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**A cluster-based approach for the application of
EMAS**

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Abstract

This paper analyses the benefits of the cluster approach in adopting EMAS (the EC Eco-Management and Audit Scheme) by some companies operating in the territorial area of Lucca. The cluster approach proves to be effective in stimulating and supporting the adoption of EMAS and, more in general, to provide a better environmental management by the interested companies. In order to start up and maintain this particular networking approach, there is to be a strong motivation by one or more actors in the cluster that are able to take the initiative and make shared resources and common tools available for the involved organisations. This motivation could be an EMAS-related recognition or “award” for the Promotion Committee. In addition to that, it has to be stressed that accredited verifiers must be fully involved in the application of this kind of approaches, in order to really enable (and promote) the use of shared resources and common tools by all the organisations of a cluster.

Keywords: environmental management, cluster approach, paper production
JEL classification: M42, Q56, L60

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1. Background

Networking between organisations emerges from several studies and empirical evidences as one of the most important factors fostering the diffusion of EMAS (the EC Eco-Management and Audit Scheme). Many authors (*inter alia.*: Biondi et al., 2000; Hillary, 1999; Steger, 2000) emphasise that working with groups of companies is a useful and efficient way of adopting EMAS particularly for SMEs, often suffering a lack of human, technical and economic resources needed for the application of an environmental management system. This happens to be particularly effective between organisations operating in the same sector (such as the industrial sector, but even service sectors like tourism or public institutions operating at different levels) and between organisations operating in the same region (or territorial area).

In the first case, enterprises can co-operate by identifying and assessing similar environmental aspects and by finding technological and operational solutions that can be applied to similar production processes and products, as well as by defining organisational structures suitable for the same kind of production cycles. In the second case, co-operation is facilitated by the ‘physical contiguosness’ and there are synergies both in improving the environmental impact on the same local eco-system, and in interacting and communicating with the same stakeholders (local population, authorities, etc..).

In some experiences, a network has been created among SMEs within a ‘cluster’¹, in order to foster information exchange and experience diffusion and to define and apply common solutions to similar environmental, technical and/or organisational problems, or to share environmental management resources. A specific kind of co-operation within a cluster of organisations takes place in the supply-chain: when a large customer, for example, is willing to support small suppliers in EMAS implementation, then all the smaller organisations involved in the supply chain can benefit greatly from networking.

This approach proved to be effective in some Member States: Germany (the so-called “Konvoi” approach), Italy (for the so-called APO “Ambiti Produttivi Omogenei”, i.e.: homogeneous productive contexts), Spain (co-operation in the supply chain, especially in the tourism sector), Nordic Countries (especially in Denmark and Sweden).

¹ Clusters have been officially identified and defined by the Final report of the European Commission Expert Group on enterprise clusters and networks as follows: “*groups of independent companies and associated institutions that are: collaborating and competing, geographically concentrated in one or several regions, even though the cluster may have global extensions, specialized in a particular field, linked by common technologies and skills, either science-based or traditional, clusters can be either institutionalized (they have a proper cluster manager) or non-institutionalized, the cluster has a positive influence on: innovation and competitiveness; skill formation and information; growth and long-term business dynamics*”.

A recent study (IEFE et al., 2006), carried out on behalf of the European Commission to support the revision of EMAS, confirmed the importance of networking. The results of 200 interviews with EMAS registered organisations and other stakeholders showed that:

- EMAS is positively affecting environmental management within the supply chains, e.g. 77% of the EMAS registered organisations are supporting their suppliers in the adoption of measures and initiatives for environmental improvement, and 72% declare that the environmental management system influences their products performance in the supply chain;
- 54% of the interviewees believe that a simplified access to registration for micro enterprises and SMEs, also based on co-operative and networking initiatives, would be a fairly or very important support for EMAS development (another 17% believe that that this would be “somewhat important”). This percentage is higher if we consider the sub-sample of the small companies (less than 50 employees);
- 31% believe that it would be (very or fairly) important to use a ‘cluster approach’ as a potentially effective support for the diffusion of EMAS among SMEs (an additional 23% think it would be “somewhat important”).

The consensus on a ‘cluster approach’ has been strengthened by experiences throughout the Member States, based on the innovations introduced in this respect by EMAS Regulation EC/761/2001. These innovations, broadly interpreted in Article 11 of the EMAS Regulation and later officially incorporated in the Commission Decision of 07/09/2001, identify EMAS as a strategic instrument in implementing local policies intended to improve the environmental performance of clusters and/or “territorial areas” in which similar small companies are concentrated.

Before the first revision, the possibility of applying EMAS to clusters or industrial areas was experimented in few cases. In Italy, we can mention the Bayer Production Pole in Filago, where companies with diversified productive activities signed an agreement to appoint an inter-company Environmental Committee, with the role of co-ordinating and promoting a “common environmental management”. Another recent case in Italy regards the EMAS registration of a touristic area in Bibione (Veneto region), carried out in accordance to the same principles. Similar cases in the EU include, for example, the Gendorf Chemical Pole in Bayern, where the companies worked closely together for EMAS implementation. All such experiences were based on a broad interpretation of the concept of “industrial site”, meaning an “extended site” (comprising the total number of industrial sites located in the same area).

Article 11 of EMAS explicitly refers to the need to encourage SMEs to adhere to the scheme, including those enterprises concentrated in well-defined geographical areas. It also refers to the role that local actors (other than a single organisation applying EMAS) can play in identifying and evaluating the environmental aspects linked to a certain territorial or supply-chain context. The EMAS Regulation also recommends that local authorities work together with other private actors in order to share the results of the analysis carried out on the environmental aspects of an area or a supply-chain. Finally, it is pointed out that SMEs can use the information provided by the local authorities or intermediate institutions to define their environmental programme and set the objectives and targets of their EMAS management system. This last concept is taken up again and explained in Annex I B to the Regulation, which points out that organisations can base their actions on local, regional and national environmental programmes, so that it explicitly gives enterprises the opportunity to rely on actions of a collective nature. Following the regulation guidelines, a Commission Decision was issued in September 2001, listing the criteria to identify the entity to be registered. At point 7, this Decision provides the basis for identifying the principles and the operation criteria to promote EMAS within a cluster.

In Italy, some important initiatives were undertaken at the institutional level to develop such an approach. In addition to some experimental activities, such as the one described in the present

article, the two most relevant initiatives are the methodology proposed and officially adopted by the Regione Toscana (Tuscany region) for the adoption of EMAS in industrial districts and the official position of the Comitato Eco-Label – Ecoaudit, Sez. EMAS Italia (the EMAS Competent Body) on the “Ambiti Produttivi Omogenei” (homogeneous productive contexts).

2. Case study profile

According to the suggestions and indications included in the EMAS Regulation and in the Decision mentioned above, a pilot-project proposed an innovative approach of co-operative environmental management for the Lucca paper-producing territorial cluster (located in the Tuscany region in Italy). In particular, within the scope of a LIFE-funded project (PIONEER – ‘Paper Industry Operating in Network: an Experiment for EMAS Revision’²), a number of industrial and non-industrial organisations (local authorities, service providers,...) have implemented an environmental management system in compliance with EMAS by relying on some co-operative and collective actions such as common procedures, shared resources, collaborative training initiatives, etc.. This enabled all local actors usually meeting difficulties in participating in EMAS (both SMEs and the organisations operating in sectors where EMAS is not diffused) to overcome the barriers in adopting an environmental management system and, simultaneously, to improve their capability to co-operate in a better co-ordinated and integrated management for local sustainability. These results have been achieved by means of a sort of “EMAS for Cluster” approach, on which each individual environmental management system of a single organisation relies. That is how the project fostered the interaction and co-operation between all different local actors interested in the integrated management of the environmental problems (industry, private service sector, public utilities, local authorities and institutions, universities, research centres, etc.).

The PIONEER project focused on some companies operating in the territorial area of the paper-producing industrial cluster of Lucca. This area is extended on a geographical surface of 750 square kilometres, including the territories governed by 12 Municipalities. More than 130 paper producing or processing firms (most of which SMEs) are located in the area, with a high level of aggregation, a considerable density per km² and with an occupational capability of more than 5.800 workers employed in the paper sector. In this area, that concentrates more than 80% of the national production of tissue paper, the industrial activities are deeply rooted in the social and institutional local context, and the production sites are mixed and integrated with many other civil, commercial, logistic, administrative and services activities. This is the typical structure of a particular cluster: the “industrial district”, as it is called in the United Kingdom and in Italy. The industrial systems of many EU countries are characterised by this territorial forms of production aggregation.

In the case of Lucca, the clustering of paper producers was due to (and originated from) the considerable local availability of water, a necessary input for this sector. The concentration of a large number of firms operating in the same sector causes relevant environmental impacts and, simultaneously, offers some opportunities of co-operation for improving the same impacts. This holds true for all the territorial areas possessing the characteristics of a cluster, even if not located in a given and well-defined territorial area (e.g.: a supply chain).

The experience of the Lucca cluster was aimed at experimenting a potentially effective “EMAS approach for Clusters”, which could be reproduced in every other similar cluster.

The premises of the analysed experience are a number of synergies that can be obtained at the management and technological level to promote the inclusion and diffusion of innovative elements

² The PIONEER project has been carried out by the Provincia di Lucca (co-ordinator), with the co-operation of the following partners: Scuola Superiore Sant’Anna, IEFE Bocconi, Camera di Commercio di Lucca, Associazione degli Industriali, Comune di Pescia, Delicarta and SCA Packaging.

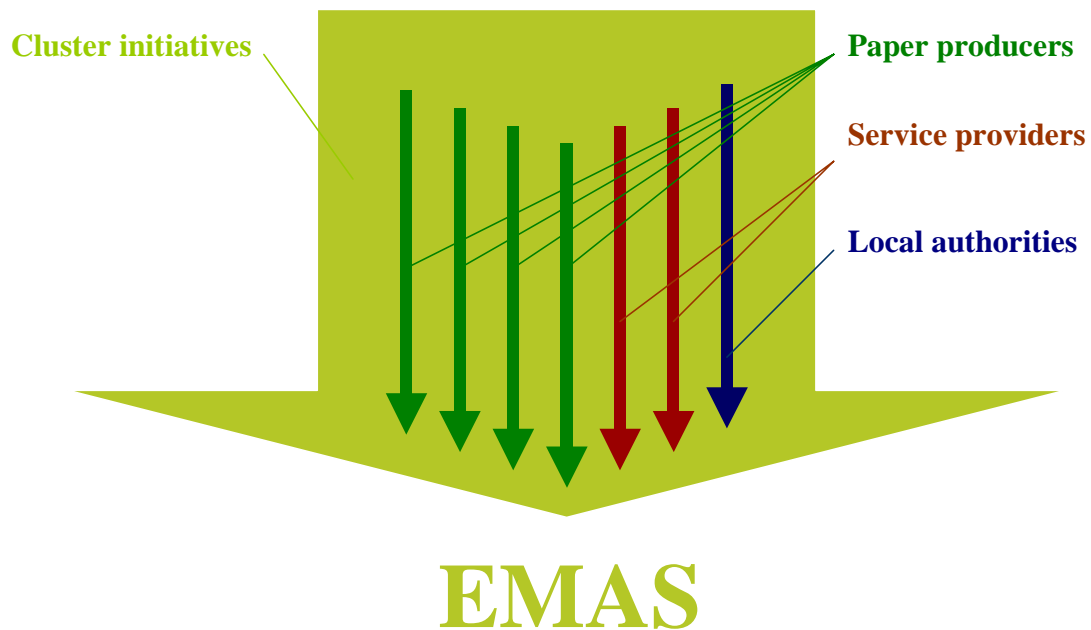
based on the partnership between the different companies operating within a cluster. It is a matter of exploiting the “co-opetition” attitude (co-operation between firms which also compete) and the collaboration between the enterprises and the other economic and institutional actors. A characteristic that favours this approach is the tendency of promoting the spread of information and sharing knowledge and technical resources.

Since the companies in a cluster are similar and have to tackle the same environmental problems, it is then possible to rely on other synergies already existing at the cluster level. For example, at the management level, it is possible to exploit the advantages connected to the identification of shared environmental “targets”, the environmental relevance of the same aspects and the existence of the same social and institutional “fabric” with which to interact. Moreover, the enterprises belonging to a cluster must comply with the same legislation, interact with the same supply chain and face the same environmentally critical situations. In this connection, the PIONEER project identified opportunities for different entities (SMEs, local authorities, trade associations, ecc.) to co-ordinate their environmental management at the local level, and this can promote improved performance, lower costs and outlays linked to the environmental management of each single organisation.

In addition, there are environmental scale-economies that can result from a joint environmental management of the equipments and services shared by the enterprises in the cluster (e.g.: the water purification systems). Moreover, in a cluster there are positive effects resulting from interacting with the citizens, due to the almost total coincidence of companies’ personnel with the local community of the cluster.

The approach proposed by the PIONEER project encompasses the implementation of the different steps foreseen by the EMAS regulation *at the cluster level*, as to create a common basis for all the individual organisations intending to use collective resources and a co-operative approach to achieve an individual EMAS Registration (see figure 1). For this purpose, the project provided a territorial initial environmental review, a local policy, a programme for the sustainable development of the cluster, a sort of “Cluster Environmental Management System” (made of different resources or procedures that are available for the individual organisations, e.g.: training, auditing, monitoring and communicating activities) and, finally, a Cluster “environmental statement”. These elements were used by the involved organisations to facilitate their adoption of EMAS on an individual basis. A sample of organisations were selected in the cluster, in order to verify the usefulness and the effectiveness of the co-operative approach. More than 40 organisations were identified among those more motivated to achieve EMAS registration and were involved in the experimental activities of the PIONEER project. As a final outcome, the project enabled 24 organisations to achieve EMAS registration by relying on the cluster approach.

Figure 1: The cluster-based approach



3. Description of the EMAS implementation process

The ‘cluster approach’ for EMAS has been implemented in different steps, reflecting the main requirements set by the Regulation EC/761/2001 for individual organisations.

The initial step was the set up of an EMAS Promotion Committee for the whole Lucca Cluster. This Committee is composed both of public (e.g.: *Provincia di Lucca*) and private (e.g.: *Associazione degli Industriali di Lucca*) actors and is in charge of defining the strategic guidelines for the cluster environmental policies and of implementing some “common resources”, in order to guarantee a co-ordinated and integrated management of environmental issues within the Cluster. The Promotion Committee has been set up by means of an official and formal agreement between local authorities and different interested parties networking for EMAS, that gave the proper rules and responsibilities in the implementation and maintenance of the collective activities and resources for the cluster.

The task of this Committee is that of designing and implementing a sort of common support framework, in order to guide and lead the local organisations towards EMAS Registration and make them share common resources and procedures. The role of the Committee is to co-ordinate the environmental management initiatives of the different local actors, to originate the actions for environmental improvement and to favour the possible synergies between the individual management systems of the local organisations.

The Promotion Committee meets periodically and its activities are aimed at pursuing the diffusion of the EMAS registrations in the territory by means of the following steps.

The second step has been the Initial Environmental Review referred to the whole Cluster. This review enabled to identify the most relevant and critical environmental aspects for the cluster. The aim of the Environmental Review of the Cluster was to support the involved organisations to identify and assess their own environmental aspects, according to EMAS. This was done, for example, by:

- identifying the most relevant impacts on the local environment and assessing the “state of the environment” that is interested by the cluster activities

- identifying the significant environmental pressures exerted by the most diffused typologies of production processes and technologies adopted by the organisations belonging to the cluster
- identifying the indirect (product-related) environmental aspects through a Life Cycle Assessment
- identifying the environmental issues that local communities (and other stakeholders) are perceiving as most urgent and important, by means of an “in-field” survey

In carrying out the review, both the cumulative effects resulting from the organisations activities / production processes and the indirect aspects (deriving from the interaction between their environmental impacts and those produced by the other operators existing in the geographical area or cluster, as well as by public services enterprises and civil residences) were considered. Information on significant environmental aspects has been provided by using environmental indicators according to EC Recommendation 532/2003. Significant environmental aspects and impacts were identified on the basis of well-defined evaluation criteria, agreed upon by the Promotion Committee. These criteria included, among the others, the importance to the stakeholders (e.g.: local communities environmental concerns, Local Agenda 21 action plan priorities, etc.).

As a third step, the Promotion Committee defined and shared a Cluster environmental Policy that became a reference for the EMAS policies of all the organisations involved in the cluster. The Environmental Policy for the Lucca cluster sets the guiding principles and general priorities based on the most significant environmental aspects and impacts, resulting from the previous review. The Environmental Policy has been officially approved by the Promotion Committee and diffused to all the interested parties in the cluster.

The policy is strongly linked to the local territorial context and it expresses the commitment of all the main actors towards the continual improvement of the environmental performances within the cluster. Such Policy meets the requirements of EMAS Regulation 761/2001 for an environmental Policy of a single organisation, and therefore can be simply adopted by any actor operating in the cluster.

From the Cluster Policy a collective and co-operative Environmental Programme and relating improvement objectives and targets stemmed, pursuing the principle of continuous improvement. This improvement is pursued in the Lucca cluster also by setting objective of continuous increase in the number of individual EMAS registrations and/or in the number of licences for the EU Eco-Label in the area. The Cluster Programme contains the concrete and measurable commitments for carrying out strategic and high-priority actions and measures for the whole cluster.

Once the Cluster Programme and the shared environmental objectives and targets have been adopted and recognised, each organisation (SMEs, public services, local authorities, etc.) can, on a voluntary basis according to the EMAS procedure, participate in the collective environmental programme and clearly identify its specific contribution to the targets of the whole programme. The programme therefore encompasses the possibility for the organisations to participate in local environmental projects, such as the implementation of a new sustainable transport system, a common action for energy saving in the local production processes or even the participation in the Local Agenda 21 process.

All these single actions can be easily taken as a reference by all local actors (including SMEs) in order to define their own individual EMAS programmes, as to contribute to the more general Cluster programme.

The Cluster Programme is based on a voluntary agreement between all the most representative actors of the EMAS Promotion Committee and is enacted by the same Committee with the co-operation of individual actors. In fact, all the organisations operating in the cluster can easily

participate in a collective and co-operative action, just by undertaking it as an EMAS individual programme.

By means of a sort of “Cluster Environmental Management System”, the Promotion Committee also provides the local SMEs with many resources and procedures that can be shared and collectively exploited at the cluster level. All these actions are aimed at supporting the development of EMAS on individual bases by the interested organisations of the cluster.

Among these activities and resources, the Lucca Promotion Committee implemented the following:

- searching common technical, organisational or managerial solutions for solving the local SMEs environmental problems (to increase efficiency of plants for reduction of pollutants, to overcome their cultural restrictions or their inadequacy for environmental management, to define and implement co-ordinated procedures for managing indirect environmental aspects,...);
- using the same infrastructures for the management of various environmental impacts;
- provide assistance to paper producing SMEs in the identification and assessment of the indirect environmental aspect, with particular reference to the product-related issues, e.g. by carrying out a (streamlined) Life Cycle Assessment of the local or cluster product(s) and by making the results available to interested organisations
- planning and carrying out environmental training activities, aimed at improving the awareness, competence and skills of managers, employees and technical staff of the organisations operating in the area / cluster;
- providing “common standards” (e.g.: Management Performance Indicators and/or Operational Performance Indicators, according to EC Recommendation 532/2003) to be used as reference models and benchmarks by the organisations (especially SMEs) in defining and implementing their environmental performance indicators; the Promotion Committee made the local SMEs aware of these benchmarks and promoted and allowed for direct comparison with these benchmarks;
- creating a common “audit team”, qualified to perform audit in the cluster at favourable conditions;
- providing organisations with continuously updated guidelines and indications on how to identify and have access to the applicable legal requirements related to their environmental aspects (e.g.: a legal requirement register was published, including a list of relevant sources, periodical updates on newly introduced laws and requirements, etc.) and to determine how these requirements apply to their environmental aspects.

Among this actions, one of the most effective was the drafting of some “model” procedures for the operational control and surveillance of the relevant activities by the SMEs in the cluster. Another interesting example relates to the many initiatives for the environmental training of the local actors that have been carried out (addressed to private and public actors). Some of the training initiatives targeted specific roles in the Cluster (corporate managers, environmental managers, public officers dealing with permits, technical and operational personnel). In addition to these initiatives, a special attention was devoted to the training of a local team of auditors. A last example refers to the audit system: the Promotion Committee planned the auditing activities for different purposes: to assess the compliance of the individual organisations with legal compliance, of their EMS with the EMAS requirements, etc. For the interested local actors it was then possible to rely on the services of a qualified team of “territorial” auditors. This enabled especially SMEs operating in the cluster to overcome the barriers they face in terms of lack of human and economic resources.

The last step of the ‘cluster approach’ concerned external communication initiatives and tools. By means of these initiatives and tools, interested parties, stakeholders and general public are continuously informed on significant environmental aspects, policy, programmes, objectives and

targets, activities and resources for environmental management in the cluster and how these change over time. The relevant information is provided by means of an environmental report concerning the whole area or cluster (similar to an EMAS Environmental Statement for an individual organisation).

This “cluster environmental statement” supports the SMEs of the cluster in communicating on environmental issues to the most relevant stakeholders.

The cluster Environmental Statement is set up in two parts:

- a general section including a characterization of the territory, the most relevant environmental aspects, the Cluster Environmental Policy, the Environmental Programme and the description of the so-called “Cluster Environmental Management System” common elements and resources available
- a special “add-on” section containing all the specific information about single organizations that individually participate in EMAS and a guideline on how to draft this part of the statement

Some other initiatives were aimed at receiving, documenting and responding to the relevant relations with the interested parties, in order to favour stable communication flows and exchange of information among the local actors. For example, the Promotion Committee created a website that responds to all the requests of information, complaints and suggestions regarding the environmental issues within the cluster, by any interested actor.

On the basis of these steps (see also figure 2), the Promotion Committee in the Lucca cluster decided to submit the collective activities and resources to an independent verification. This verification is carried out by an EMAS accredited verifier in order to assess that:

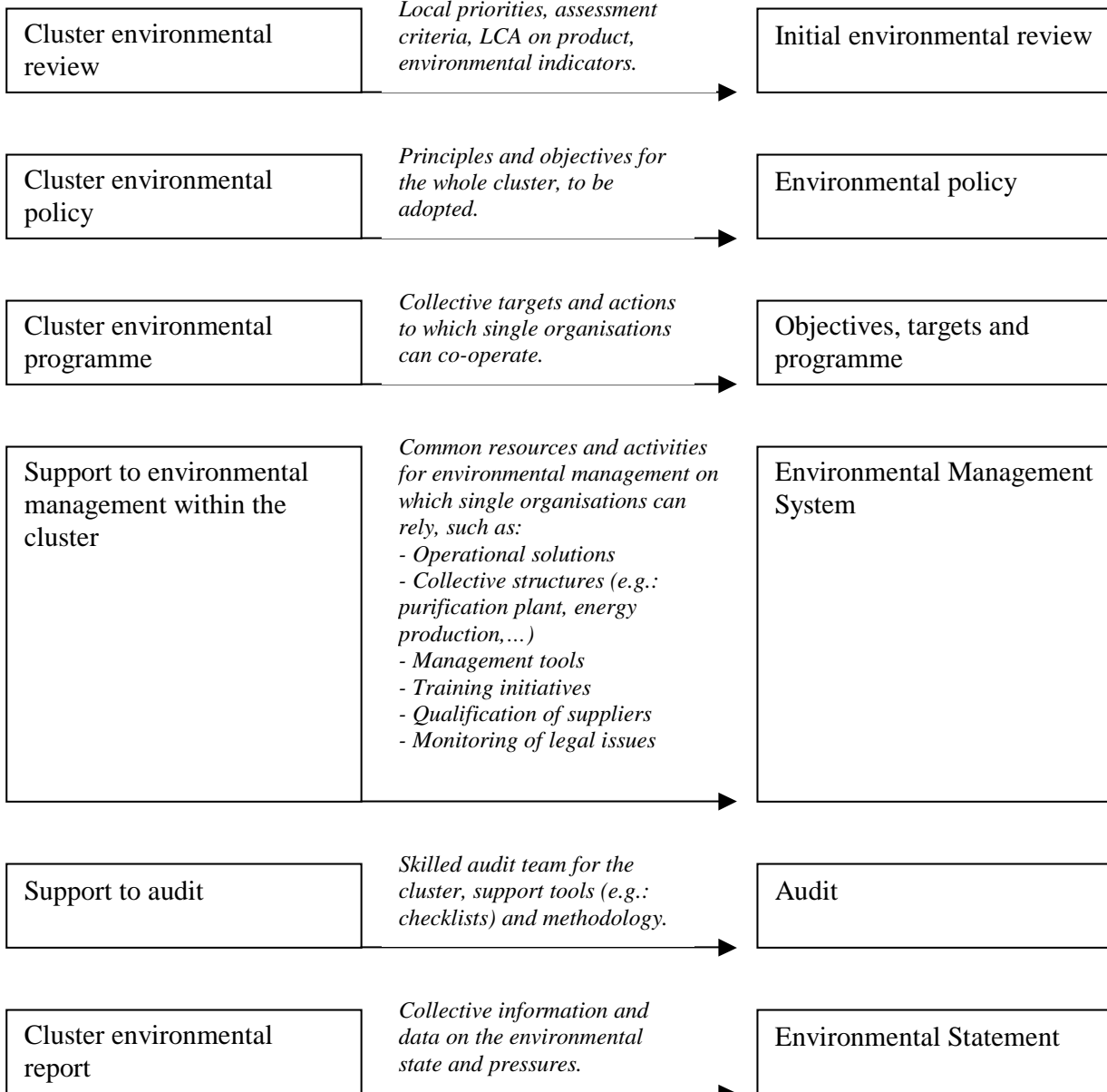
- the environmental review, the environmental policy, the “collective” environmental programme and the external communication initiatives and tools are consistent with the environmental situation of the cluster and can be an effective support for local actors, and especially for SMEs;
- these common activities and resources can be effectively used by the organisations operating in the area and/or cluster to satisfy individually the corresponding EMAS requirements in order to obtain an individual registration.

Figure 2: Methodological steps of the cluster approach

PROMOTION
COMMITTEE
OF THE CLUSTER



SINGLE ORGANISATION
OPERATING IN THE
CLUSTER



EMAS REGISTRATION

Once the collective activities and resources implemented by the Promotion Committee are verified and validated by an EMAS accredited verifier:

- the organisations located in the interested area or operating in the cluster are allowed to use the common activities and resources as a support for implementing and maintaining the corresponding EMAS requirement, in order to facilitate and simplify their steps for individual registration;
- the validated collective activities or resources do not need to be verified again by an EMAS accredited verifier when they are used by a single organisation as a support or a substitute for an individual registration.

This approach is currently allowed in Italy by the special “APO – Ambiti Produttivi Omogenei” procedure, experimentally created by the national Competent Body, and it has been proposed for the incoming revision process in sight of EMAS III.

4. Direct and indirect benefits of the “cluster approach”

Most of the benefits emerging from the adoption of a cluster approach are related to resource savings and to the possibility of relying on a shared set of tools and competences for the application of EMAS. The following are just few examples on how the companies involved in the PIONEER “cluster approach” (that are currently achieving EMAS registration) benefited from cluster-based common resources, made available by the Promotion Committee.

Kartocell, a tissue-paper producer, found it very useful to perform an assessment of its most significant environmental aspects by strongly relying on the “cluster” environmental initial review, carried out during the project. This company used the results of the cluster initial review to identify the most relevant direct aspects, and defined an assessment methodology based on the relevance that each aspect had for the whole cluster, the capability of influencing the local environment (indicators provided by the cluster review) and the level of importance of each aspect according to the local communities sensitiveness (information provided by the same cluster review, basing on an “in-field” survey on environmental awareness among the citizens). These were adopted as assessment criteria by *Kartocell*.

Delicarta, another tissue-paper producer, carried out the review and assessment of its environmental indirect aspects relying on the LCA – Life Cycle Assessment carried out on the locally manufactured products. This LCA was performed with a “streamlined” approach by the Promotion Committee within the PIONEER project, on both tissue-paper and corrugated board (which are the two most important products of the cluster). The data and information deriving from the LCA were included in the cluster environmental review, in such a way to be easily adopted by any interested producer to identify and assess its product-related indirect aspects.

Cartiera Lucchese, the first company to obtain the EU Eco-Label in Italy and pursuing EMAS registration, also relied on the cluster approach to identify and assess its environmental indirect aspects. In this case, the most useful tool has been a scheme for identifying and measuring indicators relating to the most relevant indirect aspects for the tissue-paper local industry. This tool has been prepared by the Promotion Committee and diffused to all interested companies.

SCA Packaging, a corrugated board producer, particularly relied on another cluster-based tool, made available to the local producers: a common audit team. This activity was judged as very effective by the company, as it provided a relevant opportunity to rely on external competence and to compare its experience in environmental management with other approaches.

Not only paper producers were able to take advantage of the cluster approach: two interesting examples refer to a connected supplier-sector: the manufacturing of paper-producing machinery. *Fosber* strongly relied on the environmental training initiatives carried out at the cluster level, in

order to replace the training activities that the companies should have carried out on their own. Among many other involved companies, *Fosber* took part in some courses that were organized and managed by the Promotion Committee on: environmental management, external communication, environmental auditing, etc. A second example is that of *Toscotec*, another machinery producer, that strongly relied on an effective managerial tool that was diffused to all the organizations involved in the project. The *Toscotec* environmental management system, in fact, was built on the basis of some “model” and easy-to-adapt procedures referring to the main EMAS elements: identification and assessment of environmental aspects, Non Compliances and Corrective and Preventive actions, Audit, Management Review, Training and Information of personnel, etc. Finally, it has to be emphasized that even organizations operating in non-industrial sectors can benefit from this approach, if they belong to the same cluster. A first interesting example is that of *Fabbriche di Vallico*, a very small municipality that is achieving EMAS registration and, for this purpose, initially relied mostly on the “cluster environmental review”, especially for that part identifying and assessing the pressures that the local paper industry is exerting on its territorial area. A last example refers to the *Museo della Carta*, an educational institution that aims at diffusing the history and culture of the paper production. In pursuing EMAS registration, this organization is strongly relying on the cluster approach. Particularly, an interesting choice that the *Museo* is making for empowering its role of “educator” in the environmental field is to use the “cluster environmental statement” as a supporting tool for all the training and communication initiatives addressed to students, companies and other stakeholders.

It has to be noted that, besides the above mentioned “direct” benefits for the organizations operating in the cluster (and interested in EMAS registration), some “indirect” benefits are produced for the whole institutional and social context of the interested territorial area, such as:

- a higher level of knowledge sharing and networking between EMAS organizations operating in the cluster
- a significant “multiplier” effect on all the other organizations of the cluster (higher sensitiveness, involvement in improvement actions, stakeholder pressure on the laggards, etc.)
- a wide availability of common resources and tools for environmental management, that can be made available to any interested organization
- a strong partnership between public and private actors of the cluster and a relevant capability of negotiating and agreeing upon the most effective environmental policies for the interested area
- a better informed policy making by local institutions, targeted at the specific characteristics and environmental priorities of the local industrial system
- a higher stakeholder involvement, with particular reference to the increase of environmental awareness in local communities and citizens

5. Difficulties and barriers

The most relevant barriers in the implementation of the ‘cluster approach’ experienced in Lucca have been the following:

- It is difficult to identify an actor within the cluster that is motivated enough to be the “first mover” in taking (and maintaining) the responsibility of developing, promoting and diffusing common resources and tools for EMAS application. In the case of the Lucca cluster, the “first mover” was an ad-hoc created Committee, composed of different local actors. In other cases, a public institution or a large company can be motivated enough to take the initiative.

- In cases like the Lucca cluster where a Committee is created, difficulties may arise in the governance of this newly instituted body and in the negotiation process that is aimed at defining the environmental policies and strategy for the whole cluster.
- A relevant difficulty is also linked to the economic resources that are needed to support the activity of the Promotion Committee and to provide common tools, competence and other resources to the whole cluster. In this case, a crucial support was given by the LIFE funding.
- Another barrier can be represented by the high number of organisation operating in a cluster (sometimes belonging to many different sectors and branches) and by their heterogeneity, that can prevent the possibility of creating and diffusing common resources, knowledge and tools.
- A last barrier can be represented by a “free riding” problem. Even if many companies in the cluster will be interested in approaching EMAS and, therefore, in using the cluster-based resources and tools, it might well be that some companies won’t be motivated enough and, therefore, will not benefit from this approach.

6. Conclusions

The main lessons learned for the revision of EMAS are the following.

First, the cluster approach proves to be effective in stimulating and supporting the adoption of EMAS and, more in general, a better environmental management by the interested companies.

Second, in order to start up and maintain this particular networking approach, there is to be a strong motivation by one or more actors in the cluster that are able to take the initiative and make shared resources and common tools available for the involved organisations. This motivation could be an EMAS-related recognition or “award” for the Promotion Committee.

In addition to that, it has to be finally noted that accredited verifiers must be fully involved in the application of this kind of approaches, in order to really enable (and promote) the use of shared resources and common tools by all the organisations of a cluster. This can be done, for instance, by training and accrediting verifiers in such a way to make it possible to validate the cluster-based resources and tools and, consequently, make them easily available for all the organisations involved in the cluster, with no need of double-checking and further validating these resources and tools for individual EMAS registrations.

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