

## GREENING AN INDUSTRIAL DISTRICT. EXPERIENCES FROM NETWORKING SMALL ENTERPRISES.

Extended abstract

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Small and medium-sized enterprises (SMEs) are an important group from an environmental point of view, unfortunately often forgotten. Among other things, it has often been discussed whether or not environmental management systems (EMSs) according e.g. ISO 14001 are suitable for SMEs. There are many studies reporting on barriers against SMEs adopting EMSs. In the following presentation we summarise our studies of the creation and maintenance of a joint environmental management system (EMS) at Hackefors Industrial District, Linköping SE Sweden. This solution has shown to be cost-effective and has facilitated both the implementation and maintenance of EMSs. This abstract starts with a general presentation of the industrial district and the joint EMS. This is followed by the commercial and environmental effects of the formed network. In the end we discuss some drawbacks of the joint EMS as well as the potential for this solution for SMEs in general.

### ***The joint EMS***

At Hackefors 26 small, or mainly micro-sized, enterprises have formed an environmental group (in this presentation called the Hackefors Environmental Group, HEG), a network, and implemented a joint EMS. They represent a wide range of businesses, including manufacturing, waste recycling, transportation, construction, trade, graphic industries, etc. The network was established in 1995, the EMS implementation started with environmental reviews in 1997 and in the beginning of 1999 this group of enterprises were certified according to ISO 14001, applying a concept of group-certification. The EMS model used at Hackefors Industrial district is called the Hackefors model. Each enterprise within the HEG has an EMS of its own that fulfils the requirements of ISO 14001 and thus a certificate of its own. In this way the Hackefors model does not differ from other EMSs.

The joint EMS is organised in a way that is very similar to the organisation of systems for larger industrial concerns (Figure 1). All companies have an environmental co-ordinator and these together form the EMS group. From this group is chosen a steering committee consisting of seven of the environmental co-ordinators, which in turn selects a central co-ordinator. A few individuals (i.e. the support group) support the central co-ordinator and the steering committee and assist the co-ordinators concerning their duties. Decisions are prepared in the steering committee and taken by the EMS group. The steering committee together with the central co-ordinator and the support group can be compared to a central environmental staff in an industrial concern.

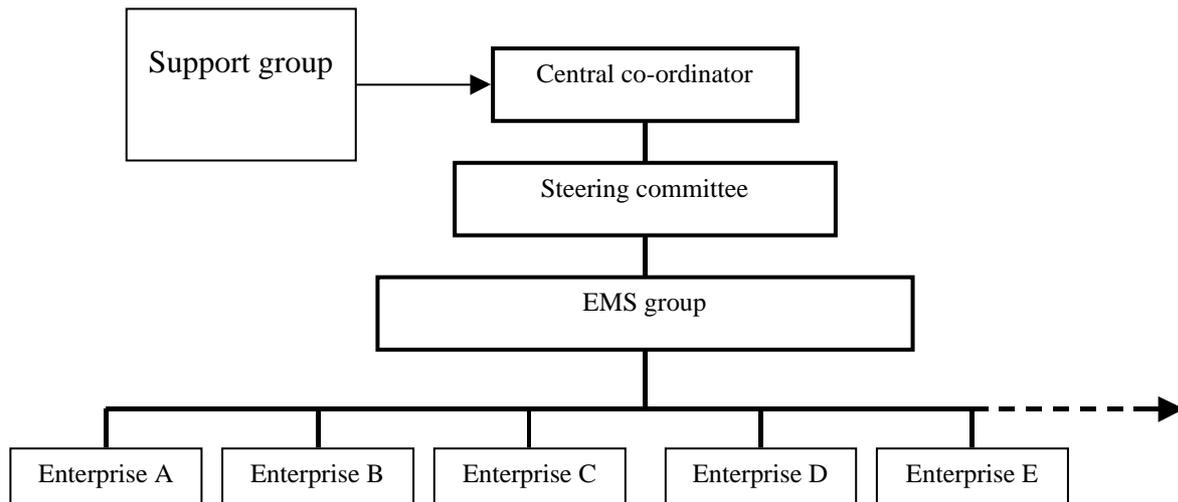


Figure 1. *Organisation of the Hackefors Environmental Group in accordance with the Hackefors model. From Ammenberg et al., 1999*

The central co-ordinator can be selected from the companies in the network or from the outside. At Hackefors the co-ordinator is employed at a consulting firm which is a member of the HEG. Personnel from this firm have supported the central co-ordinator and the steering committee, and assisted the environmental co-ordinators regarding the accomplishment of environmental reviews, documentation, training etc.

### Business effects

In an interview series, all co-ordinators were asked if the EMS had led to any changes regarding costs for waste handling, energy, goods, transportation and emissions. Figure 2 shows the distribution of the answers. It can be concluded that an absolute majority of the co-ordinators declares that the EMS has not affected these costs. Slightly more than one-third (8 enterprises; 36%) said their costs for waste handling had increased, which can be explained by the fact that the enterprises together have established a central unit for collection, separation and utilisation of waste. Most of the increased expenditures can be assigned to financing the enterprise that operates the waste unit and collects the waste. Also, this separation requires more containers etc. at each enterprise. However, since January 1st, 2000 there is a new tax for landfilling of waste in Sweden. As the increased separation has led to less waste being dumped, cost savings have probably occurred since the interviews. This tax is designed as a three-step model, where the first step was in January 2000. In 2003 and 2005 respectively, the requirements regarding landfilling will be further sharpened, which means it is possible that additional cost savings may occur within the near future.

Taken together, 14.5<sup>1</sup> (12%<sup>2</sup>) have declared cost savings and 10.5 (8%) increased costs. Interestingly, only 6 (5%) co-ordinators could give a numeric estimation of cost changes.

<sup>1</sup> One enterprise declared both cost savings and increased costs concerning emissions, which is why both alternatives were assigned half a share.

<sup>2</sup> 14.5 co-ordinators declared cost savings for the five questions on waste handling, energy, goods, transports and emissions, respectively. This means 14.5 out of 125 answers, i.e. 12%.

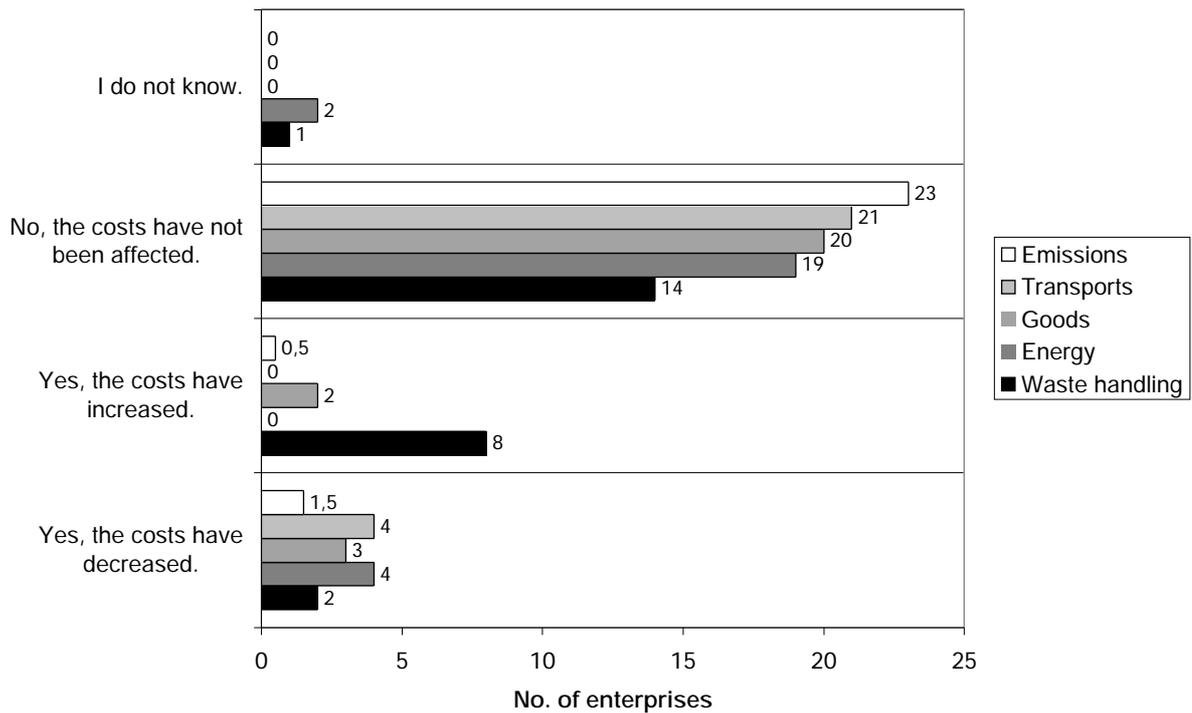


Figure 2. Distribution of answers to questions regarding changes in costs connected to EMS.

The co-ordinators were also asked whether the EMS had changed the possibility of receiving contracts for the sale of products and services or had affected the staff's comfort and motivation. Three-fifths (15; 60%) declared that it had become easier to receive a contract as a consequence of the EMS, while the remaining interviewees answered that the possibilities had not been affected (7; 28%) or that they did not know (3; 12%). Moreover, 18 (72%) believed that the EMS had led to increased comfort and motivation. None were of the opinion that the EMS had resulted in decreased comfort or motivation.

Further on, the respondents were asked if the EMS had affected the relations with existing customers, potential customers, companies other than customers, and other stakeholders (e.g. authorities, insurance companies, banks and the media). The results are presented in Figure 3. It stands clear that the EMS, in general, has improved many important business relations. A majority declares better relations with existing customers (16; 64%) and an increased interest regarding products and services from potential customers (14, 56%). That only 6 (25%<sup>3</sup>) enterprises stated better relations with "other stakeholders" is probably a consequence of little authority control, since most respondents seemed to have authorities in mind. Improved relations between the enterprises within the environmental network explains why 22 (88%) declared better relations with companies other than customers.

Almost every environmental co-ordinator (24; 96%) believed that their ISO 14001-based EMS results in positive commercial effects regarding the business in general. However, 10 (40%) added: "at least seen from a bit longer perspective".

<sup>3</sup> Only 24 enterprises answered this question.

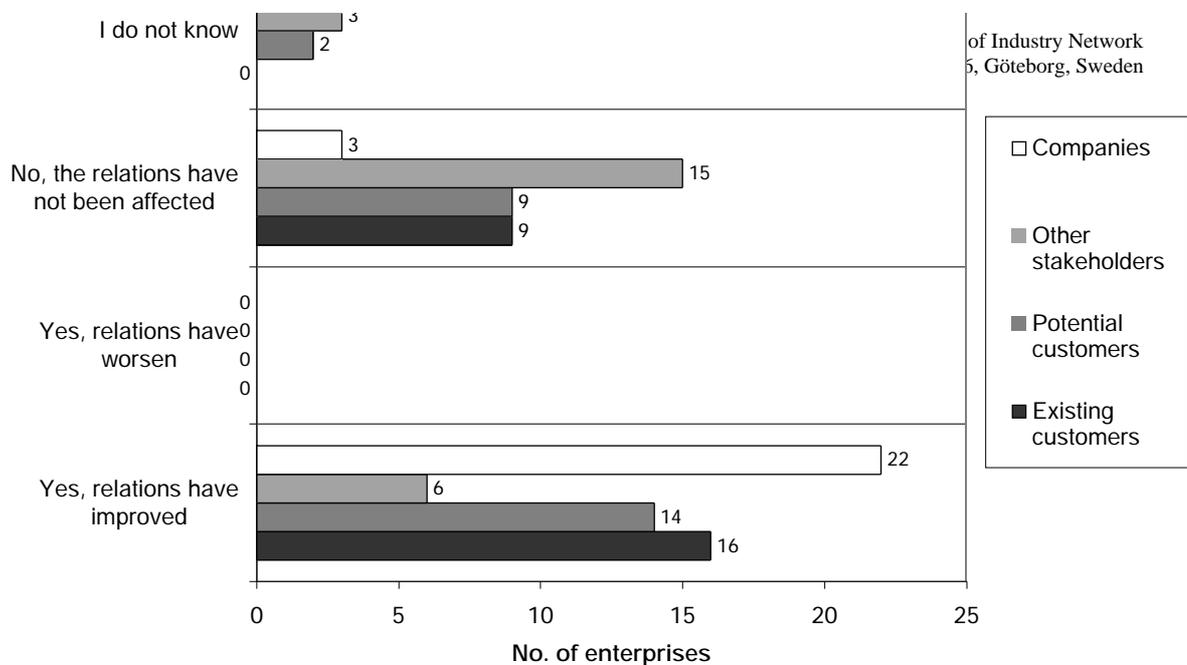


Figure 3. Distribution of answers to questions regarding changes of relations with existing customers, potential customers, stakeholders, staff and other companies.

### Environmental effects

The interview series yielded only a few quantitative results related to environmental performance. However, two major changes of environmental importance were observed. First, before the formation of the environmental network, typically each company had two waste categories, one for incineration and one for non-combustible waste. In some cases there was also a category for hazardous waste. Today, there are about 20 categories for separation at the central unit, which has facilitated recycling. Before, the category for incineration included waste that should not be incinerated, e.g. electronics, and among the waste for landfilling there were portions that should be reused or incinerated. At the present time, some former waste categories are used by other companies. Since the companies changed their waste handling before the EMSs were implemented, these improvements must be seen as a consequence of networking, rather than of the EMS. However, a few of the respondents felt that the joint EMS also gave more strength to the efforts regarding waste.

Second, the enterprises at Hackefors, together with a local power company and others, have managed to get district heating to this industrial district. According to the directors' report of the city council, 30 enterprises are expected to change to district heating, which will reduce the emissions of carbon dioxide, nitrogen oxides and sulphur dioxide by 3282, 5.1 and 6.4 tons per year respectively. It can be concluded that about 10 of the enterprises included in this study are connected or intend to be connected to this district heating network.

There are many other examples of improvements declared as direct consequences of the EMSs, as is shown in Figure 4.

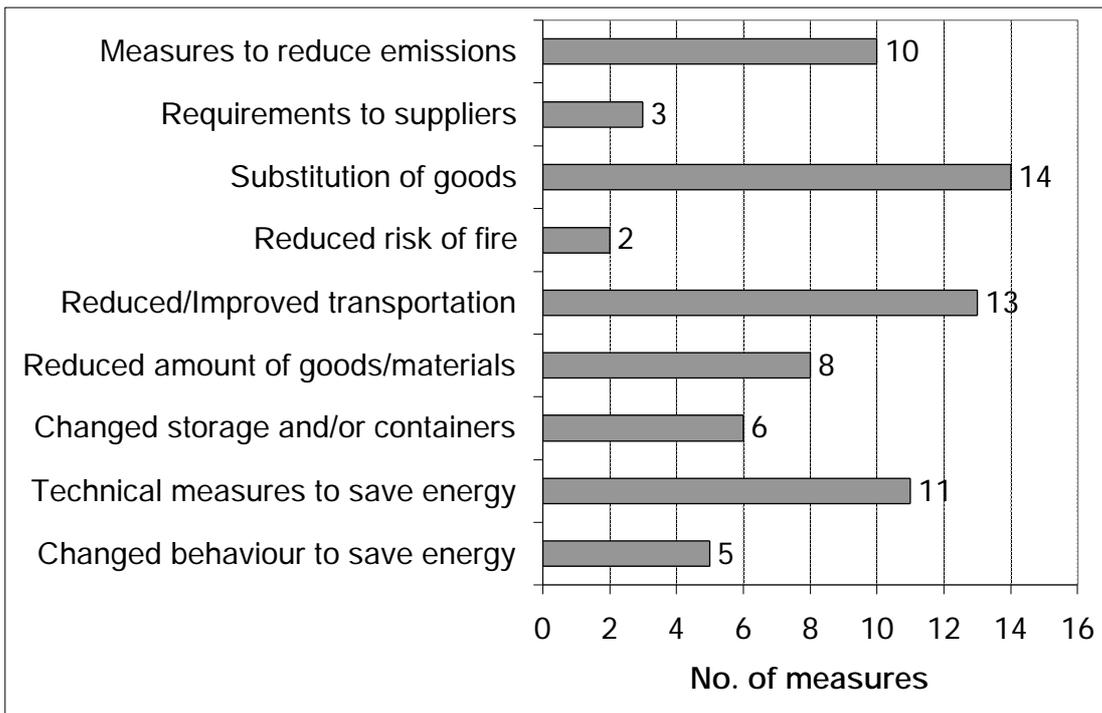


Figure 4. *The number of different environmental measures that are seen as consequences of the EMS.*

More than half of the enterprises (14; 56%) have substituted goods for alternatives better from an environmental point of view. For example, this includes the exchange of mineral oils for vegetable oils; changes in types of fuel, paint and refrigerants; and substitution of chemicals and PVC plastics. About 50% (13; 52%) have striven for a decrease in transportation or for improved transportation. Slightly more than 40% (11; 44%) have either improved the storage of chemicals, oils, batteries, etc. and/or obtained better containers to reduce the risk of accidents. An equal number of enterprises (11; 44%) have taken measures to decrease the amount of energy used, of which 6 are characterised as results of technical measures and the remaining 5 as consequences of changed staff behaviour. Moreover, almost one-third (8; 32%) has managed to decrease the amount of at least one of the goods/materials used. A few (3; 12%) have attained improvements through the use of supplier requirements and 2 (8%) have reduced the risk of a fire. In addition to the improvements presented in Figure 3, one firm declared reduced noise and more effective production that resulted in decreased amounts of goods needed. Also, another company has started to purchase from local suppliers.

### Study of environmental reviews

To complement the picture of environmental improvements given by the co-ordinators, we have analysed changes in material and energy flows at twelve of the companies in HEG. All companies use the same templates for the environmental reviews and this review had been updated at least two years after the initial review at the studied companies. We used a six step method comprising the following steps:

1. All data directly connected to flows of energy and material in each environmental review were collected.
2. A kind of functional number – a positive output called the “functional factor” – was decided for each enterprise, i.e. a number serving as a measurement of the extent of operation.

3. By using the concept of eco-efficiency we calculated environmental performance.
4. The eco-efficiency for 1997—the year the implementation of the EMSs started—or as close as possible to that year, was compared to the corresponding figure for the last year accounted for.
5. A so-called “importance factor” was decided to reflect the relative environmental in-company importance of each change.
6. The “total environmental performance score” was calculated by multiplying the comparison factors and importance factors for each environmental aspect accounted for.

According to the method used, the joint EMS and co-operation at Hackefors industrial district has resulted in significant environmental improvements in general. Concerning energy, a majority of the firms seems to have reached improvements, i.e. they have increased their eco-efficiency. Regarding water, although positive most changes seem rather modest. No observed results are negative concerning goods and the general impression is that most enterprises have managed to reach important improvements in this area. Four of the enterprises made considerable improvements concerning waste and by-products, while the others made small improvements and in two cases a small deterioration. It was also noted that only four of the enterprises seemed to have a good control regarding transportation, an environmental aspect which has been judged by the authors as significant for an absolute majority of the enterprises.

#### Other benefits

In addition to the mentioned environmental improvements, many other benefits have occurred as a consequence of the network. The companies are now co-operating in many areas. Electricity is bought together, there is a common pool of workers, collective caretakers and security guards and some office equipment (photocopier etc) is shared. The environmental training has brought about an increased interest for education and employees have studied e.g. English and computers.

#### Drawbacks

In addition to many positive organisational and business effects, some disadvantages that exist with a joint EMS should be mentioned. Much depends on the central organisation/co-ordination, which might make the solution vulnerable. Furthermore, central design of the EMSs, i.e. a kind of standardisation within the group of enterprises, results in decreased flexibility. Nevertheless, the positive effects seem absolutely dominant.

#### The potential of Joint EMSs

Our experiences of joint EMS are based on studies of one single group of SMEs and it can thus be questioned if this model is generally applicable. At present, about 500 SMEs and seven industrial concerns use the model. It remains to be seen if the outcome of these joint efforts will be successful, but the prospects are promising. This indicates that many obstacles for SMEs might be overcome through the use of the Hackefors model.

#### **Publications**

This abstract is based on the following articles:

Ammenberg, J., Börjesson, B. and Hjelm, O. 1999. Joint EMS and Group Certification: A Cost-Effective Route for SMEs to Achieve ISO 14001. *Greener Management International*

28:23-31. Also in: Hillary, R. (ed). 2000. ISO 14001. *Case studies and practical experiences*. GreenLeaf Publishing, Sheffield.

Ammenberg, J. and Hjelm, O. 2002. The Connection Between Environmental Management Systems and Continual Environmental Performance Improvements. *Corporate Environmental Strategy*. Vol 9. In press.

Ammenberg, J. and Hjelm, O. Tracing business and environmental effects of environmental management systems -A study of networking small and medium-sized enterprises using a joint environmental management system. Submitted to *Business Strategy and Environment*.

Ammenberg, J. 2001. How do standardised environmental management systems affect environmental performance and business? LiU-Tek-Lic-2001:44.