ISO 14001: time for improvements?

Tine Herreborg Jørgensen

Department of Development and Planning,
Aalborg University,
Fibigerstræde 13, Aalborg Øst,
DK-9220, Denmark
E-mail: tine@plan.aau.dk

Abstract: The aim of this paper is to discuss a number of issues related to ISO 14001:2004, the international standard for Environmental Management Systems (EMS) with the purpose of improving the next edition in order to recognise and reflect new recognitions in approaches to pollution prevention. A case study is presented and shows lack of life cycle thinking in product development. This paper suggests changes of ISO 14001:2004 in order to include a more product-oriented approach and a stronger focus on stakeholders. It also suggests to formulate clearer demands for targets and environmental improvements and to include a demand for publication of an environmental report to promote a constructive dialogue with relevant stakeholders.

Keywords: ISO 14001; environmental management system; EMS; product-oriented environmental management; POEM; life cycle; stakeholders.

Reference to this paper should be made as follows: Jørgensen, T.H. (2007) 'ISO 14001: time for improvements?' *Int. J. Environment and Sustainable Development*, Vol. 6, No. 3, pp.254–272.

Biographical notes: Tine Herreborg Jørgensen, received an MSc in Environmental Planning and a PhD in Environmental Management from Aalborg University, Denmark and is an Associate Professor teaching the master's programme in Environmental Management at Aalborg University. His research interests include Environmental Management Systems (EMS), occupational health and safety and integrated management systems, product oriented EMS and greener products.

1 Introduction

The possible solutions to the environmental problems related to industrial production have moved to the companies' production processes. This implies new ways of managing environmental effects, where strategic planning is necessary and Environmental Management Systems (EMS) is a method to secure continuous improvements of environmental performance. The existing consumer patterns in the industrialised parts of the world, the global character of today's environmental problems and the expansion and increasing complexity of the global marketplace demand a response from all countries and from all levels of society. Through the 1990s and up until today, this development has resulted in an increasing environmental pressure on industry. This pressure derives from the demand that companies should take responsibility for the

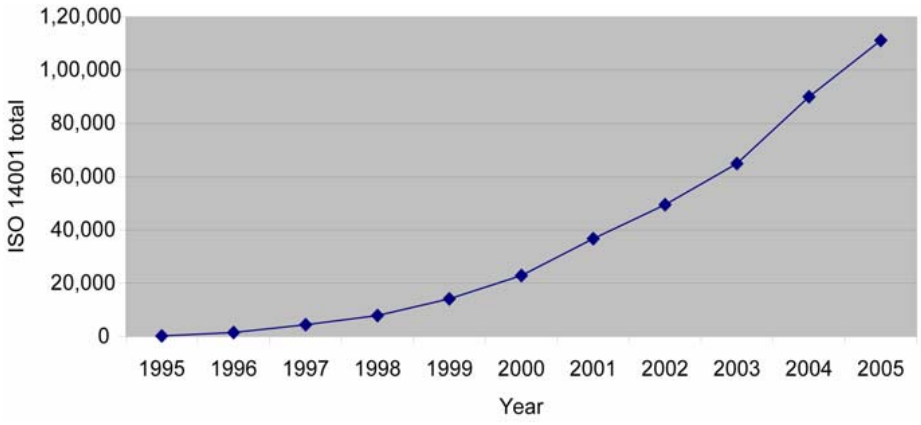
environmental damage which they create and thus approach their way of managing the environment in a more systematic and proactive way (Welford, 1998).

Environmental concerns are being incorporated in an increasing number of business strategies in order to meet the environmental demands from the different stakeholders or to create a market demand for greener products. Many companies have integrated the responsibility for pollution prevention in their management system, where actions have to take place in order to reduce the environmental impacts. The increasing interest among companies in self-regulation in relation to their environmental impacts has resulted in a need for methods and tools to support reliability and the process of change towards systematic development of cleaner production processes and products. Since the mid-1990s, with the publication of ISO 14001 (Dansk Standard, 1996), more than 100,000 companies have obtained a certified EMS (ISO, 2006a). ISO 14001 is an international standard which could have a number of opportunities for an organisation (ISO, 2002):

- a structured approach to addressing the environmental bottom line
- to manage the impact of their activities on the environment better and to demonstrate sound environmental management
- improved environmental performance
- addresses not only environmental aspects of the production processes but also those of its products and services
- can improve environmental management and enables equal access to a growing 'green' market place.

Internationally, the implementation of EMS has shown great interest. The number of ISO 14001 Certificates increased with 60% from 2000 to 2001, with 38% from 2003 to 2004 and with 24% from 2004 to 2005 (ISO, 2006a). Figure 1 shows the development in the number of issued certifications, which points at a continued interest in the following years.

Figure 1 Total number of issued ISO 14001 certificates in the world 31st December 1995 to 31st December 2005



Source: ISO (2003, 2006a).

1.1 Diffusion of EMS

ISO 14001 is an international standard applied into many different types of organisations. The standard does not, and is not intended to contain many specific requirements
(Bell, 1997). ISO 14001 is a framework that companies are obliged to adopt into their organisation. However, the standard does not specify how the requirements should be met and they do not provide an indication of what goals it should strive to achieve (Schaltegger et al., 2003). ISO 14001 is a process standard not a performance standard, which means that the standard does not set up specific demands of environmental improvements. IS0 14001 is flexible with room for interpretations, such as implementation strategies, definition of scope, environmental improvements, internal and external dialogues and cooperation.

EMS according to ISO 14001 can be considered as a 'travelling concept' at national and international levels where ISO 14001 is appropriated to different contexts. EMS is shaped due to conditions, such as:

- interests and demands of various stakeholders
- regulatory framework
- market structure
- organisational identity
- educational systems
- accreditation bodies
- available equipment and production facilities.

Not only ISO 14001 is translated from one language into another. When travelling, the whole concept and understanding of the environment is translated and transformed in order to apply to a new context.

2 Stronger product focus needed

A more product-oriented approach in ISO 14001 is necessary, because the most significant environmental impacts frequently appear in life cycle stages other than the producer of the product. This is certainly the case for many food products, as the primary production is of the hot spot, where the demand for energy and land (space) is significant (Christensen et al., 2001). For products with energy consumption during use, such as electronics, the usage stage will often be very important (Wenzel et al., 1997). The latter is also the case for a series of other products such as cars, textiles, chemicals, etc. Other groups of products may cause the largest problems in the disposal stage, such as PVC, products containing large quantities of heavy metals, for example, some batteries and various kind of electronics, etc.

A Danish study of 107 companies complying with EMAS/ISO 14001 shows that EMS has proved to be a good basis for technological innovation and environmental improvements. In nearly half of the cases, EMS has resulted in economical savings, but the companies also stress the importance of improved image. Although half of the

companies have a few aspects of life cycle thinking in the environmental review, the environmental focus is site-specific. In that sense companies complying with EMAS/ISO 14001 have recognised the responsibility for their own production, but not yet for the whole product chain (Christensen et al., 1999). In the mean time consumers, wholesalers and authorities are increasingly considering producers as responsible for the whole life cycle of their products. In other words, they put pressure on industries concerning increased product responsibility with a basis in life cycle thinking (Thrane, 2000).

A product-oriented approach at company level serves several purposes. An important goal is to reduce suboptimisation by focusing on those life cycle stages, which implies the largest improvement potentials in the product chain, as described above. However, it may also serve as a tool for communication, innovation and extension of a more value-based management system. Finally, it is important in relation to the development of cleaner products and achievement of various kind of eco-labelling (Jørgensen and Thrane, 2002).

3 Limited product focus

Danish companies have not yet recognised their responsibilities for reducing environmental impacts in the whole product chain, though some Danish companies pay increasing attention to life cycle thinking. Especially companies who deal with product development and life cycle thinking forms part of their product considerations, most often in the purchase department (BVQI, 2001; Dansk standard, 2001). The problem is, however, that companies with a certified EMS according to ISO 14001 do not have to consider potential environmental impacts in their product development.

In the following, this paper presents a case study from the textile industry. A new and improved product was developed and had unintentionally major environmental advantages both for the producer and for the customers. The case study looks firstly at the reason why the producer did not take environmental considerations into product development and secondly why the customers are still reluctant to switch to the new product despite environmental, ergonomic and economic advantages.

3.1 Presentation of Anotex

In the fall 2004, the environmental activities in a Danish textile company certified according to ISO 14001 was studied (Jørgensen and Bærendtsen, 2005). To keep the company anonymous, it will be referred to as ‘Anotex’. Anotex produces a textile product which the customers rent and wash several times. The case study includes Anotex and a major customer. The methods used were a combination of interviews, documents and observations of activities related to their EMS, product development and production. These methods were used both with Anotex representatives and customers.

In the mid-1990s, Anotex achieved a certified EMS according to ISO 14001:1996 and several reductions of environmental impacts were made; among other things through the participation of employees. Though, the last four to five years it has become more difficult to fulfil the demand for continuous improvements from ISO 14001. This is why they had great difficulties becoming recertified in 2004. The EMS of Anotex has become a low priority, and limited resources and investments have been made within this field.

The environmental groups of employees are abolished and the management commitment to the system has become low. Together with the lack of demand for product considerations in ISO 14001, this is the reason why the development of the new product, which in this paper is called 'Greentex' did not include environmental considerations.

First of all, Greentex was developed to reduce the weight of the product in order to reduce the amount of materials and by this save money on raw materials. Secondly, Anotex wanted to develop a lighter product for ergonomic reasons to make it easier to handle the product at the customer. Environmental considerations were not part of the product development. At first, the environmental advantages were viewed as a positive side effect.

3.2 Environmental advantages of Greentex

Greentex has a number of advantages. Greentex is 30% lighter in weight compared to similar products and uses a different kind of yarn. At Anotex, the reduced weight results in approx. 30% reduction of raw materials and therefore money is saved during purchase. However, this material requires approx. 10–15% more energy during production. Still this can be more than compensated for at the consumer where approx. 30% energy is saved. Test results at one of the customers of Greentex compared to the standard product is shown in Figure 2.

Figure 2 Test results of Greentex compared to a standard product at a customer

Measured parameter	Standard product	Greentex
Weight	100	70
Life time/colour-fastness	100	140
Longitudinal steadiness	100	100
Amount of kilo washed	100	80
Number of m^2 washed	100	112/126*
Amount of chemicals per m^2	100	100
Water consumption per m^2	100	74
Energy consumption per m^2	100	74
Tumbling time	100	70
Total expenses	100	72

*Results when testing at two typical types of industrial laundry machines used in the textile industry. *Source*: Jørgensen and Bærendtsen (2005).

In total, more m^2 are washed at the customer with the same amount of water even though fewer kilos are washed per wash (see Figure 2). The lighter weight makes it possible to wash more m^2 of the product in each wash without increasing the amount of water used or the amount of detergent. This reduces the water consumption, energy consumption and chemical consumption for each m^2 textile washed. The new type of yarn used in Greentex needs shorter time to dry resulting in reduced energy consumption. Furthermore, the yarn can also be washed at a lower temperature, which further reduces the energy demand. Figure 2 also shows that the life time of Greentex is 40% longer, which is due to the characteristics of the new yarn. The weight reduction means less wear of the washing machines and the employees. At the customers, Greentex also results in

improved ergonomics for the employees who prefer working with this product because of the reduced weight.

The total reduction of expenses is expected to be approx. 30% and includes reduced energy, detergent, water and wear of machinery. The reductions will vary due to different washing equipment the customers have, but the results are so significant that all customers will experience reduction of environmental impacts. Greentex is therefore a good alternative to the standard product for the customer, not only from an environmental perspective, but also from an economic and ergonomic perspective.

3.3 Barriers at the customer to use Greentex

To obtain full environmental benefits, it is necessary to wash Greentex separately from the standard product. If the two products are washed together, Greentex will dry longer than necessary and will be exposed to too high temperatures. Greentex risks shrinking and deformation. The customers' different types of products can be divided into only two groups regarding wash handling and with Greentex this makes three. Anotex encloses a technical bulletin for Greentex with recommendations for washing temperature, washing agents, drying times, etc. Anotex also visits their customers to instruct them in how to treat Greentex. Test washes are also carried out at a number of customers to make the savings visible for the customer.

A visit to a rental-customer who washes and rents out the textiles showed that surprisingly they did not wash Greentex separately. A shorter life time of the product could then be expected. The customer explained that Greentex could not be sorted from the standard in practise even though it is easy to tell the difference. The carriers who collect the textiles from their customers already sort the two other products and should they sort one more product, it would be expensive.

Even though the customer has an EMS certified according to ISO 14001 they already carry out enough continuous improvements to keep the certificate and was therefore not motivated to do anymore. The customers' parent company owns a number of companies who wash and hire out the textiles. These companies are benchmarked regarding water, energy, chemicals and oils and when they reached their quota have no economical incentives to do anymore. The customer would only change procedures for collecting and washing by demand of their parent company. A next step for Anotex could then be to contact the parent company and present the test results from their companies in order to motivate them to buy Greentex.

3.4 Incentives for life cycle thinking at Anotex

According to the external auditor of Anotex, the test results can be used as documentation for continuous improvements of their EMS even though most reductions are made in the use phase at the customers. This is an example of how EMS can expand to Product-Oriented Environmental Management (POEM), where reductions of environmental impacts in the use phase are accounted for in the production phase. For companies who have all ready taken 'the low hanging fruits' from their own production, an easier achievement of continuous improvements by being part of reducing impacts in other life cycle phases than their own could be a motivation.

Most companies are primarily concerned about their economy, where price and quality have high priority compared to the environment. At Anotex and at the customer

who is studied in this paper, the attitude towards their EMS is to do just enough to comply with ISO 14001 and further improvement activities are only initiated if demanded from the parent company, the external auditor or by new regulation. EMS is often viewed as a system used at operational level. But should the environmental considerations be an integrated part of business and for instance in the development of new products, the EMS needs a stronger internal embeddedness at the strategic level with strong management commitment.

To promote POEM, ISO 14001 could strengthen the demands for these considerations. But also the external auditors could be more committed to this issue and encourage the companies to consider the environmental impacts in the whole product chain and especially in phases, where the company could contribute to environmental improvements.

4 Product oriented initiatives an insurmountable task

An important barrier in order to increase product focus is that many companies find it an overwhelming task to carry out. The companies do not know where to begin, how to make limitations in LCA, how to make the tasks concrete and not too complicated. Besides the expected environmental improvements and economical benefits are more difficult to assess before hand compared to environmental improvements of their own production processes. Another barrier is that improvements in the product life cycle are not always reached in half a year, and must often be seen as a more long-term investment. For instance, collaboration in product chains and networks take a long time to initiate and carry through. For companies with a certified EMS, the next step towards POEM is to include this area in the objectives and targets of their environmental management programme (BVQI, 2001; Dansk Standard, 2001). At present in Denmark more tools are being developed in order to support companies' efforts regarding life cycle activities. For these tools to succeed they must be able to reduce the impression of an insurmountable task among companies.

4.1 Common sense

Actually some companies have indirectly used life cycle thinking to consciously prioritise between different approaches in for instance wastewater treatment. One company claimed that they would not work with nano-filtration of the wastewater, because they feared that the large energy consumption would eat up the environmental improvements (Thrane, 2000). This decision was made several years ago and it was mainly based on common sense or tacit knowledge. Today, LCA screenings, carried out by the consultancy firm NIRAS, actually support this decision for the same reason. In other words there are potentials for life cycle thinking, which are based on common sense and which have been used for many years within the companies (Christensen et al., 2001).

4.2 Limited demands on suppliers

Only 28% of the ISO 14001/EMAS certified companies in Denmark place demands on suppliers and other network collaborations in order to have an EMS certification or other

kinds of EMS. In general, the formal EMS is not spread up and down stream the product chain. This indicates that life cycle thinking and demands for improvements by the suppliers are still not very common (Kvistgaard Consult, 2001). Concerning the possibility for *substituting suppliers* or customers to obtain environmental improvements there are also other barriers: price and quality are almost always more important than environmental considerations.

Another barrier concerning the implementation of POEM in the companies is that it is not always possible to place *environmental demands* on other actors in the product chain. In the fish industry, the sector is characterised by a large demand and a small supply of resources. Even though all life cycle screenings point towards the fishery as the hot spot in the life cycle (TBT and energy), it is very difficult for the processing companies to demand anything from the fishery, because of the scarce resource situation (Christensen et al., 2001). Furthermore, the fish industry is interested in large quantities of fish of a high quality at the right time. This may be in conflict with the environmental demands.

Although it is often taken for granted, it is also debatable, whether the companies always have a true interest in *initiating environmental improvements* in other stages of a product's life cycle. If a company assists a supplier with environmental improvements, it does not necessarily get the credit in terms of economical pay back nor image improvements. At least it is an extra challenge to obtain this. Furthermore, they may risk that the supplier leaves the present supply chain. On the positive side is the increasing interest for supply chain management and close product chains with sharing of information and innovation initiatives. Furthermore, eco-labelling and external demands to eco-design and LCA, as we see in the electronic sector, are among the external pressures today which can probably move some companies towards more product-oriented thinking.

To support activities for greener products, ISO has developed a number of guidelines for environmental labels and declarations (ISO 14024 and ISO 14025) and guidelines for life cycle assessment (ISO 1404X-series). But as discussed in the next paragraph, going for a green label on your product or conducting a life cycle assessment is to many companies, a step too far concerning environmental strategy, resources, etc. More simple initiatives towards product-oriented environmental management are needed and they often involve dialogue and communication with stakeholders. A Danish textile industry with a certified EMS wanted in the mid-1990s to dispose of their heavy metals in production. At last, all they had left was a black colour, including heavy metals. The sales persons of the company visited 4–5 customers (furniture factories) who wanted this particular black dyestuff and explained to the company the strategy of disposing the heavy metals. They also showed another black dyestuff to the customers which they could choose instead, and by choosing this dyestuff they could make sure that their furniture would not have risks of environmental effects from heavy metals and they could sell a greener product to their customers. After these meetings, all the customers changed to the black dyestuff without heavy metals, and thereby the textile company reached their goals of getting rid of the heavy metals.

A working draft for environmental communication, ISO/WD 14063 is under development in ISO and a guideline is expected to be developed during the following years. As the example of the above textile industry, communication with stakeholders is often necessary to achieve environmental goals. But it is important to emphasise that if ISO 14001 does not include demands for product-oriented environmental considerations

and environmental communication in the standard, it is most likely that only few organisations will do this on their own initiative.

4.3 Need for creation of a greener market

Other barriers for product-oriented management are the lack of customer and consumer demand for greener products. For profit, most industries would have an increasing market for the greener products, rather than saving from reduced environmental impacts in production. The opinions among a number of companies are that there is an interest in green products, but consumers are not willing to pay the extra. In this context, it is important to realise and understand why the companies sometimes seem less eager to deal with POEM compared to EMS.

An increasing demand for greener products should be promoted both with regulatory incentives and with initiatives from the individual companies. The companies should more often consider to take initiatives in informing and educating their market about the green products, similarly to the example with the Danish textile company. Another example is Grundfos, a company who have developed a range of pumps. The use of materials has been reduced by 26%, and the energy consumption has been reduced with 30% by using the pumps (Grundfos, 1999). When considering the environmental improvements in a life cycle perspective, it can be concluded that the environmental impacts of these pumps have been reduced in each link of the product chain (production of raw materials, manufacturing of materials, manufacturing of products, use of the products, waste disposal and transport). In the advertisements of these products, Grundfos focuses on what the customer gains from the reduced energy consumption when using the pumps. Grundfos and other companies, dealing seriously with POEM, should focus more on informing their customers about the environmental gains by the reduced environmental impacts in other part of the product chain and apply to environmental consciousness which may not necessarily benefit the customer directly and economically.

More research on potentials and barriers for POEM in industries needs to be carried through, but it will not be discussed further in this paper. Though in the following, the focus is on the need for greater product focus in EMAS and ISO 14001 as an important incentive for moving environmental activities of the companies in this direction.

5 Limited product focus in EMAS and ISO 14001

To promote implementation of POEM in industries, demands for product focus should be incorporated more strongly into ISO 14001. In ISO 14001 the demand for life cycle considerations is vaguely formulated. In EMAS II the demands for indirect impacts have been strengthened: “An organisation ought to consider both direct and indirect environmental aspects of its activities, products and services” (European Parliament, 2000, Annex VI, 6.1). In Annex VI, both the direct and indirect environmental aspects as well as the organisation are described. The environmental statement today must, among other things, include: “A description of all significant direct and indirect environmental aspects which result in significant environmental impacts of the organisation and an explanation of the nature of the impact as related to these aspects” (European Parliament, 2000, Annex III, 3.2.b).

EMAS II must necessarily increase the attention of the registered companies to its impacts in all parts of the product chain. Though, without placing direct demands on the individual company to reduce their indirect impacts. These demands can be viewed as the first step to companies' implementation of POEM in a future perspective.

5.1 More product focus needed in ISO 14001

In principle ISO 14001 holds demands for POEM in certified companies as the scope for the standard, among other things, states that: *"It applies to those environmental aspects* that the organization identifies as those which it can control and those which it can influence." (Dansk Standard, 2004). Most companies, however, do not consider themselves to have an influence on environmental performances other than from their own production processes. For instance, companies producing energy consuming products to households must be considered to have an influence on the energy consumption of the products. Therefore use of these products must be an environmental aspect to be included in the company's EMS.

From interviews with three lead auditors from the three biggest certifying organisations in Denmark, it can be concluded that two of the three interviewees do not place demands regarding the environmental impacts of the products on their clients regarding ISO 14001 (Jørgensen, 2001). The third lead auditor demands/requires that the companies have conducted life cycle considerations. Regarding the formulation of environmental policy in ISO 14001, the demand for life cycle considerations is vague, as the first criteria for fulfilment of the policy is that: "it is appropriate to the nature, scale and environmental impacts of its activities, products and services" (Dansk Standard, 2004). It is up to the company and the lead auditor to interpretate whether impacts of the product in the product chain should be included in the EMS.

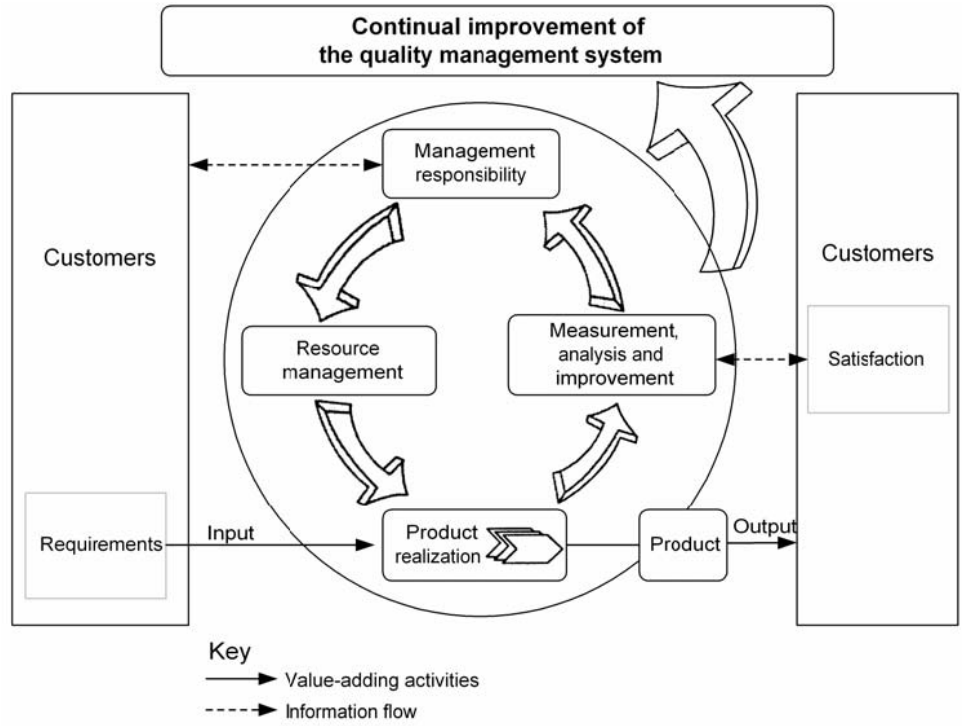
6 More customer and supplier focus in ISO 9001 than ISO 14001

With the revision in 2000 of ISO 9001 for Quality Management Systems (QMS), the focus on customers and continuous improvements became stronger. The circles and arrows in ISO 9001:2000 symbolise a dynamic and continuous process (see Figure 3). With focus on the customers, their demands and the satisfaction, the organisation has to be more oriented towards the product chain in which it operates. ISO 9001:2000 has also been aligned with ISO 14001:1996 "in order to enhance the compatibility of the two standards for the benefit of the user community" (Dansk Standard, 2000a). By the end of 2004, more than 670,000 ISO 9001:2000 certificates have been issued in 149 countries (ISO, 2006a).

ISO 9000 for QMS places, among other things, increasing demands on customer satisfaction: "Organizations depend on their customers and should therefore understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations" (Dansk Standard, 2000b, 0.2.a). With the demand for increased customer focus, the ISO 9001 standard places increased focus on value and money flow in the product chain (Dansk Standard, 2000a). By this, ISO 9001 make higher demands to the product chain than both EMAS and ISO 14001 do today. The focus on customer satisfaction in ISO 9001 could indirectly promote greener products and in this way it could influence the priority of environmental activities, because the

customer analysis might show increasing environmental expectations as a product quality in the future. This could also result in more dialogue and cooperation in the product chain regarding environmental improvements. Increasing environmental demands or expectations from customers could contribute to moving the EMS from process focus towards product focus.

Figure 3 Model of process-based quality management system



Source: Dansk Standard (2000a).

ISO 9001:2000 also provides some requirements for the purchasing process which include you as the customer. These requirements address the following topics (ISO, 2006b):

- requirements regarding the purchasing information that should be provided so that suppliers clearly understand their customers' needs
- the ways in which supplied products can be verified as meeting the requirements of the customer.

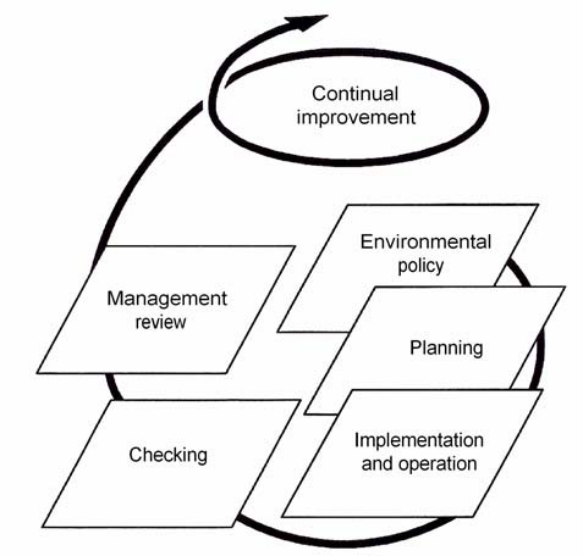
To help in this task you may consider the following (ISO, 2006b):

- What is the specific product (goods or service) you are buying?
- What impact does this product have on your own business?
- What are the risks to your business if you experience problems with this product?

- How can you be sure that the product you receive will actually meet your requirements?
  - What do you know about the reputation and historical performance of your supplier?
  - What level of confidence do you need in your supplier's ability to provide you with conforming product on a consistent basis?
  - If you decide that conformity to ISO 9001:2000 is important, (based on your assessment of the risks associated with the goods and services you are buying) how can you be sure that your supplier does have a QMS that meets ISO 9001:2000 requirements?
  - Are the goods and services you require covered by your supplier's QMS? (You may need to ask for a copy of your supplier's actual certificate or declaration of conformity to find this out!)

The above quotations and questions related to ISO 9001 could as well be asked related to the environment and ISO 14001. With point of departure in QMS (see Figure 3) a similar model for EMS could be developed with the purpose to state the importance of the organisations relations with relevant stakeholders and the life cycle of the products. The illustration of the EMS in ISO 14001:2004 illustrates the system elements (plan-do-check-act) and continuous improvements but does not relate it to the stakeholders and the product life cycle (see Figure 4). A closer relation between ISO 14001 and the relevant stakeholders could also promote environmental improvements in the product chain because the certified company will have to be more conscious about stakeholder interests and react on it. In ISO 14031:1999 about environmental performance evaluation, the relation between the organisation and environmental conditions and interested parties are illustrated. But as long as it is not included more clearly in ISO 14001, only few organisations will probably include this on their own initiative.

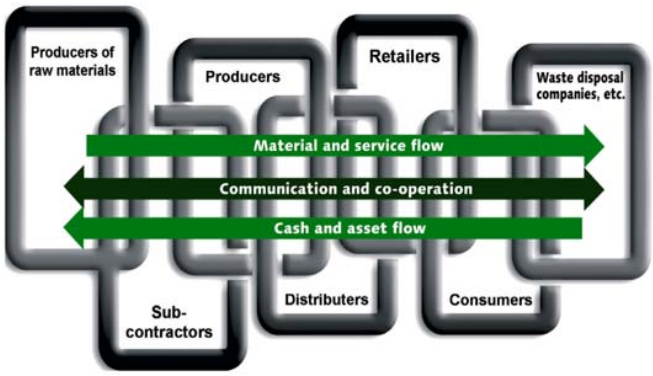
Figure 4 Environmental management system



Source: Dansk Standard (2004).

With the product-oriented approach, the focus shifts from within the companies' fence to the entire product chain (see Figure 5). For the companies, the challenge is to connect the links in the product chain in such a way that focus on both environmental optimisation of the material flow in the supplier chain; and on the customer's expectations regarding environmental considerations in the value chain (Remmen and Münster, 2003).

Figure 5 Communication and cooperation in the product chain



Source: Remmen and Münster (2003).

Over the past five years, the revisions of standards for management systems in ISO has created a path towards more *compatible* management standards with cross references and 'integration' of system elements, which can reduce confusion and give administrative benefits related to implementation and maintenance of the systems. However, compatibility is only a small step towards an integrated management system. A prerequisite for integration is an understanding of generic processes and tasks in the *management cycle* – the plan-do-check-act, and the potential benefits of such an integration is related to internal coordination and the reduction of possible trade-offs. An even more ambitious level of integration is concerned with *creating a culture* of learning, stakeholder participation and continuous improvement of performance in order to realise external benefits and to contribute to sustainable development. To realise this ambition, focus of the management system has to be on the synergy between customer-based quality, product-oriented environmental management as well as corporate social responsibility (Jørgensen et al., 2006).

7 The role of stakeholders

An interesting question is how quickly and to what extent the environmental impacts from industry are reduced in order to move towards a more sustainable production. This will depend on the development in demands from stakeholders, the respondence of industry and the internal dynamic in the companies in relation to their wish to be one step ahead and to have a reliable environmental image towards the stakeholders (Jørgensen, 2001). In the previous section, a number of stakeholders in the product chain were shown in Figure 5. The stakeholders are very important for environmental improvements of

products. If the customers or consumers demand greener products, the industry would provide it, but the demand is rather weak for most products. In the following, the focus is on three stakeholders: authorities, external auditors and the public.

7.1 The role of public authorities

An important stakeholder to promote reduced environmental impacts of production and products is the environmental authorities. Regarding environmental pressure from authorities, a common problem of several developing countries is weak administrative and institutional capacities, poor regulatory enforcement and centralised systems. In countries with weak environmental enforcement of authorities, ISO 14001 is a system that could take part in the role of securing better compliance with the environmental regulation for certified companies in the specific country. A country like South Africa is said to have one of the best environmental laws in the world, but the enforcement is low. Here ISO 14001 could contribute to ensure that certified companies comply.

Another question to be raised here is: "what are the differences in regulatory demands of the environmental law in different countries?" In some countries both environmental law and enforcement is weak. For a company with a certified EMS in such a country it might be rather easy to comply with environmental regulation contrary to companies in other countries with more strict environmental regulations, with more environmental demands and more control from authorities. As a consequence of this, some parent companies have formulated their own environmental standards which all subsidiary companies must comply with no matter their location in the world. I will not go any further into this question but point out that customers with suppliers certified according to ISO 14001 do not necessarily know anything about how strict environmental regulation is formulated in these countries and for instance the use and disposal of hazardous substances. This means that to a certain extent the customers should obtain knowledge about environmental regulation in the countries of their suppliers in order to assess, whether it is satisfactory.

Developing countries with limited resources for enforcement of environmental regulation could consider concentrating on the formulation of clear and appropriate environmental law and regulation towards industry and at the same time demand the most polluting companies to become certified according to ISO 14001. In this way it is the lead auditors from the certifying bodies who control and secure that the companies comply with the law. Even though ISO 14001 is no guarantee for continuous environmental improvements, certification of the most polluting companies most likely would lead to a number of reduced environmental risks and impacts, and lead to improvement. A high standard of the certifying bodies must also be secured.

7.2 The role of the external auditors

The certifying bodies and especially the individual auditors who certify and audit companies' compliance with ISO 14001 play an important role interpreting the standard. As mentioned in the introduction ISO 14001 leaves room for interpretation. Both at national and international levels, studies show that auditors have different attitudes and opinions of the interpretation. In a comparative analysis of EMAS and ISO 14001 it is indicated that not all auditors demand continuous improvements with an ISO 14001 certificate (Kvistgaard Consult, 2001). A Danish auditor did personally experienced

differences in the interpretation of continuous improvements between Denmark and Thailand. He believes that culture has an influence on the demands placed at companies in different contexts. In the following years, many companies in developing countries must obtain an ISO 14001 certificate in order to enter the international markets.

In this respect, it is of great importance that the certificate has credibility and that it is not something to draw in a vending machine (BVQI, 2001).

At national level differences in interpretation between certifying organisations and between auditors in the same certifying body also seems to vary. Smink followed the certification of three car-dismantling companies, who were certified by two different certifying bodies. The auditor in the first company certified the company in only two hours and allowed a consultant of the dismantling company to answer some of the questions (which they are not allowed to). The auditor from another certifying body spent two days on each of the other car-dismantling companies (Smink, 2002).

From interviews with one lead auditor from each of the three biggest certifying organisations in Denmark, it can be concluded that two of the three interviewees do not place demands regarding the environmental impacts of the products on their clients in relation to ISO 14001. The third lead auditor demands/requires that the companies conduct life cycle considerations (Jørgensen, 2001). Interviews with 13 auditors from the same certifying body (SWEDAC in Sweden) also show differences in their interpretation of ISO 14001. On the question "How do you control that the requirement regarding continual improvement is fulfilled?" the answers varied (Ammenberg et al., 2001):

- I focus on the environmental targets (eight auditors)
- I try to make a comprehensive judgement, where environmental targets constitute one part (four auditors)
- I focus on procedures for handling non-conformance (one auditor).

On another question: "Which criteria are approved for inclusion in the assessment of environmental aspects when determining the significant environmental aspects?" the answers were (Ammenberg et al., 2001):

- only criteria related to environmental impact are approved (8 auditors)
- criteria regarding economy, technical possibilities, legal demands, etc. are also approved in the assessment process (5 auditors).

The above discussion indicates that the interpretation of ISO 14001 varies more than the certifying bodies imply. ISO 14001 could be clearer regarding continuous improvements and regarding the assessment of the environmental aspects. As Georg points out: "auditing is the key to making the organisation transparent, but an important prerequisite for auditing is, however, that things have in some way been made audible" (Georg, 2003).

7.3 Public assessment of environmental performance in industry needed

The fact that a company is certified according to ISO 14001 does not automatically inform stakeholders about how polluting the production is compared to other companies. With ISO 14001 the company is only committed to publish their environmental policy and that is not sufficient in order to assess and compare the environmental performance of, for instance, two different companies. EMAS registered companies in EU have to

publish environmental statements which give stakeholders better opportunities to assess and compare environmental performances. With the increasing number of stakeholders concerned about the environmental impact and performance of industry, ISO 14001 could respond to this concern by integrating demand for environmental statements in the next edition of ISO 14001. Another way of providing public assessment is practised in Denmark since 1995 with a demand for the most polluting companies to deliver an environmental report no matter if they are certified or not (Holgaard and Jørgensen, 2005). This is also the case in a number of other countries.

Public access to environmental information about performance in the individual company through environmental statements/reports would probably motivate some companies to make an extra effort to comply with environmental legislation and conduct continuous improvements on their environmental performance.

8 Environmental improvements

Another issue of relevance to discuss in relation to ISO 14001 is the demand for environmental improvements of the EMS. Which specific environmental improvements must the company live up to; that is a question of interpretation of the standard. ISO 14001 does not provide an indication of the goals, for which the company should strive to achieve. Besides, with an ISO 14001 certification stakeholders do not know if the specific company is among the least polluting companies at national/international level or among the worst.

In relation to the specific formulation of aims, companies often set up goals with environmental impacts produced per unit. The outcome changes when the production increases. If for instance a dairy cleans the pipes twice daily with detergents, and then production increases and they still clean twice daily then the result is that used detergent per produced unit or per amount of raw milk is decreasing. In practise the dairy has not made any environmental improvements, they have just increased production. Is this an environmental improvement? You could say no with the argument that the total use of detergents in the company has not decreased, on the other hand you could argue that it is an improvement, because you produce more products with less environmental impact per unit. Another example could be that the dairy uses more energy in total when increasing production, but the energy consumption per ton raw milk might be the same or even decreasing. This means that environmental improvements can be reached in spite of the fact that the total environmental impacts have increased. When this is the reason for the environmental improvements, it should be stated in the environmental statement/report of the company in question, to inform the public about the preconditions of the improvements. Companies do expand their production and economic growth is the basis of most businesses. Therefore ISO 14001 should be clearer in the definition of environmental improvements, and a discussion should lead to the kind of goals which are most appropriate to reduce environmental impacts from industry.

It is also relevant to discuss: what is an environmental improvement? In various surveys of companies with certified EMS only approx. 40–50% of these companies have achieved specific improvements related to use of resources or related to output emissions (Ammenberg and Hjelm, 2003; Annandale et al., 2004; Christensen et al., 1999). According to ISO 14001:2004, “continual improvement is a key attribute of an effective environmental management system”. But experiences show that the improvements in the

early stages of EMS in some companies are difficult to retain in later stages. In a case study with 40 Australian companies, 40% found this was the case (Annandale et al., 2004). In the first year after certification, organisations often achieve a number of environmental improvements, 'the low hanging fruits' and over time improvements become smaller or are made in connection with technological jumps like investments in new technology. Expanding the focus on production processes to the product chain, could contribute to setting and achieving new goals for the environmental performance.

9 Conclusion

In order to reduce the most significant environmental impacts from products it is necessary for a specific company to consider other relevant stages in the product chain than their own and also to cooperate and communicate with relevant stakeholders. It is suggested to incorporate life cycle considerations more strongly into ISO 14001. A more product-oriented approach is necessary, because the most significant environmental impacts frequently appear in other parts of the product chain than in the certified company in question and the company can have a significant influence on reducing this impact. It is still a barrier for several companies to take the first step towards POEM, the first step is to realise their responsibility. The interpretation of the standard by lead auditors could also be more homogeneous, if ISO 14001 becomes clearer about setting targets, demands and definitions of continuous improvements and for product focus. ISO 14001 should make these issues easier to audit homogeneously among auditors.

The relevant stakeholders should also be more in focus in ISO 14001, as they are in ISO 9001:2000, where the customer and supplier relations are integrated into the system. More openness about a company's environmental performance and data about development in environmental improvements, for instance, must also be expected to become available for the public to a greater extent in the future. Instead of hiding these data, a modern company should have an open dialogue and cooperation with its stakeholders about its actual environmental performance.

It must be expected that ISO 14001 adapts and strengthens demands in the next edition along with developments of new knowledge and understandings about pollution prevention, both at academic level and in society at large. Do the demands in the standard begin to lack behind 'common knowledge' and 'best practises', the standard will risk to loose reliability. To promote a product oriented approach in industry it is also necessary with support from regulatory incentives at national level towards industry as well as towards the customers and consumers.

When certified according to ISO 14001, companies must comply with environmental legislation, but it is important to bear in mind that national legislation and enforcement can differ significantly between countries. Especially, in some developing countries with limited resources for enforcement of environmental regulation it is suggested that the authorities concentrate on formulating a clear regulation of high quality and at the same time demand the most polluting companies to become certified according to ISO 14001. In this way, the individual company must take responsibility of documenting compliance, and authorities could to some extent let the auditors from the certifying bodies' control that the companies comply. It is also suggested that ISO 14001 integrate a demand for

publication of environmental reports in order to provide public access to environmental information about activities and performance.

References

Ammenberg, J. and Hjelm, O. (2003) 'Tracing business and environmental effects of environmental management systems – a study of networking small and medium-sized enterprises using a joint environmental management system', *Business Strategy and the Environment*, Vol. 12, pp.163–174.

Ammenberg, J., Wik, G. and Hjelm, O. (2001) 'Auditing external environmental auditors – investigating how ISO 14001 is interpreted and applied in reality', *Eco-Management and Auditing*, Vol. 8.

Annandale, D., Morrison-Saunders, A. and Bouma, G. (2004) 'The impact of voluntary environmental instruments on company environmental performance', *Business Strategy and the Environment,* Vol. 13. pp.1–12.

Bell, C.L. (1997) 'The ISO 14001 environmental management systems standard – one American´s view', in R. Hillary, (Ed). *ISO 14001 and Beyond – Environmental Management Systems in the Real World*, UK: Greenleaf Publishing.

BVQI (2001) *Lead Auditor, Telephone Interview*, Denmark,. May 2001.

Christensen, P., Madsen, J.N. and Thrane, M. (2001) 'LCA of Danish fish products', *Proceedings, International Conference on LCA in Foods*, SIK Dokument 143, Gothenburg, Sweden.

Christensen, P., Remmen, A. and Nielsen, E.H. (1999) 'Experiences with environmental management in Danish companies', *Miljøprojekt nr. 486* (in Danish). Miljøstyrelsen, København, Denmark.

Dansk Standard (1996) *EN ISO 14001; Environmental Management Systems – Specification with Guidance for use*, 1st edition, Copenhagen, Denmark: Dansk standard.

Dansk Standard (2000a) *EN ISO 9001; Quality Management Systems – Requirements*, 3rd edition, Copenhagen, Denmark: Dansk Standard.

Dansk Standard (2000b) *DS/EN ISO 9000. Quality Management Systems – Fundamentals and Vocabulary*, 1st edition, Copenhagen, Denmark.

Dansk Standard (2001) *Lead Auditor, Telephone Interview*, Denmark May.

Dansk Standard (2004) *Environmental Management Systems – Requirements with Guidance for use*, *DS/EN ISO 14001*, 2nd edition, Denmark: Copenhagen.

European Parliament (2000) 'Regulation of the European parliament and of the council allowing voluntary participation by organisations in a Community', *The Eco-Management and Audit Scheme*, PE-CONS 3658/00, ENV 432, CODEC 916, Brussels.

Georg, S. (2003) 'Environmental mangement standards – traveling ideas for providing transparency and trust?', *Position paper for the DUCED-EMP Research Workshop*, Chulalonkorn University, Bangkok, Thailand.

Grundfos (1999) *Annual Report*.

Holgaard, J.E. and Jørgensen, T.H. (2005) 'A decade of mandatory environmental reporting in denmark', *European Environment*, Vol. 15, pp.362–373.

ISO (2002) *Benefits of the ISO 14000 family of international standards*, Accessed on 19th February 2003, Available at: http://www.iso.ch/iso/en/prods-services/otherpubs/iso14000 /benefits.pdf.

ISO (2003) *The ISO Survey of ISO 9000 and ISO 14000 Certificates. Twelfth cycle: up to and including 31 December 2002.* Available at: http://www.iso.ch /iso/en/commcentre/pressreleases/2003/Ref864.html Accessed on 28 July 2003

ISO (2006a) *The ISO Survey of ISO 9000 and ISO 14000 Certificates. Up to and including 31 December 2005.*

ISO (2006b) *What does it mean in the supply chain?* Available at: http://www.iso.org/iso/en/ iso9000-14000/explore/9001supchain.html Accessed on 5 March 2006.

Jørgensen, T.H. (2001) 'Miljøledelse – systemer, standarder og praksis', *Skriftserie nr. 277 (in Danish)*. Denmark: Department of Development and Planning, Aalborg University.

Jørgensen, T.H. and Bærendtsen, P. (2005) 'Barriers when taking the first step towards life cycle management', *Proceedings, the LCM Conference on Innovation by Life Cycle Management*. Barcelona, Spain.

Jørgensen, T.H. and Thrane, M. (2002) 'Life cycle based environmental approach in the industry', *Proceedings, Corporate Social Responsibility and Environment Conference*, Leeds.

Jørgensen, T.H., Remmen, A. and Mellado, M.D. (2006) 'Integrated management systems – three levels of integration', *Journal of Cleaner Production*, Vol. 14, No. 8, pp.713–722.

Kvistgaard Consult (2001) 'Miljøstyring og miljørevision i danske virksomheder', *Miljønyt (in Danish),* No. 62, Copenhagen: Erhvervsfremme Styrelsen og Miljøstyrelsen.

Remmen, A. and Münster, M. (2003) 'An introduction to life-cycle thinking and management', *Environmental News*, No. 68, Dansh EPA.

Schaltegger, S., Burritt, R. and Petersen, H. (2003) *An Introduction to Corporate Environmental Management. Striving for sustainability*, Greenleaf Publishing.

Smink, C. (2002) 'Modernisation of environmental regulations. End-of-life vehicle regulations in the Netherlands and Denmark', PhD Thesis, Denmark: Aalborg University.

Thrane, M. (2000) *Innovation, miljø og kvalitet i fiskeindustrien (in Danish)*, Aalborg: POET's projektserie om fødevaresektoren, Aalborg Universitet.

Welford, R. (1998) *Corporate Environmental Management – Systems and Strategies*, 2nd edition 1999, London: Earthscan Publications Ltd.

Wenzel, H., Hauschild, M. and Rasmussen, E. (1997) *Environmental Assessment of products*, Vol. 1, London: The Danish Technical University, Chapman & Hall.