



Finding the connection: environmental management systems and environmental performance

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ABSTRACT

With more than 130,000 organizations worldwide certified according to ISO requirements, business people, regulatory authorities and other stakeholders have reason to wonder whether the purpose of ISO 14001, which is to help improve environmental performance, is being fulfilled. There is a growing body of literature attempting to answer this question. The results, however, are inconclusive.

This meta-study analyzes a pool of 23 studies connecting environmental performance to environmental management systems. It shows that the reason that earlier studies arrived at mixed conclusions is twofold. Firstly, there is no agreement on what environmental performance is or how to measure it. Secondly, there is neither clarity nor agreement about how or why environmental management systems are expected to aid performance. It is therefore unclear whether the mechanisms that lead to improvement are expected to be the same for all companies or dependent on each implementation.

The authors conclude that it is more fruitful to research how environmental management systems affect performance, rather than whether they do so or not. The recommended starting point for such studies is environmental performance as each organization defines it. This in turn implies a case by case approach and a need for much more research in the field.

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1. Introduction and purpose

A significant and growing number of studies have attempted to examine the environmental outcomes of environmental management systems (EMS). Since their development and launch in the 1990s, with the Rio Summit as one motivator, the phenomenon of externally audited environmental management systems has caught on in industry and other organizations and continues to spread. Foremost among environmental management standards is ISO 14001. So far more than 130,000 organizations worldwide have certified their environmental management systems according to ISO requirements [1]. After more than a decade of existence standardized environmental management systems should certainly have a sufficient track record for meaningful evaluation. The stature and success of the standard indicate that such attention is warranted. One pressing line of inquiry is to what extent use of the standard has actually benefited the environment.

The usefulness of EMS as a tool to manage environmental issues in companies is a question of interest to many different parties. One of the most interested groups conceivably are the companies themselves, who invest large amount of resources into the

implementation and operation of EMS. As a natural follow up they seek to find out not only their own performance in connection to increased environmental work, but also the general value of the standardized EMS as recognized on the relevant markets. Companies that have invested in EMS want to see a return in whatever terms it was that led to the decision to implement their EMS.

Companies are also interested in environmental management done in other business establishments. One of the reasons is to benchmark with competitors on the market [2]. Another growing trend is to demand ISO 14001 certificate from suppliers. This practice serves as a first step to environmental supply chain management, and also creates new opportunities for businesses that have implemented the environmental management systems. The certification by itself shows that environmental practices are implemented and environmental performance of companies is at least on an acceptable level. There is, however, a large unrealized potential to use the EMS to monitor and manage the environmental performance of the suppliers [3]. Companies using EMS in their supply chain management therefore also require a better understanding of how the aspects of environmental performance important to them are affected.

Governments have an interest in efficient regulatory mechanisms and there is hope that environmental management systems could facilitate this [4]. The very existence of the EMAS regulation

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also clearly demonstrates that governments perceive a regulatory need or opportunity that can be addressed with environmental management systems [5]. Regulatory authorities on various levels are offering possible control relief for environmental front runners. It was claimed as one of the possible benefits for organizations and lately also has become known as a practice to offer regulatory relief for companies investing in the systems compliant to EMAS and ISO 14001 [6]. Now, after years of possible experience gathering regulatory bodies may be interested to find out if such practices are worthwhile, if EMS-oriented organizations are actually performing better than those without EMS.

One very good reason to wish to examine if EMS improves environmental performance is that the enhanced environmental performance is at least part of the reason for the standard. “The general purpose of this standard is to provide assistance to organizations that wish to implement or improve an environmental management system and thereby improve their environmental performance” [7]. This claim must, however, be seen in the light of what may be defined as performance and improvement.

The purpose of this study is to facilitate continued research on the results of EMS by analyzing and summarizing earlier work. This article, based on a meta-study of selected literature, discusses how the outcomes of EMS in terms of environmental performance are first of all perceived and defined. The methodological choices are also focused in order to answer the question of causal relationship between EMS and improved environmental performance. Further, the issue of context dependency of EMS is discussed. The authors hope to contribute to asking the right questions in coming research, but also to increase the clarity of investigations.

This article starts with a brief presentation of some recurring theoretical issues that guide the following sections with findings and analysis. As the last part the authors conclude the study and give recommendations for future research.

2. Problem definition

2.1. Perceptions of environmental performance

As can be seen from the opening remarks, there are many parties interested in environmental management systems and therefore there are also conceivably differing expectations as to what a positive outcome of environmental management efforts would entail.

According to the ISO 14001 standard, the result of EMS is environmental performance, and it is broadly defined as “measurable results of an organization’s management of its environmental aspects” [8]. However, specified interpretations may vary depending on the perception of the EMS and its role in the organization. It is plausible to assume that facilities implementing the system may see their environmental performance quite differently from what the general public does. Moreover, the differences in the characteristics of environmental management systems certainly affect the way the environmental performance is defined.

Further, external standards, such as ISO 14001, generally require that facilities establish environmental targets but they do not specify the substantive nature of these targets [8,9], thus the ambition level may vary substantially. Thus, the view of what EMS should improve varies between companies, and does not necessarily reflect the views of other stakeholders.

For example, a business survey carried out amongst Swiss firms identified 14 benefits of implementing an EMS which were considered to be important by at least half of the respondents. The benefits ranged from ‘strengthening innovation’ and ‘customer loyalty’ to ‘prevention of new environmental legislation’, with ‘enhancement of corporate public image’ ranking highest. Only three of these had a direct relationship with actual environmental

impact (‘risk minimization’, ‘certainty of legal compliance’ and ‘support of ecological transformation of the line of business’), and these were not ranked as the most significant [10]. This illustrates very well both the diversity of EMS as well as perceptions of what the results of the system can be.

Moreover, research on outcomes of EMS such as environmental performance meets practical hurdles such as data collection. For example, there are only few publicly available national databases on emissions, such as in Great Britain, USA and Netherlands, and the data quality and its usability differs. Despite international efforts such as GRI, there is no widely accepted reporting standard for data [11]. The reporting standard relates directly to allocation questions. They pertain to the way the different environmental indicators used for calculations of environmental performance are constructed, and are very much dependent on the individual decisions of companies. Thus when the environmental outcomes of EMS are discussed it is thus important to understand what limitation were brought by the selection of the research method and the quality of data used.

Similarly, the researcher seeking to evaluate EMS must do so by some method. It is necessary to define not just performance, but what is meant by improvement. The choice of method of appraising performance is never entirely objective [12].

2.2. Connecting performance and EMS

The connection between EMS and environmental performance may be examined in a great variety of ways. One of the ways reported in literature is in terms of the expectations and benefits the companies themselves are experiencing. Because of the variety of perceptions of environmental performance, this type of study is easier to conceive as a specific for each organization studied.

Another way might be to seek correlation between the existence of an EMS and enhanced environmental performance as defined by an external party for all companies. In a research constructed in this way, the investigation will seek to answer whether the EMS resulted in improved environmental performance, e.g. defined as reduction of waste generation. Such an approach, even if often used, bears the uncertainty of whether the correlation can show causality, meaning that the improved environmental performance, here minimized waste generation, may not necessarily be the effect of the EMS [9]. Moreover, companies with a better environmental track record may well be more apt to implement and certify an EMS, as a way to capitalize on their environmental achievements and advertise “green” image, as was suggested by other authors [13]. Even when the particular company shows improved performance after putting an EMS in place, this does not confirm that the improvement was caused entirely by the EMS. It is quite plausible that the improvement was achieved with the co-existence of other supporting factors. In fact, the correlation between EMS and improved environmental performance does not show that the improvement would not have been the same without the EMS [14].

Thus correlation alone cannot show causality, but it can certainly strengthen or weaken such an argument. Particularly, if correlation studies are coupled with theory about how environmental management systems are expected to improve performance, a stronger argument can be made if there is correlation between performance, systems and the functioning of the particular mechanism that is expected to have effect. If we are to show that EMS improves environmental performance (or not), it would therefore be helpful to examine the mechanisms that are expected to affect the improvement.

It is thus necessary to focus not only on the question if there is a strong correlation between implementation of the EMS and improved environmental performance, but more importantly on the question how the environmental performance is defined at

each implementing company, supported by investigations on different factors that might have affected the outcomes of EMS.

2.3. Context dependency

For many companies introducing an environmental management system is the first step in controlling their environmental footprint. The ISO 14001 standard requires that an implementing company should take care of its significant environmental aspects.

Environmental aspects are the headlines for the internal environmental work, since a company implementing ISO 14001 builds the system to tackle them. Nevertheless, there is no guarantee that the selected aspects will perfectly reflect the environmental burden of a specific company. According to the standard itself, “There is no single method for determining significant environmental aspects. However, the method used should provide consistent results and include the establishment and application of evaluation criteria, such as those relate to environmental matters, legal issues and the concerns of internal and external interested parties” [8]. This means that selection of the objectives for the environmental work of companies is influenced by many factors, both internal and external to the company. These factors include the understanding of company's operations in the larger context, the level of company's ambition for the environmental work of the company in question and also financial possibilities. It is thus understandable that the outcomes of the EMS, such as environmental performance, will be determined to large extent by the initial scope of EMS.

In the more general case, there may be grounds to evaluate the management methods prescribed in the systems compared to other approaches. For example, it might be expected that the fact of introducing an organized and structured way of managing environmental issues, regardless of its ambition level, might increase the company's environmental performance. Such ancillary effect was reported by some authors, but it cannot be so far broadly generalized [13]. The level of influence of the structure on performance is rather dependent on characteristic of a particular company, including its intangible assets such as culture, values and competitive environment [15].

Although the standards are quite prescriptive in the use of various instruments of management, there is also significant room for adaptation and indeed interpretation. Also, the environments in which the management systems operate vary in terms of corporate culture, legislative environment, and many other factors including, notably, the natural environment. The interpretation of a standard and internal uniqueness of each company creates strong grounds for the assumption that the outcomes of an EMS are context dependent.

3. Study design and data

This research is constructed as a meta-study based on a pool of 23 research articles and reports assessing and discussing the environmental outcomes of EMS. The selected studies appeared to be heterogeneous in the design, focus and methodological approach; however, the common criteria for them were to report on environmental outcomes or benefits related to implemented EMS. The study pool was generated mostly by direct search in academic databases, but also by searching through the references used in the articles found. Despite efforts to ensure that searches were comprehensive, there is always a risk of some imperfection in search methods, language barriers and also there may be issues of limited access to some sources. Three of the studies used in this meta-study are not published in peer-reviewed academic journals. Two of them, the MEPI study [16] and NDEMS [13], are broadly referred to in many academic works. The third one, a report by Bring Procopé and Axelsson [17], was selected since it is important locally and addresses issues relevant for this meta-study. Besides these reports, the meta-study is based on the research articles only. In this case there was no access to underlying data or analysis, other than that which is described in the respective articles. It should be therefore noted that the analysis and conclusions are limited by the scope of underlying studies, which vary in purpose, theory and reporting style.

The studies selected for this research, detailed in Table 1, were published between 1996 and 2008 in 15 different academic journals. Within this pool, the time span of the different studies varied

Table 1
Selected studies and overview of the approaches.

Study	Data type	Research method	Research question/ Measuring object	Environmental performance definition	Context dependency
[4,13,16,20,22,23]	QuaN	Survey, database, 2 studies used mix of databases and questionnaires	Studies are using indicators and are focusing on effects of EMS on plant level performance	Studies, with one exception, are not defining the EP. Implicitly focused on (toxic) emissions, eco-efficiency of the firm	No with one exception
[19,32,38–40]	Qual	Survey	EMS and impact on EP, management of env. costs, risks, stakeholders, competitiveness; EMS as policy instrument; EMS and expected benefits	Studies, with one exception, are not defining the EP. Implicitly are focused on impact on firm's performance, competitiveness; plant level performance and other benefits.	Yes
[24–27,41]	Qual	Survey	Economic and environmental benefits of EMS; connection between EMS and environmental behavior; EP	EP is not defined in the studies. Other approaches are employed, such as looking at benefits, adoption of env. practices, and not EP.	No
[42]	Qual	Case study	The overall impacts of implementation and certification	Study is not defining EP. Implicitly looks at waste minimization, recycling and operational management	Yes
[17,18,30,31]	Qual	Interview	EMAS and internalization of environmental issues and values, The impact of EMS on EP and other effects of the systems	Studies are not defining the EP. Implicitly they focus on benefits perceived by managers. In one case it is defined as continual improvement in the work with the significant aspects	No with one exception
[6,29]	Qual	Mix of methods	EMS and regulatory dividend; Effects of EMS on environmental management practices and operations	No definition of EP provided. Implicitly they look at effect of EMS on legal dimension and operational management practices; relation to design, waste management and recycling practices.	No

significantly, from 2 years to just a few months, depending on the research method. Similarly, the number of organizations varied dramatically from just one organization to as many as 1510. Such high variability is inevitably connected to the method chosen for the particular study, from in-depth study to large-scale surveys and investigations of mixed methodology. The prevailing methods in the selected studies were surveys (14 cases); in-depth studies and small-scale studies were used to a lower extent (2 and 7 cases, respectively).

Almost all the studies selected for the overview analyzed organizations operating in one specific country. The countries were mainly European, but also North America, Australia and Asia were represented. Only two reported analyses referred to cross-continental results.

The response rate is connected very closely to the scale of the survey, the larger the study, the lower the response rate. The response rate in the large studies varied from 10 to 50%, while for the other studies it was ranging between 13 and 62%. The high response rate in some studies can be well explained by the nature of organizations responding. The respondents were the organizations with an EMS already in place or in the process of implementing one. They therefore could be regarded as environmental front and as such be less hesitant to reveal their performance results, and thereby perhaps enhance a favorable environmental image. None of the studies with low response rate used a non-response analysis.

When it comes to the method chosen in the selected studies, the great majority was comprised of studies based on the collection of qualitative data, obtained either by interviews or questionnaires. In some cases, the details of the particular methods were not given explicitly. Instead they sometimes could be found throughout the publication text. In the cases where methods were explicitly described, it was possible to find out that the design of the questionnaire was different from case to case, and the same could be said about the interviews, where the questions were structured, semi-structured or open-ended. Where questionnaires or surveys were used to gather data, the answers were weighted by placing them on a Likert scale or otherwise ranked.

Only six of all studies employed quantitative data. Three of them used quantitative measures based on publicly available data. These were focused on developing indicators to measure improvements in operational environmental performance. Three others used mixed methodology, such as broad surveys followed up with interviews. These three studies are also the long-term and large projects, as might be expected when employing two different methodologies.

4. Findings

The number of academic studies analyzing the outcomes of EMS is growing. The results of these studies are, however, so far inconclusive. While some authors claim that EMS leads to improvement in the environmental performance [13,18–20], others show that there is no such connection, at least not in the areas selected for the investigation [21,22]. These evaluations are, dealing with different industrial sectors, companies of different sizes and last, but most importantly, have different preconceptions of what environmental performance is, and apply different approaches to discuss the environmental outcomes of EMS.

Table 1 summarizes the selected studies. It lists them firstly in accordance with the type of data, i.e. if it is qualitative or quantitative. The 23 studies fall into six method groups. For each group, the table lists the objective of the research, the environmental performance definition and the view on context dependency, i.e. measures taken to ensure the connection between the environmental performance and the other factors of possible influence.

4.1. Respondents

In the studied articles, the respondents selected for studies were not always very well specified. Where this information was available, the respondents represented the management staff, in the prevailing cases the environmental managers and sometimes also the top managers. In very few cases did respondents represent groups other than top and environmental management. Other key personnel, community representatives, residents and local governments were thus seldom selected for the studies.

4.2. Perceptions of environmental performance

The definition of environmental performance was formulated differently in every study. Although the content of performance varied, its assessment fell into two categories.

The first category dealt with environmental performance as expressed by the use of operational performance indicators referring to the resource use, waste generation, emissions or water consumption, i.e. “aspects” in ISO 14001 terms. This captures easily measurable short term changes, but leaves aside issues more difficult to quantify, such as internal social benefits, impact on the stakeholders etc. This definition of performance is used in connection with quantitative research methods and use of data facilitating calculations of indicators.

The other quite broad category viewed environmental performance as expressed with the means of various perceived environmental benefits. They can range from compliance enhancement, waste reduction, savings generated by EMS, systematization of operational practices to the complex issue of competitive advantage. Since most of qualitative studies do not rigidly define environmental performance in advance, the response data tends to be richer in variety. The broader scope of what environmental performance can be leads to unique and valuable data when the businesses list what they believe are the most important benefits of EMS, but not to quantifiable improvement.

4.3. Connecting performance and EMS

In general, the selected literature for this study was aiming at discussing the EMS as a tool to manage the environmental issues at companies (see Table 1). Even if the overall purpose of all papers was similar, the specific research questions varied. The respective authors concentrated their efforts on issues ranging from creating a list of benefits the EMS brought to the companies to evaluating the value of implemented systems to measuring environmental performance of the implementing companies. Depending on the research question, the research approach was accordingly diverse. This means that the definitions, sampling and research methods were quite different from case to case.

There are examples of studies based on quantitative approaches where existing databases containing publicly available data were used to assess environmental performance, such as in Matthews [22] or Potoski and Prakash [20] and Anton et al. [23]. Others used self-reported data by the companies taking part in the research projects, such as in Ammenberg [4]. In both these cases the researchers used the data to either find a statistical correlation between the parameters, or to use calculations in order to prove or disprove the propositions of the papers. Environmental performance was then expressed in a numerical way. Therefore, the issues of usefulness of EMS used in these articles were defined to reflect the potential effect the EMS may have on waste generation, resource use, emissions and similar issues.

Some other authors selected large-scale surveys as their primary data collection tool. The research approaches were, however, also very diverse, even within this group. In some cases

the authors used surveys to generate large amounts of data, including self-reporting of quantitative information on company related selected parameters. In this way they were able to perform the correlation analysis between selected values, see e.g. Dahlström et al. [6], Arimura et al. [19], or Potoski and Prakash [20].

Surveys were also used to gather qualitative data and similarly to use it to correlate selected values, e.g. Raines Summers [24], Welch et al. [25], Zutshi and Sohal [26]. Such studies are often referred to in the literature, including by the authors themselves, as studies measuring perceptions [27].

Another interesting approach was to combine different methods. Some authors have made an attempt to triangulate large-scale surveys with field studies, such as in-depth interviews or case studies, e.g. Ref. [28,29]. In the study of Florida and Davison, the survey was supported by interviews with various stakeholders of five selected plants [28]. This measure has resulted in particularly interesting results, where the researchers employed views of not only environmental managers of plants, but also community representatives, residents and local governments. In this way, they have managed to obtain quite a broad spectrum of effects the EMS might have on the plant.

On the other hand there is a substantial pool of studies tending to focus environmental performance or improvements stemming from EMS through other qualitative methods, such as interviews. These smaller scale investigations have limited the researchers in terms of generalization. On the other hand authors brought a richness of in-depth information and managed to shed light on the complicated nature of environmental improvements in the companies. Examples of such investigations are Annandale et al. [18], Bring Procopé and Axelsson [17], Morrow and Rondinelli [30], Pérez et al. [31].

4.4. Context dependency and generality

Within the pool of publications that were analyzed in this study, there are some that explicitly addressed the fact that the outcome of EMS can be influenced by factors independent from the companies themselves. For example, in a report summarizing a longitudinal study in United States, the authors discussed such possible limitations [13]. They recognized that state financial support for implementation of an EMS could positively influence its outcomes. They also acknowledged other issues that might have had similar effect, such as external consultancy help and interest shown by the stakeholders [13]. Pérez et al. looked at forces that may be willingly used by companies and that could have an influence on possible outcomes of the EMS. They found that accommodating for the stakeholders interests while shaping the EMS is an important input. Furthermore this can lead not only to gaining a competitive advantage, but also to creating intangible assets, such as increased communication and commitment of managers, as well as enhancement of their knowledge and skills bank. Thus these intangible assets can play a role in enhancing the environmental performance of these companies [31].

Florida and Davison [28] investigated the issue of external influences and conditions that might influence the potential of the EMS to reduce environmental risks. They asked respondents to identify and rate the importance of factors such as: environmental regulation, business leadership, quality of local government, effective partnerships, active citizen involvement, and active environmental groups. They expanded the usual industrial perspective by interviewing stakeholders other than representing the companies and using their views on the environmental work of the selected firms.

Ann et al. [32] hypothesized that not only the supply chain issues but also past experience with ISO 9000 would affect the level of performance of the firm. Environmental regulations and other

possible voluntary agreements other than ISO 14001 can also influence the environmental performance of the companies. Arimura et al. [19] in their study on adoption of ISO 14001 in Japan investigated whether existing Japanese regulatory context can influence the companies to perform better, but found no correlation. These authors also recognized that management attitudes are likely to be correlated with environmental performance, and thus tend to be important endogenous issues.

Most of the investigations were not limited to any selected industrial sector. On the contrary, researchers made efforts to assuring great variability, and by this generality in terms of the sample profile. In most of the studies, many industrial sectors were present, including the particularly environmentally sensitive industries.

On the other hand, the few studies where the sample was limited to just one industrial sector were aiming at assessment of the environmental outcomes of the implemented systems, and a choice of one particular sector was steered by the data availability and by the higher representativeness of the results.

5. Discussion

5.1. Perceptions of environmental performance

Environmental issues, as observed in businesses, have an interdisciplinary character. They cut across different sciences, thus methodologies employed to environmental research require quantitative analyses as well as qualitative explorations. From the previous sections it can be seen that evaluation of environmental performance is quite a diverse process, that depends on what tools are applied and what assumptions and decisions are made. The findings section clearly indicates that selected studies took different approaches to what was the major outcome of the environmental management system.

In the quantitative studies, environmental performance of companies was seen from an outside perspective, with a preference for measurable entities. Therefore we can further assume that quantitative methods of evaluation of EP have a more or less explicit policy perspective. The goals of the studies were oriented more towards general conclusions and broader applicability. A typical method of looking at outcomes of EMS would be to look at plant level emissions and investigate if they are related to implementation of EMS. It is plausible to assume that the advantage of using a quantitative definition of EP helps to simplify the complex issue of EP and therefore facilitates comparing companies to each other.

It should, however, be kept in mind that all perceptual measurements are prone to be biased. One of the important sources of the bias are the respondents. In the selected studies there was a clear overrepresentation of respondents in corporate environmental management. According to Huber and Power the choice of respondents can be of importance for the further interpretation [33]. Depending on their affiliations within the organization, the researcher may get accordingly affected data. There are four reasons why respondents might give inappropriate data:

1. They are motivated to do so,
2. Their cognitive and perceptual limitations result in inadvertent results,
3. They lack crucial information about the event of interest,
4. They have been questioned with inappropriate data elicitation procedure [33].

The overrepresentation of a particular group can probably be explained by the typical limitation of environmental work to the environmental departments and its manager. Relatively few people

from outside this department use to have good information about environmental issues of the company. Moreover, there is often a visible division of labor in companies, where a questionnaire about environmental management might be given to the environmental manager to answer, irrespective of to whom it was addressed. The same sort of issues may arise with respondents for interviews. These raises a difficulty, since it is not just a corporate perspective that is reflected in this approach, but a corporate perspective as interpreted mainly by environmental management practitioners.

5.2. Connecting performance and EMS

It is not entirely clear if all companies will be willing to disclose the information necessary for the research to be generalizable. In current practice, ISO 14001 does not require any public disclosure of environmental information. There are probably few companies that willingly would reveal data which often is regarded as sensitive. Without disclosure, as Metzenbaum discusses, the broad application of ISO 14001 as a policy tool is rather unclear. The other underlying question related to EMS and its possible role as public policy instrument is how the outcomes of EMS are formulated, measured and compared between companies [34].

It should, however, be noted that the quantitative perspective risks difficulties related to causality/attribution. In policy evaluation research, it is necessary to study the causal connection between an intervention and an effect [35]. If environmental management systems are to be seen as policy instruments, one needs to show the attribution between EMS and environmental performance [36]. Is not always easy to conclude that the observed effects were in fact caused by the implemented EMS. There could be very many other influences that lead to the observed effects, meaning that without thorough analysis, causality should not be claimed. This means that there is a need to better understand the question of how EMS affects environmental outcomes in this perspective as well. However, the “how” question can vary between companies. In some cases the effect most relevant to the company itself is the morale leverage and assigning appropriate importance to the environmental issues across all departments, whereas in some other companies the most important is to regulate the waste generation issue. This leads us to suggest that more fruitful view of environmental performance in connection with EMS is that of each individual company. If conclusive evidence of a causal connection on a corporate level could be found, then this would inform about the effectiveness of EMS as a management tool, although it would still be left to a value judgment whether the EMS actually benefited the environment.

On the other hand the “qualitative” category of the studies tends to be more company-oriented, using both corporate perceptions and definitions of environmental performance. In these studies, we see a tendency towards “how” questions. Perceptions, rather than only operational data, are studied, and methods selected for such research are therefore qualitative. These studies approach not just the “yes” or “no” question of whether EMS improves performance, but start the inquiries into what way, under what conditions, and why environmental management systems have the effects they are perceived to have. This type of study may be particularly useful to the companies themselves, as it tends to examine performance, and perceptions of performance, according to the view of the company itself.

5.3. Context dependency and generality

In the study on the effects of environmental management systems, it is plausible to assume that the context in which the companies are operating can have a significant influence both on

the shape of the EMS and indirectly on the environmental performance of the company in question.

Conceivably, the success of an environmental management system might vary a great deal, depending not only on how it is implemented, but also on the internal and external conditions of the company. In some companies the beneficial effect of EMS can be related to the fact of structuring of the environmental work or giving it appropriate importance, in other it may depend on the stringent regulations that pushed companies into preventive thinking, in some others it may depend on charismatic leadership. On the other side one needs to be aware that structure and organization of work, which are the inherent parts of the EMS, are also debated as possible hindrances to the innovativeness of the companies [37]. In general management literature, current theory on structure in organizations is that extremes might not be beneficial too much of the structure can be as bad as too little. “Especially in changing markets and technologies, extensive structure exacts a price, that price is stymied flexibility and stunted innovation” [15].

6. Conclusions and recommendations

Although the body of research on the connection between EMS and performance included in this work is still inconclusive, the efforts so far can yield some conclusions.

The first conclusion is that the definition of performance used in any study, though varied and subjective, must be clearly stated, since it increases the understanding of what is selected as the object of the research and it has the major impact on the final conclusion one can draw. The authors found that definition was not often clear and explicit. In many cases the only way to get to know the definition was to deduce it from various parts of the text. This could impair the possibilities for the results to be used more broadly. It is especially important to be clear whether the study evaluates EMS according to the company’s own objectives or other criteria. Because many studies will be needed to paint a general picture of outcomes of EMS, it is imperative that definitions are clearly described in the presentations of the research.

Secondly, it has to be recognized that all research methods have their own strengths and limitations. Whereas in the pool of selected studies the quantitative methods usually looked at emissions, the qualitative were more directed towards general perceptions or the issues that were of importance to the particular company. All these approaches may usefully serve different purposes and lead to different conclusions. Thus, since the quantitative and qualitative studies will continuously facilitate the knowledge development around EMS and its applications, it is important that thorough context dependency provisions are taken.

Policy makers need to beware that not only may it take some time before the connection between EMS and performance is clear, but also that the results may be mixed. If we ask if EMS leads to improved performance, the answer will quite likely be: “It depends.” If we instead ask how EMS affects performance, this will at least generate useful insight for improving the systems.

The variety of results so far supports a hypothesis that the effects of EMS are not general, but dependent on other factors, such as the management style and goals of the particular company, its operating environment, culture and stakeholders. The studies selected for this meta-study have approached the issues rather differently, and only few took sufficient measures to provide for the question of attribution. The authors here suggest that the question to research which will be most fruitful is not whether EMS improves performance, but how, when and why, depending on goals, culture, economy, legislation and so on.

The studies reviewed here are a good start of the research on the effects of EMS, but more data will be needed to understand the causal relationship well enough. Because of the limitations facing

a meta-study such as this, and the need for generating more and broader understanding, further research is an excellent opportunity for collaborative efforts. Research done in parallel in different countries could perhaps benefit considerably from comparison with other ongoing work as the research proceeds. This would allow greater sharing of methodological detail, in addition to comparison of raw data.

The suggested approach will require a great research effort before results in a sufficient variety of goals, cultures, environments and so on can be evaluated. The number and power of interested parties should ensure that the effort is made. Here is a fruitful field for cross-border collaboration in order to achieve comparisons between implementations within studies, as well as between studies. The connection between EMS and performance is a puzzle, of which a few pieces are now in place.

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