

## Diffusion Channels of Environmental Management Standards

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### Abstract

*The last decade of the 20<sup>th</sup> century witnessed rapid growth in the adoption of ISO 14000 standard series for Environmental Management Systems within organizations. In 2002, approximately 50.000 firms have adopted ISO 14001 in 110 countries, however the level of diffusion and implementing of this Environmental Management Standard (EMS) differs greatly across these states. Such factors as economic integration of Europe, technical and technological evolution, increasing of quality und environmental requirements have combined to produce this trend.*

*This paper analyses the variety of diffusion channels of EMSs such as governmental (GOs), non-governmental (NGOs), intergovernmental (IGOs) organizations and industry associations (IAs) and puts the main emphasis on the contradictory role of Transnational Corporations (TNCs) as one of the main agents and drivers of complex economic and social processes of diffusion of environmental management practices and techniques throughout the world.*

### Introduction

The PhD-Research-Project “Environmental Management Standards – Development, Diffusion, Implementation and Impact”, which is undertaken at the Department of Business Administration 1 of the University of Heidelberg under the supervision of Professor Dietfried Günter Liesegang and supported through the scholarship of the German Federal State Baden-Württemberg, will investigate mechanisms of development and channels of diffusion of EMSs in Bulgaria, the Czech Republic, Germany and Poland as well as analyse various aspects of their implementation and their environmental, economic and social impact.

The empirical part of this project will focus on the cement industry as an energy and emissions intensive industry with a homogeneous, standard, low cost and heavy product and particularly on the introduction of the Environmental Management Standard (EMS) at the cement plants of the largest European transnational cement corporation HeidelbergCement Group in Bulgaria, the Czech Republic, Germany and Poland.<sup>1</sup>

The PhD-Research-Project is to have an informative purpose for the improvement of current development of EMSs and for the increasing of their efficiency on a national and international scale and will be a contribution to the research field of Corporate Sustainability, Environmental Management Systems and Environmental Risk Management.

This paper highlights various general approaches to the current issues of EMSs diffusion at national and international scale and points out ways for further more specialized studies.

## Principles of Environmental Management and Environmental Management System

The concept of environmental management systems has been used in research and practice since the 1970s, but only in the early 1990s a small number of national standard setting bodies and first and foremost the British Standards Institution began working on developing international standards for environment management systems.

## Principles of the ISO 14000 Family of Standards

The formation of the ISO's Technical Committee 207 on Environmental Management in 1993 was a result of a sequence of activities of the UN, the ISO and the IEC<sup>2</sup> leading to a coordinated world response to common environmental challenges and contributing to the goal of sustainable development.

The ISO 14000 family of EMSs, according to the present plan, comprises 23 individual standards, guidelines, technical reports (TR), technical specifications (TS) and committee drafts (CD) related to environmental management in a company's environmental management system. Consequently, they cover all areas of environmental significance: Environmental Management Systems<sup>3</sup>; Environmental Auditing<sup>4</sup>; Environmental Labelling<sup>5</sup>; Environmental Performance Evaluation<sup>6</sup>; Life Cycle Assessment<sup>7</sup>; Environmental Management Vocabulary<sup>8</sup>; Environmental Aspects in Product Standards<sup>9</sup>.

The ISO 14000 series are intended for use as a voluntary, internal management tools and are not intended for use by Environmental Management System certification/registration bodies as a specification standards. The only standard in the series to which an enterprise can formally certify is ISO 14001.

## Principles of the ISO 14001 Standard

The ISO 14001 standard is the 'core' of the 14000 series, as it outlines the criteria for implementing an environmental management system. The 14001 EMS formula can be summarised in eight steps (ISO 14001:1996, clause 4):

- a commitment by top management to define the organization's environmental policy and implement the environmental management system;
- the establishment of a procedure by which all aspects of the organization's activities which have, or can be expected to have, environmental impact are identified and documented;
- the establishment of an effective procedure by which all relevant legal and regulatory requirements are identified, and a commitment to comply with them;
- this also involves a commitment to comply with any non-regulatory guidelines to which the organization voluntarily subscribes;
- the identification of environmental objectives and targets, quantified where practicable, which effectively address each of the following: the overall environmental policy, the organization's environmental impacts, and the organization's legal and regulatory requirements;
- the development of a procedure to monitor performance against the objectives and targets, and to channel this information back into the environmental management system;
- creation of a work plan (subject to financial constraints) through which all objectives and targets are to be achieved; this work plan may consider changes in production processes, product design and services provided, employee training, communication of results, evaluation of performance indicators and documentation of the above;
- a regular management review which addresses the possible need for changes to policy, objectives and other elements of the environmental management system, in light of

environmental management system audit results, changing circumstances and the commitment to continual improvement; including also, scheduled audits of the entire management system;

- a commitment to continual improvement and the prevention of pollution.

Depending on the industry, market and domestic context, the certification of an environmental management system may be useful to some organizations but not to others. The 14001 standard has been drafted in such a way that conformance to it can be assessed by the organization itself (for self-declaration purposes), by interested parties (second-party verification by a client or affiliated company), or by a registered auditing company (third-party independent certification) (Rotherham 1999).

The standard does not impose common performance requirements on the companies implementing it, whether they choose to seek certification or not. This fact is clearly stated in the introduction to the standard: "It should be noted that this International Standard does not establish absolute requirements for environmental performance beyond commitment, in the policy, to compliance with applicable legislation and regulations and to continual improvement". (ISO 14001:1996, Introduction). Consequently its usage does not guarantee that an enterprise will pollute less or meet national environmental requirements. Thus, two organizations carrying out similar activities but having different environmental performance may both comply with its requirements. That means that it is impossible to compare environmental performance of two different ISO 14001 certified firms only on the basis of their certifications.

## Diffusion Channels of EMS

From the introduction of the ISO 14001 in 1996 to the end of 2002, according to the ISO 14001-survey at least 50.000 organizations were regis-

tered in more than 110 countries as conforming to this standard, and registrations were increasing at well over 50% per year. The five leading countries are Japan, Germany, United Kingdom, Sweden, and the USA.

The principle idea of the ISO 14001 standard touches the vital public interest concerning the sustainable development and environmental issues and therefore its diffusion goes through so different channels and is supported through so various sources (Delmas 2002).

## Governmental Organizations (GOs)

From the GOs point of view, the ISO 14001 standard's main benefits are likely to be the commitment to comply with local environmental regulations and laws, the internalization of monitoring costs, and the breadth of the additional issues that are considered within the organization's corporate environmental policy. If complying with regulations can be made easier, and if voluntary guideline programs can obviate the need for some additional legislation, then the often adversarial relationship between environmental regulators and industry groups may also be reduced.

Due to these perceived benefits there have been a variety of initiatives of GOs regarding ISO 14001 and the 14000 series.

## Promotion of EMS through GOs

The EU Eco-Management and Audit Scheme (EMAS) is a management tool for companies and other organizations to evaluate, report and improve their environmental performance, that has been available for participation by companies (originally in industrial sectors) since 1995 (Council Regulation 1993). A large number of publications, report and discussions of all kind were devoted in the late 1990s to the various theoretical and practical problems of intercon-

nection between the 'governmental' EMAS and the 'private' ISO 14001 because the later due to its certain characteristics has become much more widely adopted than EMAS.<sup>10</sup> (Corbett & Kirsch 2001, Morrow & Rondinelli 2002). This "competition" was stopped in 2001 as the new edition of EMAS was open to all economic sectors including public and private services in the European Union and the European Economic Area (EEA) (Council Regulation 2001) and was strengthened by the integration of EN/ISO 14001 as the environmental management system component required by EMAS-II. Therefore the ISO 14001 standard is diffused now across the European countries simultaneously with the diffusion of EMAS-II. The latest study of German EMAS-validated facilities (Rennings et al. 2003) proved that EMAS does have a positive influence on environmental process and product innovations as well as on environmental organizational innovations. At the national level, many GOs have developed investment promotion programs and policies to encourage and to support sustainable private sector initiatives in the area of international trade, foreign direct investment and EMAS-II (=ISO 14001) registration. Firms that accord with the EMAS-II (=ISO 14001) enjoy certain competitive advantages, including lower liability insurance, less regulatory oversight, and increased access to customers (including the public sector) that care about their own environmental reputation.

### **Diffusion of EMS within GOs**

After the European Commission, the Committee of the Regions together with the Economic and Social Committee and the European Parliament, it is now the European Environment Agency based in Copenhagen that has decided to implement an environmental management system according to EMAS II.

In April 2000, then-President Bill Clinton issued Executive Order 13148 titled, "Greening the

Government through Leadership in Environmental Management." The order was meant to ensure that government agencies implement environmentally sound practices and firstly the ISO 14001 standard. During his first year in office, President George W. Bush re-confirmed EO 13148 as a national priority for government agencies. The EO requires that each federal agency implement an environmental management system at all appropriate agency facilities by no later than December 2005. As a result, some military organizations proceeded with ISO 14001 registrations at individual bases: the Department of Defense, the Air Force, the Coast Guard, the Marine Corps, the Air National Guard and the U.S. Navy.

### **Intergovernmental organizations (IGOs)**

Such IGOs as FAO, WWF, OECD, UNEP, UNESCO, European Environment Agency developed a special programs to support its members with information on the current development of EMS and to encourage them to being pro-active in their national environmental policies. The IGOs worked a number of principles and recommendations for business and industry related to environmental management and performance: 16 principles of the International Chamber of Commerce Business Charter for Sustainable Development, endorsed by more than 2,000 companies, assist enterprises in developing their own environmental policies. The same goal pursue the European Scientific Research Center (CERES) Principles, endorsed by 46 companies.

At the international level, initiatives have also been taken by such multilateral financial institutions as the World Bank, which imposes certain environmental standards on the investment projects it considers for support and assesses the environmental impact of projects considered environmentally sensitive. The International

Finance Corporation has adopted environmental and social safeguard policies as well, in July 1998. A 1997 UNCTAD expert meeting, that coordinates and cooperates its activities with ISO (DEVCO), ITC (UNCTAD/WTO) and UNIDO, concluded that pressures on developing country suppliers to demonstrate ISO 14001 certification could result in barriers to trade and/or detract from the environmental objectives of setting up an environmental management system. Companies in developed countries should establish supportive cooperation with their suppliers in developing countries in the area of environmental management system's implementation, the experts concluded, adding that TNCs could play an important role in that regard.<sup>11</sup>

In cooperation with the Government of the Netherlands UNCTAD conducts country projects on strengthening capacities for trade and environmental policy co-ordination in India and Vietnam, which encompass a number of studies on the implications of the ISO 14001 standard for continued market access and improved environment performance.

The decision to promote ISO 14001 was taken in July 1996 by the environment ministers of the then 18 (now days 21) member economies of the Asia-Pacific Economic Cooperation (APEC) Forum.

### **Non-governmental Organizations (NGOs)**

Over the years environment and development NGOs such as the Greenpeace, Friend of the Earth, Eco Net and the others have played a central role, both nationally and internationally, in raising public awareness of environmental issues. After the adoption of the first ISO 14000 standards many activist organizations became increasingly concerned over both the content of the standards and the process by which they

were developed. In 1997, the U.S. EPA commissioned a report on participation in the TC 207. At the same time, two activist groups, ECOLOGIA and the Community Nutrition Institute, launched a project titled "NGO Initiative: ISO 14000" to stimulate debate over these standards and to increase NGO representations on the U.S. Technical Advisory Group. 1998 ISO TC 207 issued a resolution to form an NGO Contact Group in order to investigate concerns expressed by the NGOs. In 2000, TC 207 established an NGO Task Group, which provides advice and assistance to those NGOs who seek to participate or who would like additional information on the EMS-issues (Guide 2002).

### **Industry Associations (IAs)**

The ISO 14001 standard includes a commitment to comply with other requirements to which the organization subscribes (ISO 14001:1996, § 4.3.2). These 'other requirements' can be guidelines of industry associations, voluntary codes of conduct and standards which often apply to specific industries (chemical, pharmaceutical, etc). Subscription to 'other requirements' may be quasi-mandatory, such as internal company standards and industry association stewardship programs. Although most of these codes include substantial commitments that go beyond local law, they generally do not provide a verification mechanism, leaving compliance assessment up to the individual organization. ISO 14001, by requiring a company to address these principles and to undergo scheduled third-party audits in order to become certified, can be used as a verification mechanism for these more far reaching commitments.

Nevertheless many companies were willing to abandon their membership in the industry comprehensive codes of practice for ISO 14001. The chemical industry associations who maintain Responsible Care® in country after country

dealt with the ‘threat’ of ISO 14001 hegemony in different ways. Canadian chemical firms realized that gaining ISO 14001 certification would not take any more effort than they were already expending in their rigorous certification process, and quickly dismissed the “threat.” They kept Responsible Care® and began the process of ISO 14001 certification. In the United States, however, the American Chemistry Council asked the automakers for reciprocity for firms that had been verified through their MSV (management system verification) process. Unlike the ISO 14001 audit requirement, the US chemical industry’s MSV is not repeated, it includes trained industry peers instead of independent auditors, and it is company-wide instead of facility-based (King & Lennox 2000; Prakash 2000a, 2000b; Sissell 2001). When the automakers rejected this request, the ACC began work – similar as the European Council with EMAS - on a ‘hybrid’ Responsible Care®/ISO 14001 certification process. The hybrid RC 14001 contains the best of both programs, and in such a way ISO 14001 does not destroy Responsible Care® through competition, but improve its potential to deliver environmental protection and democratic processes (Green 2002).

## Transnational Corporations (TNCs)

A transnational corporation (TNC) is defined as a firm having productive activities in two or more countries. TNCs play an important politic-economic-environmental role within the emerging global economy due to their vast corporate networks and technological resources and the international consequences of their decision-making. The main research question regarding the role of TNCs in the diffusion processes of EMS is whether TNCs are contributing in a direct or indirect way positively to, or on the contrary undermining, the environmental performance and sustainable development of host

developing countries. On the one hand, there is some evidence that TNCs have relocated polluting industries and transferred obsolete technologies to developing countries making the so-called “industry flight”. On the other hand, TNCs have the potential to promote sustainable development by facilitating the transfer of environmentally sound technologies and efficient environmental management practices such as the ISO 14001 standard and to share these practices with partners, suppliers, customers, and even regulators.

## Cross Border Environmental Management

Cross border environmental management is defined as the management procedures, organizations and practices – such as the ISO 14001 standard - instituted by corporate headquarters to ensure the quality of environmental work at foreign affiliates.

Increasing numbers of TNCs are making commitments to certify all their facilities to ISO 14001. This top-down initiative becomes then one of the main corporate strategic policy goals presented to public in international environmental reports. In 1998, Ford became the first automaker to certify all of its 140 manufacturing plants under the ISO 14001. The same policy can be observed at 3M, ABB, Adtranz, Alstom Transporte SA (Spain), Arcelik AS (Turkey), Baxter International, BMW, Compaq, Coca-Cola, Dana Corporation, Delphi Automotive Systems, DENSO Corporation, Deutsche Telekom AG, Electrolux, Heidelberger Druckmaschinen (Germany), HeidelbergCement Group (Germany), Honda, IBM, Jabil Circuit ST (USA), Kodak, Lear Corporation, Matsushita – Panasonic, Murata Electronics, Manufacturing Ltd (Japan), NEC, NESTE, Oki Electric Industry Co. (Japan), Panasonic (Japan), Philips, PowerGen (UK), STMicroelectronic, Stora Fine

Piper, TNT UK express delivery, Toyota, Vodafone and many others.

The diffusion of the ISO 14001 standard across all subsidiaries and affiliates of a TNC, at home and abroad, allows it – due to the generic characteristics of the standard – to consolidate the environmental activities so as to operate with the same policies and the same general criteria throughout the whole corporation, although taking in consideration standards dependent on the technologies at a given facility and other peculiarities of production process and local conditions.

The international acceptance of ISO 14001 plays a pivotal role for TNCs as it hardly makes sense for a TNC with headquarters e.g. in Germany to make national standards uniform for the whole corporation as a large amount of this company's turnover is outside Germany. Instead this TNC focuses readily on the international EMS. However, to implement ISO 14001 in a credible manner corporation-wide requires elaborate control procedures, enabling headquarters to ensure compliance with internal company standards (Evangelinos & Halkos 2002). Such control procedures could be standardized reporting between headquarters and the affiliate, on-site assessments, auditing, or formalized allocation of responsibilities for environmental matters between headquarters and the affiliate. International studies of cross border environmental controls in TNCs have indicated that most TNCs have quite elaborate procedures for controlling environmental conditions at foreign affiliates. A study by the United Nations of cross border environmental management in 169 of the world's largest TNCs found that 2/3 of all TNCs conduct environmental audits of foreign affiliates, that around 50% of the respondents have environmental monitoring procedures in place in relation to affiliates in developing countries, and that 45% have a formal allocation of

environmental responsibilities with foreign affiliates (UNCTAD 1993).

Through training and information exchange as part of headquarters control efforts the ISO 14001 statements and philosophy are conveyed to employees throughout the corporation. Thereby, environmental management at affiliates becomes more aligned with headquarters objectives related to corporate environmental management standards.

### Drivers of cross border environmental management

The motives for adopting cross border environmental management on the base of the ISO 14001 standard by TNCs can be expected to be substantially different from the motives behind the ISO 14001 certification of a SME without export activities. The motives of TNCs can be consolidated into six categories:

1. *A sense of moral obligation.* From a moral perspective it could be argued that there should be no substantial difference between the way a company manage environmental matters at an emerging economy affiliate and at an OECD production site (Rondinelli & Berry 2000).
2. *Building good relations with host country authorities.* TNCs implement environmental management standards in order to maintain good relations with authorities in the host country. Such policy positions the company in the developing countries among the environmental pioneers and give the company 'prestige'. Local authorities and local partners want usually to be involved with a western company meeting "western environmental management standards". Finally after having implemented ISO 14001 in the locations it is much harder for the local authorities and NGOs to put pressure on TNCs and place them in a dependency relationship.
3. *Anticipating future regulations and national standards.* Regulatory demands and national

standard setting processes in several emerging economies will in due course approach international – and firstly EU – standards. In particular the East European countries candidating to become EU members next year enforce on the one hand environmental regulations in an increasingly vigorous manner, especially air emission standards, and on the other focus on the standard setting activities such as translation of the international standards and their adoption as a national norm. Local authorities and NGOs of the developing countries being aware of ‘industry flight’-policy of TNCs keep much more stringent regulations and conditions especially toward foreign corporations. The ISO-14001 certification can be one of the market access conditions for TNCs and if they have adopted this standard as a corporate-wide one earlier, they enter the process of corporate certification later.

4. *Technology bundling.* A pivotal factor explaining the diffusion of the ISO 14001 standard throughout some TNCs worldwide, is that these companies “simply cannot do otherwise”. Often, the environmental management of emerging economy plant will be designed or redesigned according to the corporate standards.
5. *Economies of scale.* There is a strong incentive for larger TNCs operating in numerous locations, to seek a higher degree of coherence in the rules and regulations applying to the company world-wide. This is typically done by internalizing environmental controls and adopting company wide standards. Previous studies of cross border environmental management has clearly indicated that the scope and content of cross border environmental management is a function of the size of the company (UNCTAD 1993; Rappaport et al. 1991). Large TNCs have the financial, technological and managerial resources to organize environmental management internationally and they might experience significant scale advantages from operating with a unified system worldwide.
6. *Market strategy.* In the above examples, cross border environmental management stan-

dards were rather defensive and reactive. But in some cases, cross border environmental management is intended to strengthen the competitive position of the company. Environmental leadership in international operations is for some companies a way of gaining competitive advantages, getting ahead of competitors and increase profits. In this situation it is essential for TNC to have comprehensive environmental policies and programs in place. The corporate-wide ISO 14001 certification program as well as the usage of the environmental profile and high environmental performance becomes therefore an integral part of TNC’s marketing toward the public and consumers.

### **Barriers to cross border environmental management**

A diffusion of EMS through cross border environmental management system works smoothly usually in relation to affiliates located in developed countries. A host of specific problems appears, when a TNC implements environmental management standard at affiliates located in emerging economies. The barriers can be consolidated into three categories:

1. Inadequate environmental regulations.
2. Lack of infrastructure
3. Lack of trained personnel

### **Supply Chain Environmental Management**

Another issue of importance is how TNCs manage the diffusion of the ISO 14001 standard beyond their own company limits. The debate over corporate accountability has recently centered on the question: to what point in the supply chain (subsidiaries, major suppliers, contractors etc.) are TNCs responsible for environmental protection (Sarkis 2001). Some firms, like Unilever, “acknowledge the idea of extended responsibility...we share with other stakeholders in our supply chains an interest in ensuring that

we have a sound economic base, a healthy environment, and flourishing communities” (Weir 2000). The relationship of TNCs to their local suppliers and subcontractors with respect to the diffusion of EMS is an essential factor in helping developing countries to achieve sustainable development. A number of procedures and practices are used by TNCs that have some kind of ‘green’ procurement policies to manage the supply chain, such as questionnaires, on-site audits and screening (UNCTAD 1999; Walton & Handfield 1998).

TNCs have several reasons, to undertake a regularly “green” screening of their subcontractors and suppliers. First, some of TNCs apply life-cycle perspectives on their environmental impacts and environmental co-operation with subcontractors and suppliers is an integral part of such perspectives. Second, various commitments made by TNCs require them to screen environmental conditions at suppliers and subcontractors. For instance the Business Charter for Sustainable Development encourages subscribers to co-operate with suppliers on improving environmental conditions and companies adopting EMAS commit themselves to survey environmental conditions at suppliers and subcontractors. Third, several TNCs feared that an environmentally dubious record of a supplier or subcontractor could reflect badly on their image. This reason was emphasized by a large TNC with infrastructure operations. Normally, the results of an environmental screening will not cause TNCs to find another supplier or subcontractor as it is a matter of “co-operation not cohesion” that purpose is to provide services and guidance not to “cut off suppliers”. TNCs provide technical assistance and consulting services by their affiliates to local suppliers encouraging them to seek ISO 14001 certification or to apply environmental management practices which are similar to those of the TNC. Nevertheless there are TNCs that have fired subcon-

tractors in emerging economies because of poor environmental performance, what means, that the real performance of a firm is much more pivotal for a TNCs as its EMS, that not always can serve as a precondition of a sound environmental performance.

The long term goal for TNCs is to exercise control with environmental conditions at suppliers and subcontractors and to hire only those of them with a certified environmental management system. In such a way the presence of the ISO 14001 certification is increasingly a precondition for getting contracts for local companies working in emerging economies as subcontractors of TNCs. In April 1998, IBM's Global Procurement Department sent a letter to over 900 suppliers encouraging each to align their EMS with ISO 14001 and to pursue registration. In 1999 Toyota has created environmental procurement guidelines for its 450 overseas and domestic suppliers and is urging all its suppliers to gain ISO 14001 certification by December 2003 and to issue annual progress reports. In November 1999, Ford Motor Company announced that it would require all of its suppliers - over 5000 manufacturing facilities world-wide - to meet the international environmental standard by the end of July 2003. Following TNCs have undertaken the same steps towards establishing the initially voluntary ISO 14001 certification as a new market condition for doing business (in a manner similar to the development of ISO 9000 quality management standards), what however could have both positive or negative effects on trade: Apple Computers, China Light and Power – CLP (HongKong), Ciba-Geigy, Daimler-Crysler, General Motors, Jaguar (UK), LG Semicon (Korea), NEC+Nissan+Canon, Nokia, Rover (UK), Shell UK Exploration and Production, Siemens, Skanska Sweden, Volvo (France/Sweden) and some others.

## Conclusion

This paper explicitly analyzed the content and the current development of international environmental management standards by showing, how these management principles are diffused worldwide through various governmental, inter-governmental, non-governmental and corporate channels, hence lending support to the view that EMS can indeed be exported through the activities of transnational corporations in emerging economies. Unlike the 9000 series of standards that deal with customer needs, the 14000 series address the needs of a broad range of interested parties and evolve needs of society for the protection of the environment, what explains the active commitment of GOs, IGOs, NGOs and enterprises to the diffusion of environmental management standards and practices.

This essay assumed that the ISO 14001 certification is a necessary, but not a sufficient condition for a better environmental performance. Conse-

quently the real impact of the adoption of the ISO 14001 standard can be shown up not through the progress in environmental performance such as air emission or solid waste reduction, what may be of a short duration, but through the amount of investments on the environmental issues. Only in such a way management of a company can contribute to the long-term protection of the environment and provide the corporate environmental policy with soundness and sustainability.

Detailed investigation of the conditions of development, diffusion, implementation and impact of the international environmental management standards in Germany and in Eastern Europe with a focus on the cement industry and the activities of TNC HeidelbergCement Group by the transmitting of the corporate environmental management principles will be the next research steps of the current PhD-Project.

## Notes

<sup>1</sup> This part of the PhD-Project emerges from a collaborative endeavor with Dr. Bernd Haegermann, Head of Department Environment (HeidelbergCement Technology Center), and Victoria Hellstroem, Manager for Environmental Affairs (HeidelbergCement Central Europe East), Heidelberg, Germany.

<sup>2</sup> International Electrotechnical Commission (IEC)

<sup>3</sup> ISO 14001:1996; ISO/CD 14001:2001; ISO 14004:1996; ISO/CD 14004:2001; ISO/TR 14061:1998; ISO 14063:2002.

<sup>4</sup> ISO 14015:2001; ISO 19011:2002.

<sup>5</sup> ISO 14020:2000; ISO 14021:1999; ISO 14024:1999; ISO/TR 14025:2000.

<sup>6</sup> ISO 14031:1999; ISO/TR 14032:1999.

<sup>7</sup> ISO 14040:1997; ISO 14041:1998; ISO 14042:2000; ISO 14043:2000; ISO/TR 14047:2001; ISO/TS 14048:2002; ISO/TR 14049:2000.

<sup>8</sup> ISO 14050:2002.

<sup>9</sup> ISO/TR 14062:2002; ISO 14064:2002; ISO Guide 64:1997.

<sup>10</sup> As Krut and Gleckman explain, the first edition of EMAS was more rigorous than ISO 14001, "In process and in content, the differences between the two standards lie precisely in the areas crucial to sustainable development: public access to information, legal environmental proceedings, assurances of

regulatory compliance, and environmental performance assurances and improvements. . . EMAS is a standard of excellence. . . ISO is a method of standardization” (1998: 16).

- <sup>11</sup> Trade and Development Board. Commission on Trade in Goods and Services, and Commodities. Expert Meeting on Trade and Investment Impacts of Environmental Management Standards, particularly the ISO 14000 series, on Developing Countries, Geneva, 29-31 October 1997. TD/B/COM.1/10; TD/B/COM.1/EM.4/2; TD/B/COM.1/EM.4/3.

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