large part in terms of cost. Each time certification is sought for a business it must comply with the laws within that demographic area, national and international ISO14001 certification so can be extremely costly.

Costs including implementation and certification for large businesses can range from £50,000 to over £500,000, whilst for SME's this can vary from £5,000 to £50,000. This depends largely on the type of business that an organisation may be in or the legislation within a given area. A company should consider both internal and external costs.

Internal costs include the costs for new equipment for taken measurements or the modification of existing equipment. There will also be budgets required for training employees and in addition, employee time for planning and implementation of the ISO14001 EMS. There may also be additional costs for systems to record environmental data and the communication of this data these costs are estimated to take up 80% of the overall budget required.

External costs include the services of an external 3rd party auditor for registration and annual audits. A legal representative to check compliance with environmental legislation may also be required in relation to the demographics of their products and/or services. These costs may make it difficult for SME type organisations to explore certain markets, which is restrictive and in some ways could be construed as unfair.

Problem Solving Ability

One of the key objectives of ISO14001 is to reduce the impact an organisation's processes, products and services have on the environment. Once a company understands its environmental aspects and impacts, it may find that many of the environmental improvements don't require complex problem solving techniques (e.g. use of energy saving bulbs, recycling paper etc). However, certain problems may not be obvious or easy to solve and ISO14001 does not provide the tools and techniques to make the necessary improvements sought from their self imposed targets.

Many environmental problems may need structured statistical analysis in order to identify root causes. Processes may exhibit high degrees of variation which demonstrate being out of control and many companies may not have the internal capability to solve these complex problems.

Some organisations that use ISO14001 are combining it or using it alongside business improvement approaches such as Lean Six Sigma to gain the capability to increase its chances of solving complex problems.

Indeed a survey (173 responses) conducted by the authors indicated that when asked whether Lean Six Sigma (15) enhances current EMS's the response showed that 64% thought that it did whilst just 7% thought it did not, 28% had not considered this question before. This indicates the value in combining commonly used business improvement approaches with an EMS.

Voluntary Process

ISO14001 is entirely a standard that companies can choose to employ if they want to or not. Pressure may exist on companies to achieve certification but this is usually due to pressure from stakeholders such as customers, shareholder and external suppliers. The pressure may also exist from local government to achieve ISO14001. However companies not wishing to engage in the process are not automatically forced to do so. This is of concern if we wish to monitor companies who may be causing excessive environmental impacts. However, it could be viewed that with increasing national legislation such as the climate change bill (CCB) in the UK (16); these companies may be forced to implement ISO14001 whether they want to are not.

Internal Goal and Target Setting

Companies aiming for ISO14001 certification set their own goals and targets which can be viewed in both positive and negative terms. The positives are that the company knows its own capabilities and limitations and therefore should be able to set it realistic goals to achieve using the ISO14001 framework. However, this could also be exploited by the company by setting itself easy goals to achieve and subsequently stating to stakeholders that it is ISO14001 certified without really deserving this status. Having ISO14001 could appear on the surface to customers may make a company look very ethical however they may have improved by 1%. This can make the process very misleading and exploitative to customers and shareholders alike.

It would be useful if the process allowed open and transparent benchmarking between comparative organizations, this would help ensure that targets were more realistic from a sector to sector basis

No Performance Standard

A key omission of ISO14000 is that it does not establish performance standards (17) and it doesn't measure environmental performance. What it does do is assist organisations in reaching a target of increased performance; ISO14001 is more concerned about processes than the actual outcomes.

There is little linkage between ISO14001 and the various nations that develop national and international laws and legislation. Also a company could if it so wished relocate to less restrictive nations and become an ISO14001 certified organisation. The effectiveness of the standard in this situation would therefore be minimal and surely depicts a poor image of ISO14001 to customers, suppliers and shareholders.

Self Implementation and Management

Implementing ISO14001 is a self managed process, and therefore its success depends largely on the management commitment present within the organisation. Many organisations may fail to achieve the goals of ISO14001 due to a management structure's lack of awareness of the commitment required in terms of time and money. Managers may set unrealistic or extra lenient goals to portray their organisation in a better light than it should, ISO 14001 does not protect customers and other stakeholders from dubious Managers who may have a different agenda for their reasons for achieving ISO14001 certification.

Potential Improvements to ISO14001

ISO14001 provides legitimate companies with an excellent framework to help organisations reduce their environmental impacts. It provides them with the policy which enables them to understand their environmental aspects and the necessary planning needed to achieve environmental benefits, however as clarified in this paper there are certain weaknesses in its armoury.

Inclusion of a Performance Standard

The addition of a performance standard would reduce and/or eliminate certain problems with ISO14001. The lack of a performance standard leaves it open to abuse by certain organisations and nations depending on the laws and legislation within particular countries. There needs to be a level of integration between the two. This is a bit of a chicken and egg situation, e.g. should countries develop their legislation and performance standards around ISO14001 or vice versa? This is a difficult question to answer however some integration between proposed performance standards and legislation is clearly required in some shape or form in the future. An open and transparent working relationship between ISO and national governments would certainly be a good starting point. There could be different levels of performance standards depending upon factors such as industry types, organisation size and country status e.g. developed or not.

Increased Transparency and Awareness

There would be many benefits to increasing the transparency of ISO14001; these benefits would transcend towards many different stakeholders. Firstly companies who have high integrity regarding their implementation of ISO14001 would improve their image from an environmental standpoint which could increase their customer base and subsequent revenue.

Customers would benefit by gaining increased awareness of the companies they do business with, it would give them the choice to decide not just on typical factors such as price, brand and warranty, but also how ethical the supplier is in terms of energy consumption and wastes from raw materials.

Gains would also be realised for shareholders who can also decide to either choose to invest or continue to invest based on the knowledge received from understanding the company's efforts in relation to ISO14001.

Finally employees, who are provided information about their company through increased transparency, would benefit from knowledge transfer. Many organisations do not disseminate the status of an ISO14001 programme to all their various functions It depends on an individual company however if this was standard practice it would improve the overall acceptance of the standard.

Integration to Lean Six Sigma

Lean Six Sigma is a widely accepted business improvement approach used by thousands of organisations worldwide to reduce costs, improve cost and delivery (18). It uses an approach called DMAIC which stands for define, measure, analyse, improve and control. This has similarities to the framework adopted by ISO14001. It differs to ISO14001 is that it uses a wide range of tools and techniques (19) to solve problems. These tools include many statistical analysis techniques which enable data driven decision making based on facts not intuition.

A research survey developed by the authors and issued to the global Lean Six Sigma community received 173 responses from over 20 industry sectors. The survey indicated that 60% of users thought that Lean Six Sigma had resulted in environmental benefits within their organisation between 50-100% of the time. This contrasted with 24% who thought it has provided environmental benefits either rarely or never and 16.% were not sure if any impact has occurred.

Awareness of new and innovative Green versions of Lean Six Sigma is also increasing. Many large organisations are developing their own environmental Lean Six Sigma approaches these include the Environmental Protection Agency (EPA) in the USA with their "Lean Environmental Toolkit" and IBM with their "Green Sigma" programme. The survey indicated that 30% of the user base had heard of Green derivatives of Lean Six Sigma. This is supported by the increase in conferences both in the UK and USA endorsing Green Lean and or Six Sigma.

Asked whether a combined approach of EMS's and Lean Six Sigma would be of value to their organisation the responses showed that 51% thought that it was of value, whilst only 16% thought it would not be. 33% had not considered this before.

The survey also asked whether environmental teams or functions work with Lean Six Sigma teams on business improvement projects, the response showed that 39% did work together, whilst 32% did not, 28% were not sure about the answer to this question.

It was also found that when asked about the impact of increasing legislation and targets would have on their organisation, 58% of the survey was concerned, 27% were not and 15% had not considered this before.

Reward and Recognition

Transparent and open companies which successfully use ISO14001 in their sector should be rewarded for their efforts and gain certain privileges over those who do not. These benchmark companies may also share their lessons learnt with other organisations such as external suppliers to reduce their overall environmental impacts across the entire value chain for their products and/or services. They could be rewarded with fewer government inspections, these incentives should be offered to those who conduct audits in a timely manner and those who actively correct any issues.

Conclusions and Recommendations

There is no doubt that ISO14001 has helped improve many thousands of organisations reduce their impact on the environment. This success stretches globally from a wide range of business sectors and sizes; however it is clear that there are opportunities to improve ISO14001 to meet the challenges for the coming decades.

One of the key areas for improvement must be to link ISO14001 to the current and/or planned future environmental legislation. Many of the larger organisations have the resources to be able to

accurately set targets that are linked to legislation however many SME's do not have this capability. In the UK legislation such as the CCB has ever increasing targets to meet however there is no intrinsic link to ISO14001.

More also needs to done to reduce the risk of organisations exploiting the attainment of ISO14001 certification for their own gain when they are actually making minimal improvements and subsequently misleading stakeholders such as customers and shareholders. As ISO14001 is an international standard any improvements to it must focus on reducing the bias that some countries have over other countries due to differences in law and legislation.

Furthermore awareness of ISO14001 needs to increase in particular in the SME businesses. A large percentage of organisations have limited or no awareness of ISO 14001 and local, national and global environmental legislation. This will limit their growth and in many cases ability to survive.

Finally by integrating the standard to business improvement tools and techniques such as Lean Six Sigma will increase the problem solving ability of ISO14001 and also potentially its sustainability for the coming decades.

References

1. Goetsch D. and Davis B**. Requirements of ISO14001** ISO 14001 Environmental Management, Prentice Hall 2001 p97

2. Block M **Implementing ISO14001** Quality press Milwaukee 1997 p3

3. Edwards A. J. **ISO 14001 Certification Step by Step** 2004 p8

4. Amissah R. **Rio Declaration on Environment and Development** 1997

5. Grier M **ISO 14000 Putting the standards to work** http://www.cemag.us/articles.asp?pid=288 2002

6. Anon **ISO14000 Environmental Management** http://www.iso14000-iso14001-environmental-management.com/iso14000.htm 2002

7. Drury S. **Resource Management The EMS Policy** http://www.envirowise.gov.uk 2009

8. Goetsch D. and Davis B**. Requirements of ISO14001** ISO 14001 Environmental Management, Prentice Hall 2001 p37

9. Woodward O. **Success Process** http://orrinwoodward.blogharbor.com 6.11.2007

10. Pinero E. and Mason P. **Case Study: ISO 14000 - Benefits To The Bottom Line http://www.p2pays.org/ref/01/00844.pdf 1998 p7**

11. Holland G **Fast track 14 - An accelerated route to ISO14001** 2006 p5

12. Johansson L. **SME'S and ISO 14001 Do we have the right equipment** http://www.cec.org/files/pdf/ECONOMY/SMEs-ISO-14001_en.pdf, October 2003 p5

13. Block M **Implementing ISO14001** Quality press Milwaukee 1997 p64

14. Wenk M.S. **Interrelationships between BS 7750 and the EMAS Program Springer Netherlands** 2006 p5-8

15. George M. **Lean Six Sigma** McGraw- Hill 2002

16. Defra UK **Adapting to climate change** June 2009 p36

17. Hansen F EPA **Position Statement on Environmental Management Systems and ISO 14001 and a Request for Comments on the Nature of the Data To Be Collected From Environmental Management System/ISO 14001 Pilots** Federal Register: March 12, 1998 (Volume 63, Number 48)

18. *Kanungo S Hamilton A* **Driving Improvements in Government Service Delivery Using Lean Six Sigma: Defense Leads the Way** March 2008 p53

19. Antony J and Escamilla J**. Blending the Best of Lean Production and Six Sigma for Achieving and Maintaining Operational Excellence** 2003 p9