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The Impacts of Corporate Environmental Management Systems - A Comparison between EMAS and ISO 14001**

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Abstract:

The authors present and discuss the results of empirical research on the implementation of standardised environmental management systems in companies. As there are basically two competing standards – the European Eco-management and Audit Scheme (EMAS) and the worldwide ISO 14001 – the focus of the paper is on potential different and common features of the corporate implementation, experiences and impacts.

Although the methodical approaches of the empirical research projects differ to a great extent, their results are quite similar: the experiences of companies with environmental management systems do not really differ with respect to the formal standards underlying them but to the corporate culture and the strategic importance environmental orientation has for the company. There are some more or less important differences in the formal demands of the two standards (e. g. the duty to publish an environmental report within EMAS but not within ISO 14001), but these differences do not really lead to different corporate practices. The widespread opinion – especially in Austria and Germany - that EMAS leads to ‘star performance’ in environmental management cannot be confirmed by empirical findings.

In addition to these results this paper points out the occurring problems of empirical research in the field of environmental management. Many of the given statements by the corporate actors cannot be verified by researchers and therefore have to be handled carefully. This leads to the proposition that companies have to evaluate their grade of sustainability themselves and should publish the results to make it possible for the stakeholders to make a comparison. The main task for the scientific community then would be to develop the necessary indicators, benchmarks, standards and so on to help the companies.

Two competing environmental management system standards

Within recent years many companies all over the world have installed standardised environmental management systems (EMSs) in order to systematically manage the environmental effects of the companies' activities. There are basically two relevant systems: EMAS (Eco-management and Audit Scheme, the European Union [EU] standard, and a state run system) and ISO 14001 (the worldwide EMS-standard, privately run by the International Organization for Standardization [ISO]). Several empirical studies have tried to find out how the implementation of one of those systems influences environmental performance and the costs and benefits in companies.

Since most of this research took place in German speaking countries, the results have not yet been published in English. In this paper we try to give a short overview of the results and a comparison of experiences with EMAS and ISO 14001. Both EMAS and ISO 14001 are formalised EMS standards that compete to gain the favour of companies and organisations – at least in the EU. Because EMAS was established by the EU and is furthermore, provided with the force of law, it is considered to be more significant. ISO 14001 is just an industrial standard but, as part of the ISO management standard 'family', it is very well known by potential users. Participation is voluntary, and both systems do not substitute national environmental law. The development, especially of EMAS, was motivated by the idea that the pressure of competition would encourage a large number of companies to participate, even if their previous voluntary environmental care was rather small.

Both standards represent a new approach to corporate environmental care. They do not focus on results of actions in form of material objectives and limits but on setting up organisational structures and managerial processes and subject these to continual control. To comply with these requirements corporate actors are no longer allowed just to obey the rules. Rather, they have to develop and make use of different abilities such as formulating environmental objectives and implementing organisational structures and processes as well as measuring achievements. This engagement is rewarded with a certificate that shows to the public the corporate environmental commitment. In the case of EMAS the certificate is combined with the right to use the EMAS-logo in corporate advertising (but not in product advertising).

In the core of the EMS, the structure of the management system, ISO 14001 and EMAS were quite similar at the time the studies described herein were carried out. Both systems include specific organisational measures to avoid pollution and damage to the environment and aim to improve the environmental performance of a company. They force participating companies not only to implement particular measures (such as an environmental policy, aims and programme) but also to carry out periodical internal checks and external audits by independent auditors.

If we look at both standards in detail, there are some differences (for a detailed comparison of all the important aspects of both systems, see BMU/UBA 2000:28-34). EMAS is, above all, a supranational instrument of environmental policy that aims to stimulate the rather deadlocked and Europe-wide differently developed environmental legislation by turning away from the former 'command and control'-concept, with its limited effects in implementing comprehensive environmental measures.

Whereas ISO 14001 is primarily an internal management tool used by companies to improve their systematics, legal security and innovative ability, EMAS places a further focus on external stakeholders. Companies participating in EMAS must publish an environmental statement to inform the public of their actions and progress. ISO 14001 does not include this duty.

The recent amendment of EMAS (EMAS II) defuses the rivalry between the two standards. ISO 14001 is now the management system required by EMAS. A company that has already installed an EMS based on ISO 14001 must accomplish some additional duties only (e.g. proof of complete legal compliance with national environmental laws, and publication of an environmental statement) to receive validation as an EMAS participant as well.

The Corporate self-control and the supervision by public and experts required by EMAS regulations are often considered to be a substitute for state control. Therefore, EMAS has frequently been misinterpreted as an instrument of deregulation of environmental laws. This is the main reason why several companies expected state support in return. In the case of ISO 14001, as a private standard, these expectations did not surface and, consequently, participation in this system does not require any public statement. Nevertheless, both standards are open in content. The users themselves and not the standards set the goals they aim to achieve with the aid of the established EMS. In Germany in particular it has been argued that EMAS is overall of greater validity than the ISO 14001 standard. However, this proposition can be evaluated only through an empirical study of practical experiences and not from the wording of the standards themselves.

Meanwhile, numerous empirical studies have been published on EMS. The majority refer to the EU as well as - more often - to German or other national practices. They are based mainly on the implementation of the first version of EMAS, sometimes in combination with ISO 14001. The results presented in this paper are essentially based on our own studies (in particular, FBU 1995; UNI/ASU 1997). We compared our results with a wide range of other empirical studies based on questionnaires and case studies (mainly Baum *et al.* 1996; BMU/UBA 2000; FEU 1998a-1998c; GCG 1995; Hartmann 1998; Höppner *et al.* 1998; Isaak and Keck 1997; Jäger *et al.* 1998; Klemisch 1997; Schnauber *et al.* 1994; Seidel and Weber 1998; UF/IHK Dortmund 1996; Wietschel und Rentz 1997). The results of these studies are, to a great extent, consistent.

Switzerland is the only country in Western Europe where, as a non-member of the EU, companies can implement EMSs only according to ISO 14001.

With most of the German studies concentrating on EMAS, and the additional problem that many eco-orientated companies in Germany participate in both systems, Switzerland is the country where we can gain knowledge of experiences purely with ISO 14001. A recently published study by Dyllick and Hamschmidt (2000; for a short overview in English, see Hamschmidt 2000), from St Gallen in Switzerland, offers the opportunity to compare results and to clarify questions regarding the value of each standard. Another look at ISO 14001 in practice in the form of collected worldwide case studies is provided by Hillary (2000).

The Spread of the Systems

It is not surprising that the ISO 14001 standard attracted more participants, even though it came into force a year later than EMAS. After all, it is valid worldwide. More significant than the absolute numbers are the relative changes. In the last two years the number of ISO 14001 participants rose from 13,440 in December 1999 to 40,970 in October 2001 - a growth rate of over 200%. In the same period, EMAS participation increased by only 23%, from 3,155 to 3,891 with numbers even falling of late. Although these figures show ten times more ISO 14001 participants than EMAS participants, a valid statement about the attractiveness of each standard is not possible because of the different area of validity (worldwide compared with EU only). Such a comparison is feasible only within the EU, where companies can choose between the two standards.

Analysing the data on participation in the EU, the preference for ISO 14001 becomes evident. In every EU-country, except Austria, ISO 14001 is preferred to EMAS. About two-thirds of the EMAS participants are located in Germany (either sites of German companies or international companies situated in Germany). It is difficult to explain why so many German sites take part in EMAS. One reason can certainly be seen in the government-financed programmes for participating companies that were offered especially in the early stages of the European EMAS implementation process. However, German companies are confronted with very strict environmental laws and therefore have to do significantly more in order to be validated than companies in other European countries, except Austria, where the situation is similar to that in Germany.

In relation to the different sizes of the EU member states we find the largest share of EMAS sites in Austria, followed by Germany and the Scandinavian countries. Apart from Germany and Austria, the ratio of ISO 14001 participants compared to EMAS participants is 5:1, or higher.

The study by Dyllick and Hamschmidt offers another interesting detail. They investigated the highly concentrated market for ISO 14001 certifications in Switzerland. The three major certified companies have an accumulated market share of 94% (Dyllick and Hamschmidt 2000:30). To our knowledge, comparable data of the corresponding market structures in Germany are not available, at least not publicly. It would be interesting to have more information on these conditions, because they are likely to influence the further development of validations and certifications as well as the costs.

Another insight into instructive background information on the global spread of EMS standards is provided by the BMU/UBA study. It deals with the acceptance of EMSs in different countries and cultures and shows the great influence of different national eco-political constellations on the uptake of such systems. Moreover, the importance of the varying cultural conditions of companies, law and the economy is evident in the results of this study (BMU/UBA 2000:103-109). Besides all superficial similarities of economic reality in different countries - which can be put down mainly to globalisation - the globalised economy and, accordingly, the environmental management remains rooted in national cultures. This explains at least partially the great differences in the propagation of EMS-standards.

At first Sight, the competition between EMAS und ISO 14001 seems to be decided: the world-wide spread of the industrial ISO standard has prevailed. It is questionable, whether the EMAS II amendment will be successful in winning back lost ground, especially since EMAS II has converged even closer to ISO 14001 instead of increasing the demands in order to position itself as the star performer it already claims to be.

There is a wide range of possible explanations for this actual situation that we do not aim to discuss in this paper. Instead, the focus lies on the impacts of each system. Only if EMAS really is the 'star performer' compared to ISO 14001, the prevalence of ISO 14001 is problematic from an ecological perspective. This question seems less relevant considering that the total number of eligible companies who implemented any EMS is less than 1%. However, it can be stated for Germany that EMS affect over 50% of all employees, because the larger companies participate to a greater extent than do the small or medium sized companies.

Experiences and impacts

To begin with the punchline: the available studies do not prove that there are any significant differences in the effects of EMSs depending on the different underlying standards. Apart from details, the observed differences of impacts between companies are not to be put down to the applied formal EMS standard. Rather, they result from those corporate political intentions that led to the implementation of the standard as well as from the corporate cultural conditions with

which the standards are confronted and more or less fit in. This conclusion results strongly from the substantial findings of the surveys to hand.

1.1 Ecological Impacts

Environmental management systems get implemented to improve corporate environmental care by detecting and removing ecological weak spots, either as a self-imposed aim or influenced by stakeholders. According to surveys on the motivation of companies, this is stated to be the main reason for establishing EMS (see e.g. Seidel and Weber 1998:24; UNI/ASU 1997:48). Therefore, the ecological impact is central to the question of whether there might be a difference in the effectiveness of various EMS standards.

At first, it is expected that the self-set eco-political aims in the context of EMSs should significantly improve the ecological performance of companies with formalised EMSs compared with those without. If EMAS really is of a greater value as a result of its sanctions arising from state-controlled validation, explicit orientation towards the public and the demand for documented ecological activities beyond compliance, EMAS companies should furthermore effect noticeably better results than companies certified only according to ISO 14001. However, this conclusion cannot be drawn from any of the results of the empirical studies. Neither has it been proven that companies with an implemented formalised standard show an ecological performance that is superior to those without any formalised EMS, nor do the studies point out that enterprises following EMAS aim for higher goals than those following ISO 14001 or another EMS-standard (see BMU/UBA 2000:34-36).

Early studies gave evidence that established structures – such as formal responsibilities, working and procedural instructions, periodical audits and detailed environmental manuals - resulted in strict formalism and clear documentation rather than in adaptable and innovative organisational structures and processes (see e.g. Freimann/ Schwaderlapp 1996). This is believed to be an inevitable symptom of EMAS (see Freimann 1997) and is evident in the empirical studies.

Conclusions drawn from subsequent empirical studies tend to confirm these early judgements. EMSs are primarily expert systems. Participation of the employees is considered to be very important by most of the respondents, but in practise actual participation by employees seems to be an exception rather than the rule. Participation of the works council is realised only in a small minority of companies. The established structures show predominantly only small differences from those requested by legal regulations. In consequence, EMAS does not improve the level of corporate environmental care to a greater extent than already achieved by obligatory liabilities.

It is the formal structure of EMAS itself, and not only the special German method of implementation, that enforces this phenomenon (in particular, see FEU 1998a; Hartmann 1998; Issak and Keck 1997). EMAS implementation requires systematic checks of all relevant corporate activities and a complete documentation of all formal measures installed. Compliance with these requirements must be proved to the accredited verifier and - by being forced to publish an environmental statement – even, partly, to the public. At the same time, a process of continuous improvement of corporate environmental care is to be established. According to the findings of modern organisational theory, this is only possible by loosening strict regulations and structures and enforcing organisational learning and development.

EMSs in general as well as EMAS compared with ISO 14001 have not yet proven their capability to lead companies improved ecological performance, let alone to sustainability. With the use of new and therefore often cleaner technology, even companies with no or only modest ecological ambitions realise cost savings by reducing the input of resources and the output of waste.

Accordingly, cynics have predicted that it will be neither the ecological pioneers nor the other well-managed companies but those with the largest (ecological) backlog that would gain the most from participating. In fact, the Swiss study on ISO 14001 confirms that the majority of participating companies (73%) had no experiences with environmental management before adopting this standard (see Dyllick and Hamschmidt 2000:29f.). Contrary to the popular self-assessment of participating companies as eco-pioneers, the standards seem to attract primarily those that are not above average in this field.¹

If one takes a close look at the environmental goals companies have to set by themselves, in both standards, and the corresponding level of achievement, one gets a first impression of the ecological impact of EMSs. Here, it becomes evident, that - at least in the beginning of the work with EMSs - operational goals dominate: namely, those that seem with a sufficient certainty to be achievable in the short term.

The corporate environmental policy of companies participating in EMAS is dominated by technical measures. The focus is still on additive (end of pipe) technologies. A move towards technologies that avoid environmental pollution instead of treating it after it has been produced has yet to happen in great number. At the moment, investments in integrated environmental technologies are not common. Nevertheless, the Swiss study confirms a trend that had emerged in the earlier German studies: organisational activities as well as the introduction of product-orientated ecology gain ground in the companies' programmes when EMSs are adopted. In the future, we can expect a step to be taken towards comprehensive ecological modernisation, especially in companies that already have more experience in EMSs.

These empirical findings contradict the criticism of EMAS: that it had a weak point in relation to products because, EMAS I – in contrast to ISO 14001 – did not require companies to deal with product ecology (see e.g. Dyllick 1995; Glatzner 1997). The finding that the implementation of an EMS increases the sensibility of companies to ecological problems with regard to the use and disposal of their products applies to EMAS and to ISO 14001 (see BMU/UBA 2000: p. 58-60).

A main difference between the two systems is the request to evaluate the impact of all measures in terms of ecological effects in order to achieve not only efficiency but also effectiveness. This is included in the EMAS standard but not in ISO 14001 (see Stahlmann and Clausen 2000). In practice, companies lack the competence to do so, and regional or national environmental goals are often missing. Therefore, a valuation of the relevance of corporate ecological goals and measures rarely takes place (see BMU/UBA 2000).

Altogether, the answer to the question of the ecological impact of standardised EMSs has, apparently, to be adjourned. It cannot be answered until there is long-term experience with EMSs and generally accepted indicators have been developed.

1.2 Economic Impacts

The economic impacts can be determined from the comparison of implementation costs and financial benefits. EMAS and ISO 14001 participation is connected with considerable costs. We do not mean costs for implementing technical measures such as water treatment or waste gas cleaning. such costs may be regarded as consequential expenses of EMSs. EMS costs are those costs that are directly connected with the implementation of the management system, from the point of decision to participate up to the validation or certification.

Regarding the costs, we find that, despite the need to print and publish environmental statements, the validation by the state-accredited verifier and the registration, companies participat-

ing in EMAS seem to experience lower costs than do those participating in ISO 14001. The study by Dyllick and Hamschmidt (2000) of ISO 14001 reports average costs of € 195,000. This varies from € 68,000 in the case of small companies to € 365,000 for bigger companies. In contrast, the German EMAS sites spend an average of € 80,000 ranging from € 35,000 to 130,000 (see UNI/ASU 1997). That is about half of the amount that Swiss companies spend on an EMS. This difference is much too high to be explained in terms of the higher price level in Switzerland. Does the allegedly simpler and less demanding ISO system cost significantly more than the 'noble' EMAS?

Regarding monetary benefits, the Swiss study displays average monetary benefits (mostly cost savings) of € 115,000 per year; the German study about € 50,000. The best part of this difference can be explained by the different sizes of companies involved in the studies.

The payback period found in the Swiss study (Dyllick and Hamschmidt 2000) is 2.2 years; according to the German study (UNI/ASU 1997) it is 1.5 years. Many other German studies report payback periods between 1.5 and 2.5 years. The available data regarding the different sizes of sites reveals a gap between smaller and medium-sized to larger companies. In particular, for smaller companies the payback periods are much longer (up to 10 years).

Again, at closer inspection, the findings have to be put into perspective. The empirical knowledge regarding EMS costs in the above-defined sense is based on the statements of corporate managers in response to different questionnaires. Usually, these statements are based on more-or-less precise data of corporate costing systems. These sources are of limited reliability. Most of the costing systems do not provide the possibility for exact cost allocation of environmentally relevant types of costs, especially of internal costs that do not directly lead to expenditures. The consulted corporate actors admitted that the statements on costs were mainly estimates. In addition, many of the managers who responded to the questionnaires did not distinguish between EMS project costs and the consequential expenses for undertaking environmentally based technical measures. This leads to considerable variations in the cost data given in empirical studies.

Furthermore, many companies have received financial aid from government. Consequently, their statements about the actual costs do not match the planned costs quoted to the official sponsor. As well as these political circumstances there are micropolitical interests to be considered (see Freimann 1999b). The corporate actors approach combine their own internal goals with their statements. The environmental experts, for example, must communicate their work within the company as something that saves expenses rather than increases costs. These effects vary with the individual position and influence of the actors. It is not possible to take all these circumstances into account and translate them into financial parameters.

In ISO 14001 companies as well as in EMAS companies the internal costs amount to more than half of the total costs. In particular, these costs are subject to problems in terms of accounting and, in consequence, in terms of validity. Therefore, the findings of the ISO 14001 study have to be carefully interpreted.

If we take a look only at external validation and certification, the environmental statement as demanded by EMAS, and the registration (the costs of which are directly connected to expenses), the cost findings alter. EMAS costs average out at about € 18,000, whereas ISO 14001 costs only € 12,000. As expected, EMAS is significantly dearer than ISO 14001.

Even less valid than the estimated costs are the ascertained valuations of monetary benefits. First, the accounting problem, as mentioned above, is even more precarious in relation to the benefits. To attribute cost savings achieved by means of resource reduction directly to the implementation of an EMS is possible only in exceptional cases. Second, the above-mentioned

problems regarding answers influenced by micropolitics occur here as well, and even stronger, as economic benefits are the main internal argument to continue working with an EMS.

Concerning the effects on costs and benefits, it has to be stated that the larger amount of intended benefits occur where monetary valuations are impossible to do. The implementation of an EMS has to be regarded as an investment. The costs have to be incurred immediately; the benefits accumulate over time and are often difficult to associate directly with the EMS. Questionnaires are the least suited method to attain valid findings in this field. Therefore, the quantitative data has to be interpreted with greatest care (see Dyllick and Hamschmidt 2000: 80).

Considering that the external benefits of validated and certificated EMSs – although extremely difficult to evaluate - should be higher in the case of EMAS compared with ISO 14001 because of the duty to publish an environmental statement, the necessary higher expenditure seems justified. To prefer ISO 14001 only to save expenses is not advisable.

1.3 Corporate benefits

It is not surprising that according to the different studies the stated corporate benefits too are nearly the same for EMAS and ISO 14001. Amazingly, this applies even to external corporate-political impacts. Owing to the different constructions of the systems, differences in this regard could have been expected.

In this area the impacts are much smaller than expected. Irrespective of the standard, the EMSs attract very little interest from the company stakeholders. In particular, only slight positive market effects were noticed by the surveyed managers. In contrast, they report on better contact and co-operation with authorities with responsibility for environmental law - in the German EMAS studies as well as in the Swiss ISO 14001-study. Managers predominantly mentioned overall image improvements as positive effects of EMSs.

How can this be explained, considering the fact that ISO 14001 demands external information much less than does EMAS, which sets an important focus on the public? Of course, even though it is not demanded, ISO 14001 does not bar any users from actively communicating their environmental management and its ecological benefits. That is exactly what most users do: 57% of the surveyed Swiss companies publish environmental statements or at least plan to do so. In contrast, a significant number of EMAS companies do not perceive the benefits of external communication, but regard it only as a nuisance and a liability. Some companies even demand payments for making their environmental statements. The Public seems to be only slightly interested anyway. The authorities positively recognise the voluntary efforts for environmental care no matter whether based on the state-controlled EMAS or not.

In fact, positive corporate benefits from EMSs evolve mainly inside the organisation. The work with EMSs leads to systematisation and documentation of competences and processes of operative environmental care, and they ensure compliance with environmental laws. They help to get the idea of corporate environmental care – and, with it, the responsible persons – accepted by including the corresponding rules into the company's basic principles and by receiving documented support from the management. This happens first internally, with the option to communicate it externally. Regarding the strategic dimension of corporate policy, it has already been attested that EMSs show little impact (in particular, see Dyllick 1999; Dyllick and Hummel 1995; Freimann 1999a).

Methodical problems and perspectives

The insights into corporate environmental management and its substantial results as well as the experiences of companies with standardised EMSs presented in this paper come mainly from empirical academic research projects (i.e. Baum *et al.* 1996; BMU/UBA 2000; FEU 1998a-1998c; GCG 1995; Hartmann 1998; Höppner *et al.* 1998; Isaak and Keck 1997; Jäger *et al.* 1998; Klemisch 1997; Schnauber *et al.* 1994; Seidel and Weber 1998; UF/IHK Dortmund 1996; Wietschel and Rentz 1997) and not from continuous internal or external evaluation of companies. This fact implicates some benefits but also several problems.

The most important benefit is that empirical academic research can afford to define specific goals and an adapted design for each study. It usually does not have to look after the costs as long as at least one financier has declared a willingness to pay for the project. The research projects clearly define the goals and criteria that are to be applied. Although they have been focussed mainly on corporate environmental care, they have tried to evaluate the economic and social outcomes as well. Therefore, one can say that the actual status of corporate sustainability was indeed evaluated by the chosen research projects.

However, the project status of the evaluations means that the results produced are valid only for the time-period under study. All the research projects referred to in this paper provide only a snapshot of the social field with which they are dealing. The surveys also suffer from problems, already touched on, regarding the use of questionnaires. Most of the empirical research is based on oral or written interviews with corporate experts. The statements these participants give must be seen as subjective and often superficial judgements of more or less well-informed persons who mostly do not make much effort to answer the questionnaires. Even if they talk, for example, about costs or environmental technical figures such as quantities and qualities of waste, we do not know if they referred to their technical or cost accounting documents before writing down the figures or if they just estimated the answers. Even if we pay regard to all the sophisticated rules of empirical research we therefore cannot be sure that the results we present are valid and reliable.

In addition, no company can be forced to take part in the surveys. They will take part only if they have a close connection to subject under study. Thus usually only environmentally active or at least interested companies participate in projects about corporate environmental management topics. The results of such projects do not really inform us about the status of the subject matter in the general economy but only within the environmentally conscious sector.

Another disturbing factor is that the respondents are used to answering not only academic questionnaires but also questions by other public agents such as journalists and environmental activists. They are professionals in corporate public relations who are used to paint a positive picture of what they are asked for. Additionally, they have to communicate their own social role within the company as a positive one, so that they will not give any information that could harm the company or themselves as environmental experts. This might lead to biases that cannot be eliminated from the results of empirical questionnaire research.

But even if the respondents are willing to tell nothing but the truth and have the necessary knowledge, there remain some other problems. The usual financial and technical documentation of companies is not sophisticated enough that they show all those figures needed for comprehensive evaluation of corporate sustainability efforts. The normal cost accounting, for example, cannot exactly show the costs and benefits of special environmental measures, not only because some of the effects cannot be evaluated precisely in financial terms but also because

the exact cost figures disappear in the general overhead costs of the company. Sophisticated environmental cost-benefit accounting usually does not exist in 'normal' companies.

In EMAS companies, at least, there exists an environmental statement, which has to be published after the external validation process by the accredited verifier. Most of the ISO 14001 companies voluntarily publish environmental or sustainability reports as well. These documents could be used as more valid sources for the evaluation of corporate sustainability than questionings and interviews. They are valid empirical evaluations at least in German-speaking countries (see e.g. Lange *et al.* 2001; Loew and Fichter 1998; Steven *et al.* 1997). Also, besides giving general information about the company and specific information about its environmental policy, organisation, goals and measures, such reports give some 'hard' figures about the ecological and social impacts of the firm's activities and products. However, the general guidelines for environmental reporting and the specific directions within the EMAS regulation are so weak that most of the information given cannot be compared from one company or branch to another. That is why most of the report do not evaluate the sustainability status of the company but look instead at the features of the report itself such as completeness, intelligibility and credibility. Unless there are exact and binding rules for corporate environmental reporting, the reports will not present a valid base for corporate sustainability evaluation (see e.g. the first international guidelines for sustainability reporting by the Global Reporting Initiative [GRI], at www.globalreporting.org).

To sum up, one can say that probably most companies do not know their own sustainability status, let alone what that term may imply. Any academic who tries to evaluate this status and compare it with other companies or with the average status of all companies in one sector or the whole economy is therefore in a very difficult position. Even if he or she could explain clearly what corporate sustainability means, he or she up to now does not have the appropriate empirical instruments to evaluate it in a valid and reliable way.

There are three major steps to move towards an evaluation of sustainability:

- First, the scientific community must define as exactly as possible figures and indicators that are appropriate to measure the phenomenon of corporate sustainability.
- Second, as many companies as possible should voluntarily or be forced by law to build up a corporate sustainability information system that delivers valid figures as needed for such an evaluation.
- Last, those figures must be published in order to create the possibility of comparing different companies and branches with respect to their sustainability performance, without being dependent on oral or written statements from corporate experts.

There exist at least some academic projects that try to make progress in making the first step. We mention again the efforts to standardise corporate sustainability reporting of the Global Reporting Initiative as well as other projects in this field (see IÖW/IMUG 2001). In addition, we should mention attempts to use the new 'balanced scorecard' strategic management tool – a multi-dimensional strategic information and management system - to implement corporate sustainability management by defining figures and indicators of sustainability as corporate strategic goals (see Arnold *et al.* 2001; Dyllick and Schaltegger 2001). But, even if one considers this step as relatively easy to make, in the future it must be shown whether there is a realistic chance of the next steps being taken. The second step could be prepared by a national or European panel or research project in co-operation with EMS companies and academic re-

search in order to develop and implement corporate sustainability information systems on a trial basis.

Outlook

The message is clear: EMSs are considered economically profitable investments by managers of the participating companies. Despite all the indicated problems of empirical research in this field, the scientists dealing with EMSs are also in almost complete agreement on the profitability of these systems. Furthermore, the systems lead to numerous additional valuable, but difficult to quantify financially, corporate benefits, and they seem - even though it is still too early for definite statements - to support the main purpose for the systems: the improvement of corporate environmental care.

All empirical findings suggest that the different characteristics of the EMSs, especially the state-run character of EMAS compared with the private nature of ISO 14001, have no significant influence on the practical effects. The impacts and benefits of EMSs are fundamental rather than being conditioned by the general strategic orientations that lead to the implementation of one of the systems.

Considering the different expenses in the implementation of the two systems, participating in ISO 14001 seems to be the better alternative. The higher costs for EMAS implementation can only be justified if stakeholders realise the significance of EMSs in general and thereby notice the importance of a stronger public commitment, as integrated in EMAS. As a state-run system the EU and the member governments are asked for support in matters of publicity. In Germany, a marketing programme for EMAS has already been started (go to www.emas-logo.de).

Which strategies predominate in practice and which means are to be employed in order to persuade corporate actors of their benefits offered by EMSs is still little understood. However, there is reason to be confident: in the context of the German research support programme *Betriebliche Instrumente für nachhaltiges Wirtschaften* (Corporate Instruments for a Sustainable Economy), implemented by the Bundesministerium für Bildung und Forschung (BMBF; the German Ministry of Education and Research), a good many projects have started that may generate answers and solutions.

Moreover, in future, EMS research must turn its attention more to the (theoretically well-founded) analysis of the internal corporate conditions in which the EMSs have to fit. The findings indicate that, especially internally, many opportunities have so far been wasted. To make the most of this opportunities, it will be necessary that the system structures used are in harmony with the organisational culture of the company. Culture contains various informal structures in addition to the more formal structures (see e.g. Czarniawska-Joerges 1992; Smircich 1983). This directs attention to all employees instead of the commonly used expert-orientated handling of EMSs. Corporate environmental care has to 'live'. This means that the protection of the natural environment has to be realised beyond formal structures, with the involvement of every member of the company. Environmental care is a multifunctional task for everyone, managers as well as employees. The success of EMSs depends to a large extent on the motivation and participation of all personnel.

Some studies have been carried out on this topic. They are often based on new (sociological and economic) organisational theories such as the concept of micropolitics (see e.g. Birke and Schwarz 1994; Burschel 1996; Dückert *et al.* 1999). Another very suitable approach is modern

system theory (Pfeiffer 2001). Qualitative studies offer more insight into the internal processes, conditions and problems of implementing and working with EMSs. However, they suffer from less generalisable results, as the micropolitical and cultural conditions of companies vary considerably. The greater profoundness of the studies is possible only in exchange for the breadth of study. In order to offer solutions rather than pointing out problems and wasted opportunities we need to know more about these internal aspects. Further qualitative research is necessary to find patterns that are applicable to most companies.²

Besides the necessary theoretical analysis of corporate behavior in general and of corporate sustainability management in particular, the methodical and informational basis for sustainability evaluation has to be improved. This must be the main focus of corporate sustainability evaluation research in the near future.

1 Findings from German studies addressing this issue are not available to our knowledge.

2 A research project on the effects of employees participation on the cultural fit of EMS is carried out at the moment by our research group.

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