

Management for Sustainability in Industry

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Abstract

The paper focuses on the need for industry to move towards sustainable management. A model for developing the concept of environmental management and linkage to sustainable management is presented and discussed in this paper. It is argued that focus on environmental management systems and reduction of environmental impacts from processes in industry should be extended with life cycle based environmental management and with focus on the reduction of environmental impacts for the entire product chain. The paper also focuses on the need for an integrated management system including quality, environment, occupational health and safety and social accountability. Furthermore, it focuses on the need for a life cycle based focus in these areas, in order to reach a more sustainable management in industry. It will also be discussed that management of knowledge and reporting for sustainability could support the development of sustainable management in industry. Though, changes of life styles and needs in society are also necessary, in order to reach sustainable management, which is not necessarily in favour of industry.

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1. Introduction

In the 1980'ies, environmental activities in a number of Danish companies began. Cleaner production projects existed, but an important experience was that after termination of the projects, new projects were not activated in the individual companies. These activities could be characterised as isolated projects, as illustrated with step 1a in Figure 1. With the implementation of environmental management systems EMS (EMAS and ISO 14001) in the 1990'es, a number of companies have moved a step upwards to step 2a, by working systematically towards reducing environmental impacts from production. Internationally, the interest in implementing an EMS has increased: The number of ISO 14001 certificates from 1999 to 2000 increased with 62%. By December 2000 almost 23.000 facilities had obtained an ISO 14001 certificate (ISO, 2001).

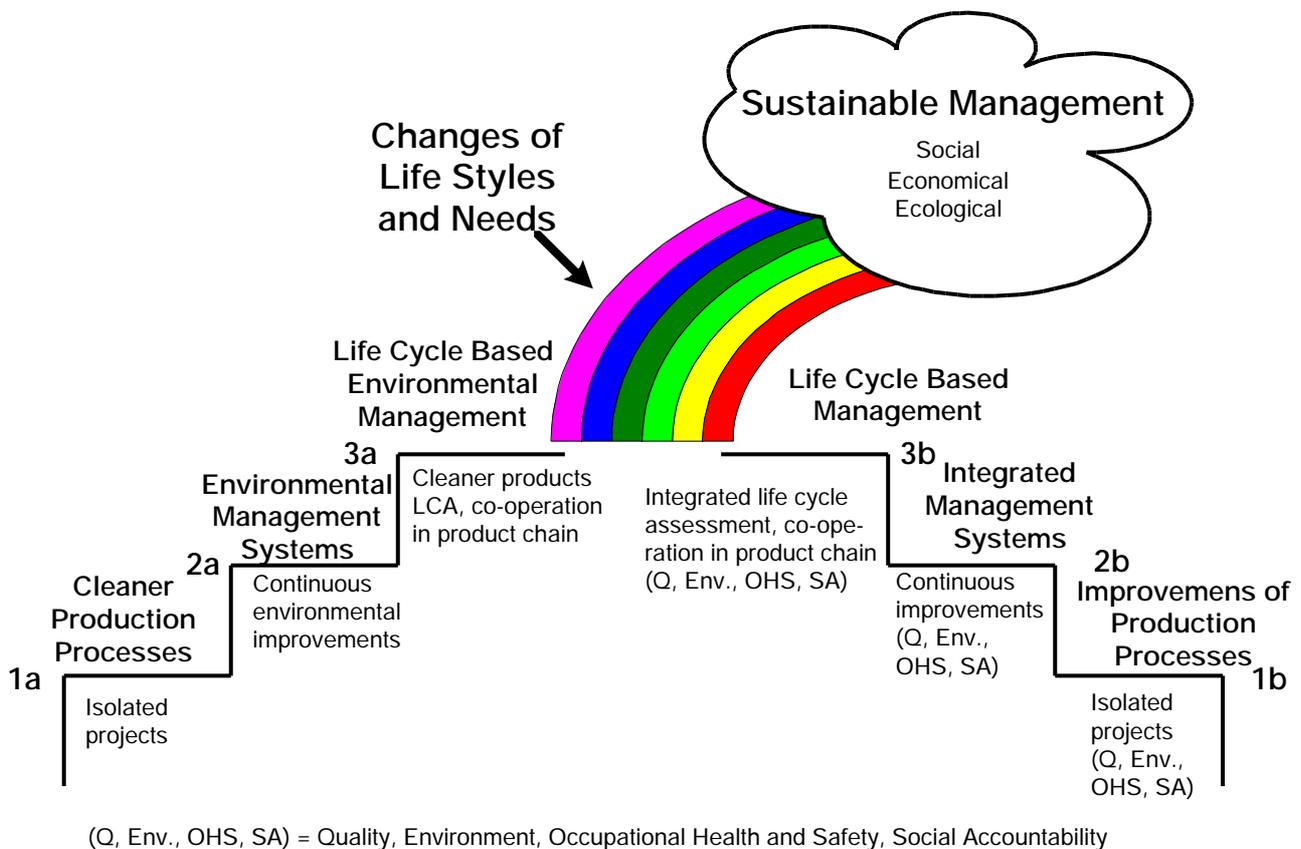


Figure 1. Development of the conception of environmental management and linkage to sustainable management (Jørgensen, 2001).

Viewed in a historical perspective, the companies' work with quality, occupational health and safety and social responsibility could also be characterised as isolated projects illustrated as step 1b in Figure 1. Today, a number of companies create integrated management systems consisting of quality and environment, some companies are also integrating occupational health and safety management in their EMS, and a few even include management of social responsibility (step 2b, Figure 1). Before presenting the next steps in Figure 1, integrated management systems will be discussed further.

2. Integrated Management Systems

In the years to come, the focus on, how to integrate different kinds of management systems into one system, will increase. Today, companies have the possibility of becoming certified in relation to quality (ISO 9001), environment (EMAS and ISO 14001), occupational health and safety (OHSAS 18001) and social accountability. (SA 8000). (ISO, 2000), (European Parliament, 2000) (ISO, 1996), (BSI, 1999), (SAI, 2001). In Denmark, 60-70 per cent of the companies with EMAS and/or ISO 14001, also have a certified quality management system according to ISO 9000. Most of these companies have integrated the two management systems into one system, instead of having two separate systems (Jørgensen, 2001). It is estimated that half of the companies with an environmental management system have integrated occupational health and safety issues in the system (Miljøstyrelsen, 1999). Today, 18 Danish companies have an OHSAS 18001 certificate, and the interest in occupational health and safety management systems is expected to increase. From a system point of view, it is appropriate to merge the systems into one system, because it reduces duplicate work and bureaucracy. As a result of this, a new standard for audit of both quality and environment is under preparation (ISO, 2001b).

In recent years, the revision of EMAS and ISO 9000 and the development of OHSAS 18001 have resulted in an increasing number of similarities between the different standards. The structures of the standards are more alike. The most recent edition of ISO 9001 has increased the focus on continuous improvements (which is one of the foundation stones in the environmental and occupational health and safety management systems), and with the newest edition of EMAS, the relationship with ISO 14001 has been clarified.

The development of the standards is moving towards the creation of a common standard, as basis for an integrated management system with supplements for each of the four areas: quality, environment, occupational health and safety and social accountability. Integration of the different management systems into one unified system, comprised of a common basic standard with supplements for each area has a number of advantages (Jørgensen and Simonsen, 2002):

- Less bureaucracy and less confusion between demands of the individual standards
- More simple, clear and manageable internal and external audits
- More focus on improvements of and the connections between quality, environment, occupational health and safety and social accountability

A common basic standard with supplements is assessed to be a realistic possibility, but not until 5-10 years into the future, and it had not yet been discussed in ISO TC 207 Environmental Management (Jerlang, 2001). The reason for this is that ISO 14001 is only five years old, and many people consider it important, firstly, to evaluate experiences on, how the standard functions in practise (Jerlang, 2001). Countries, such as Australia, Canada and Switzerland have published or will publish a national standard, in order to make it easier for the companies to integrate ISO 14001 and ISO 9001 (INB, 2001), (Karapetrovic, 2001). In Denmark guidelines have been published with the purpose: “*..to give the companies methods and examples in order to optimise environmental management systems via integration with other of the companies management systems - with the purpose of creating competitive advantages*” (COWI, 2000). These initiatives support the need for a common basic standard, in order to make it easier for the companies to integrate the standards in practise.

3. Integration of standards and organisational changes

There is a need for creating a synergy between the different areas of an integrated management system, in order to create a dynamic and well functioning system. In practise, a positive relationship must be created, between quality, environment, occupational health and safety and social accountability (Jørgensen and Simonsen, 2002). On the basis of an analysis of the organisational changes in two case studies, (Jørgensen, 2001) Figure 2 illustrates the different standards and the transverse connections between them.

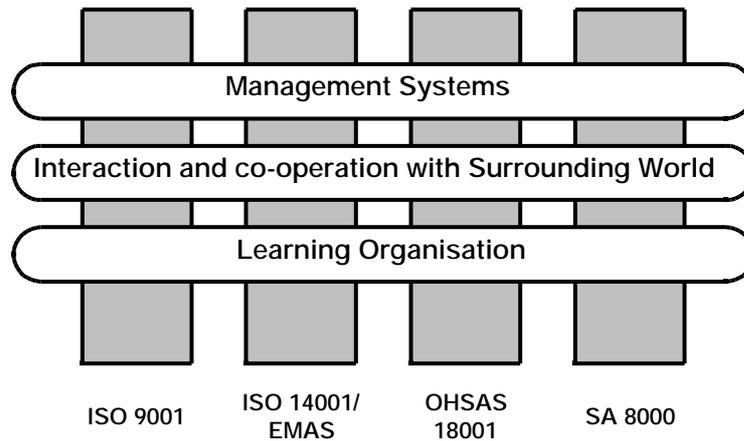


Figure 2. Integration of standards and types of organisational change (Jørgensen, 2001).

The actual management systems are viewed as a transverse connection between the different standards, where the standards have a number of similarities and common activities (policy, aims, documentation, and evaluation). The second transverse connection is the need to co-operate with stakeholders and other networks. The company needs to intercept changes in surroundings through co-operation, openness and dialogue, and to react on this by changes in the management systems, in order to adapt new demands and conditions in the surroundings. The third transverse connection is the learning organisation, the dynamic and innovative dimensions, internally by building up relevant competencies in the companies. Handling an integrated management system can be complex, and it will require continuously rebuilding, updating and innovative development within the different areas of the management system.

Knowledge will be a central issue in an integrated management system and could be handled by *knowledge management*. The Danish organisation “Erhvervsfremme Styrelsen” have developed a guideline for knowledge accounts: “*Guideline for knowledge account - key to knowledge management*” (Erhvervsfremme styrelsen, 2000). The Danish pharmaceutical company Novo Nordisk views the road towards sustainable development as a learning process: “*Moving up the learning curve, there is no magic formula for sustainable development. That is why we need to create the appropriate learning processes. By putting our thinking into practice, we also build up our competencies. In this learning process, we identify best practices which we can apply in new areas of sustainable development*” (Novo A/S, 2000). There is a need for methods and tools for knowledge management regarding integrated management systems. This paper will, however, not deal further with this issue.

For companies with an integrated management system, it would be natural also to integrate the reporting of the different areas of the management system. The reporting could enter into a sustainable perspective, where the company relates its activities to sustainability as a method of working towards a more sustainable production. Figure 3 illustrates the connection between management of knowledge, integrated management systems and sustainability reporting.

Global Reporting Initiative has published a guide for reporting in regards to sustainable development: "*Sustainability reporting guidelines on Economic, environmental, and social Performance*". The aim of the guidelines is to help organisations to report information about the three elements economy, environment and social issues. These elements are handled separately in the report guidelines, but over time, the reporting framework will move towards a more integrated reporting structure. (GRI, 2000). The companies' reports in relation to sustainable development do not imply that the companies are becoming sustainable. Sustainability reporting can support the companies' activities towards a more sustainable production and can help create company values regarding a sustainable production.



Figure 3. Knowledge management and a basic standard as the basis for integrated management and reporting sustainability (Jørgensen, 2001).

4. Product focus and standards for management systems

Life cycle based environmental management can be considered as an elaboration of the environmental management system, illustrated as step 3a in Figure 1. EMS are able to reduce environmental impacts from the production rather considerably, and companies complying with EMAS and/or ISO 14001 have recognised their responsibilities for this. As a result, they have implemented a more proactive environmental strategy. If to a greater extent, the companies should

contribute to a closure of the open material cycles and to the creation of a more sustainable development, they should begin to focus on a reduction of environmental impacts from “cradle to grave” in all links of the products life cycle. For example, the Danish company Grundfos has developed a range of pumps, where the use of materials has been reduced by 26 per cent, and where the energy has been reduced with 30 percent, when using the pumps (Grundfos, 1999). When considering these 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, production of product, use of the product, waste disposal and transport).

With life cycle based environmental management (LCM), the companies’ internal focus on processes is insufficient. It is necessary also to include the companies’ external relations and the entire product chain. The internal approach to EMS forms a good basis for a later extended focus on LCM. According to Associate Professor Arne Remmen, the external focus on LCM include life cycle assessments (LCA), co-operation in the product chain and other networks (Remmen, 2001). Life cycle assessment is a method to explain in details the significant environmental impacts from a product’s life cycle. Companies can use a life cycle assessment, for instance in order to obtain an overview of the environmental impacts of the product, as a basis of prioritising environmental activities (policies and specification of goals). LCA is also useful for data collection concerning documentation, in order to obtain an environmental label. Conducting an LCA can be very comprehensive and data complex. A number of Danish companies have expressed scepticism regarding the expert oriented approach of LCA, and they question the results, because of insecurity in the quality of the data (Remmen, 2001). In these years, LCA as a method, is in testing and development, and among other things simpler and less expert oriented methods are being developed.

With life cycle based management, the company continuously develops cleaner products. This development should take place both in co-operation with employees internally in all departments and in co-operation with the surroundings in the product chain and the networks. To promote implementation of life cycle based environmental management; demands for product focus should be incorporated strongly in EMAS and in 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 shall consider both direct and indirect environmental aspect of its activities, products and services” (European Parliament, 2000, annex VI, 6.1). In annex VI the direct and indirect environmental aspect an organisation shall consider 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). These demands can be viewed as the first step to companies’ implementation of life cycle based environmental management in a future perspective.

5. Integrated life cycle management

If to a greater extent, the companies should contribute to a more sustainable development, they should move towards sustainable management. In order to achieve this, besides environmental management systems and life cycle based environmental management, the company should also integrate other relevant issues, such as quality, occupational health and safety and social

responsibility in their management system. Today, the existing standards within these areas primarily point at the internal activities of the company. Though as mentioned earlier, the revised ISO 9001 standard has an increased customer focus demand. For quality, occupational health and safety and social responsibility as for environmental management systems, it is not sufficient, only to focus on the companies' own production. The companies must also work with these issues in a life cycle perspective, illustrated as step 3b (Figure 1) for life cycle based management, with the purpose of working towards sustainable management, where economy, environment and social responsibility are included. With focus on, for instance, occupational health and safety in a company producing chairs, the company should both work towards reducing occupational health and safety problems at the suppliers, during the production of chairs and by disposal. At the same time, the company must focus on developing chairs, which are ergonomically correct, in order for people to sit comfortable in the chairs.

At first, most companies are likely, primarily to focus on their own production, in order firstly "to set their own house in order" illustrated as step 2b in Figure 1. Later focus can be extended to the entire production chain illustrated by 3b. By doing this, the company can create a good basis for working with the concept of sustainability at company level.

An integrated life cycle based management system (3a and 3b in Figure 1) and reporting are important steps at company level, in connection with the three elements of sustainable development. This is in relation to the companies' recognition of their roles and responsibilities, contributing to a more sustainable development and working towards that. Each step towards sustainable management, illustrated in Figure 1 can be viewed as a process, through which companies may change attitudes towards themselves and their surroundings.

The companies should try to move up the steps towards sustainable management – but they cannot necessarily do this by themselves. There is a risk that a number of companies stay at step 2 and do not move up to step 3, in situations, for instance, where there is a lack of a green market. The reason for this is lack of sufficient incentives for the companies to move up to step 3. Therefore, a successful green policy for trade would be necessary, in order to create sufficient demands for greener products from customers and consumers.

6. Change of life styles and needs

It is not sufficient to implement cleaner production and create cleaner products, in order to achieve a more sustainable development. Changes towards a more sustainable management in industry also demand changes in the organisation of society, where life styles and needs change as illustrated in Figure 1. Røpke has listed seven strategies for environmental improvements, arranged according to their different levels of radicality from least to most extensive solutions, illustrated in Figure 4 (Røpke, 1991).

Strategy	Level (where is changed)	Content (what is changed)
Filter strategy	1. Clean-up after Production and Use	Treatment of smoke, waste water etc. Combustion and deposition.
Cleaner Production	2. Process	Limitation of emission from a certain process by technological changes with out affecting of the product.
	3. Part of Product	Limitation of emissions from process or from pollution of product use/disposal through smaller product changes, for instance material substitution.
	4. Product Elaboration	Radical changes of the products elaboration which influence the functional characteritics.
Cleaner Needs	5. Type of Product	The certain need is fulfilled with an other type of product than before.
	6. Part of Structure	Smaller changes in organisation of society, resulting in change of character of needs with out changing traditional life styles.
	7. Structure of Society	More radical changes in organisation of society, where life style and needs change.

Figure 4. Strategies for environmental improvements - arranged according to increasing degree of radicality (Røpke, 1991).

Industry can contribute to a more sustainable development through limitation of their environmental impacts by filter strategies and cleaner technologies, illustrated by level 1 to 4 and by level 5, where a certain need is fulfilled with another type of product than before (Figure 4). Implementation of environmental management systems, life cycle assessments and industrial symbiosis is methods, which the industry can use; in order to decrease environmental impacts from processes and products and to formulate more long termed environmental strategies. The industries' use of these methods is an important step towards reducing and closing the open material cycles and towards a more sustainable development. The strategies used in Denmark today are assessed to include level 1 to 4 in Figure 4. The way towards a more sustainable development, beside pollution prevention and cleaner technology, includes also more radical changes of the organisation of society, where life styles and needs must change. The strategies of cleaner needs, illustrated as level 5 to 7 in Figure 4, will demand radical changes of behaviour and attitudes in both industries, by the individual consumer and by the politicians.

“Fulfilment of the overall aim - a sustainable production that does not threaten the biosphere/ecosystem and the conditions for future generations - depend on a radical change- of our ways of production and consumption. It will include radical changes of the industrial production systems, phase out of processes, products, - yes whole industries. The problem is, how and to what

extent this change can be carried through.” (Søndergård et al., 1997, p. 293, translated from Danish).

In the book “Beyond Limits to Growth” the writers believe that it is possible and necessary to make corrections and that it will lead to a preferred, content, justified and sustainable future. And if no corrections are made, certainly some kind of collapse will occur in the lifetime of the present generation. Even though, the writers believe that there should be limits to growth, they also stress that no limits are necessary for the *development*. It is a challenge, how to create a society, which is materially sufficient, a more human contention than the growth obsessed society, which we know from today. (Meadows et. al, 1992). However, overproduction and over consummation seems to continue in the industrialised countries. A sustainable development in a global perspective demands that the most wealthy countries adapt their lifestyles within the possibilities of the ecology of the world (Brundtland Commission, 1987). Though level 6 and 7 in Figure 4 provide for changes in the organisation and the society, apparently only a limited interest exists, for radical changes in our lifestyles today (Meadows et. al, 1992). *“It seems evident that the planet could not sustain the globalisation of a western consumer lifestyle, but governments are less willing to accept that there must be a limit to material consumption.”* (Welford, 1995, p.15).

Sustainable management as illustrated in Figure 1, can be defined as life cycle based management with a value basis building on a balance between economy, environment and social responsibility. It is not likely to be the case over time that most companies by themselves implement a more sustainable management. Industry will need strong incentives for this, for which the society should be responsible. For life cycle based management as well as for environmental management systems, the companies still have the opportunity to achieve competitive advantages or internal advantages, such as savings through resource reductions. If changes regarding life styles and needs occur at society level, a consequence could be a decrease in the buying of products, because customers would have reduced needs, and because the products would last longer. A result of this would be less production, which would not necessarily be an advantage for the specific company. Therefore, the step from life cycle based management to changes at society level would include difficulties. This is due to the fact that it could mean great economical expenses for the individual company.

The companies’ environmental activities and the work with life cycle based management, together with changes in attitudes of the society would perhaps create fundamental changes of the value basis of the companies. An example could be a company who produces different kinds of chemicals. Could this company create sustainable management? It is likely to, yes, but only if a number of products are taken out of production and if the company places specific demands regarding amounts and use of other products. Such policies and actions would demand fundamental changes of the companies’ basic values, where economic growth is not wanted, if it has negative influences on environmental or social conditions, causing the company not to be sustainable. One example could be the Danish company Grundfos’ mission, vision and company values which are finalised with the following quotation: *“A high profit level is a means to the group’s continued existence and development - not a goal in itself”* (Grundfos, 1998).

7. Conclusion

Industry and sustainability have growing attention. The concept of sustainability is becoming more operational at company level, where as the concept earlier primarily was discussed at international

and national level. In this paper a model for developing the concept of environmental management systems towards sustainable management in industry has been presented and discussed. It is argued that companies with an environmental management system should extend it with life cycle based environmental management with focus on the entire product chain in order to take the next step towards a more sustainable management. Management for sustainability in industry should also include quality, occupational health and safety and social accountability in an integrated management system and these areas should also be considered in a life cycle perspective (integrated life cycle management).

However dealing with an integrated management system is complex and there is a need for synergy between the different areas in order to create a dynamic and well functioning system. Integration of the standards also demand different types of organisational changes: integration of the actual management systems, co-operation with stakeholders and other networks and creating a more learning organisation.

At international level still relatively few companies have an environmental management system according to EMAS or ISO 14001. Internationally the number of ISO 14001 certificates makes up for only 6% of the number of ISO 9000 certificates. This is an example of the big potential for reducing environmental impacts systematically in industry. Among the companies today with an environmental management system only few focus on the products environmental impacts in a life cycle perspective and work seriously with life cycle based environmental management. Today also only few companies have included environment, quality, occupational health and safety and social accountability in an integrated management system and only few conduct sustainable reporting.

There is a risk that a number of companies make an integrated management system but do not move on to deal with the life cycle perspective because of lack of sufficient incentives. Moving industry towards sustainable management, green policies and demands for greener product must be created by changes in the organisation of society and change of life styles and needs.

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