

Review

# The Self Diagnosis Method

## A new methodology to assess environmental management in sea ports

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### Abstract

A methodology has been designed to assess the performance of the environmental management in sea ports. The Self Diagnosis Method, developed by two research teams and about sixty sea ports, allows the comparison of the current environmental situation with that corresponding to previous years and the assessment of the opportunities for improvement. The main objective is to review the management activities and procedures that affect the environment and the way the port authority handles significant environmental aspects. It has been designed as a “first level” tool: it can be applied in approximately six hours by a non-expert user. It is based on the ISO 14001 vocabulary, requirements and structure, and it can be considered as a first step in the voluntary implementation of an environmental management system for port communities.

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### 1. Introduction

From the point of view of the environment, sea ports are very complex systems. In fact, the very existence of the port, as well as any expansion of its installations, implies a certain loss of habitat. Furthermore, in ports we find almost all the elements which, in one way or another, can be associated with environmental impact: waste water, emissions of gas or particles into the atmosphere, noise, soil contamination, dredging, waste production, accidental releases into water or air, etc.

There can, therefore, be an environmental impact on water, air or soil. Moreover, pollution can occur either in normal conditions or accidentally. The continuous movement of ships in a confined and reduced area—the port—inevitably gives rise to collisions between ships or between ships and the coast at frequent intervals, and to the consequent risk of the release of hazardous materials. A similar situation is found in land port zones, where there is usually an intense movement of lorries and trains (Trozzi and Vaccaro, 2000).

It should also be taken into account that in or very near the port area, there are usually installations or activities which can, in turn, give rise to further environmental impacts: fisheries, industrial installations, storage of hazardous materials, etc.

The importance of the different environmental issues clearly depends on the characteristics of each port, although some issues are frequently more important than others. Table 1 summarizes the ranking of the major environmental issues in sea ports, according to the results obtained from the ESPO Environmental Questionnaire 1996 that was directed at 281 European ports from 15 countries (ECO-information, 1999), and to the analogous ESPO Environmental Survey 2003, to which more than 100 ports replied to within the framework of the ECOPORTS project in 2003. As it can be seen, in 1996 port development (water related) came out as being the most important issue according to the ports, followed by water quality and dredging disposal. In contrast, in 2003 the leading concerns have been port waste, dredging disposal and dredging, respectively. The main changes that have occurred over the last 7 years are the presence at the top of the list of port waste (not even present in the 1996 top 10 ranking), the decreasing importance of water quality, and the rising position of

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Table 1  
Ranking of environmental issues according to ports' concerns, based on the results of the ESPO Environmental Questionnaire of 1996 (ECO-information, 1999) and on the ESPO Environmental Survey 2003

	1996	2003
1	Port development (water)	Garbage/port waste
2	Water quality	Dredging disposal
3	Dredging disposal	Dredging
4	Dredging	Dust
5	Dust	Port development (land)
6	Port development (land)	Noise
7	Contaminated land	Hazardous cargo
8	Habitat loss/degradation	Air quality
9	Traffic volume	Water quality
10	Industrial effluent	Ship discharge (bilge)

noise and hazardous cargoes. Such changes reflect increased environmental awareness in ports and the actions carried out as a result of increasing pressure from environmental legislation, the need to maintain a good public image, and taking third parties and stakeholders into consideration.

One aspect that may be of considerable importance is the fact that all the scenarios mentioned usually occur near or very near urban areas, sometimes with a high population density; for obvious reasons, port areas have historically grown up very close to towns. Any incident with environmental consequences can influence or affect the population to a greater or lesser degree.

All these circumstances mean that environmental considerations are essential for sea ports nowadays and will be even more important in the near future. It is, however, a field in which few initiatives have been undertaken—far fewer than in other similar sectors such as the chemical industry—and there are currently still many sea ports that are not using any specific methodology to analyze or assess their environmental management situation.

Several guidelines exist—briefly described in the next section—for implementing an environmental management system. They involve relatively complex methodologies (for example ISO 14001 or EMAS) and their application requires considerable effort and know-how. In general, the implementation of these standards can be applied after reaching a “second level”, that is, a certain degree of experience in environmental management is required. This is particularly true for ports, due to their high level of complexity and to their often considerable size. A simpler and accessible “first level” tool was therefore lacking, allowing an inexperienced port to develop a preliminary assessment of its current environmental management strategies and to detect ways of improving them, and thus prepare for the subsequent application of a higher level and more powerful methodology.

This is why a new methodology (Self Diagnosis Method, SDM) has been developed. It allows an evaluation of environmental management at sea ports to be carried out. The SDM has been elaborated in close collaboration with a number of European sea ports, where it has been tested at length.

The SDM consists of a strategic analysis questionnaire designed for environmental port managers; its main objectives are:

- To regularly review the environmental management performance in the port.
- To allow periodic self-evaluation of environmental improvement in the port.
- To compare effectively the port environmental performance against a European benchmark.
- To identify environmental priorities in the port.
- To move towards the implementation of an environmental management system (such as, for example, ISO 14001 or EMAS).

This paper describes the structure and main features of this new method.

## 2. Port environmental management standards, tools and practices

There is a growing acceptance by port managers for the need to understand more about the environmental aspects of their port activities. Results of surveys by the European Seaports Organisation and Eco-information project, shown in Table 2, demonstrate progress of the port sector over the period 1996–2003. These include an increase in environmental planning and awareness of policy issues. Whilst there are a number of factors influencing this trend, including increasing legislation and recognition of the common challenges faced by ports, a prime factor is the ability for port professionals to use tools and methodologies derived from collaborative research. The self diagnosis methodology is one such standardised tool, designed specifically for port use, and related to broader international standards for environmental management.

It can be stated that at an international level, the reference in the field of environmental management is set by the standard ISO 14001 (ISO, 1996). Its application is voluntary and it can be adopted by any type of organization, from the simplest ones to large-scale companies and institutions. An external body audits the environmental management system; if this auditing process gives a positive result (if the standard is met), the organization benefits from certification. Obviously, the bigger and more complex the organization, the harder it is to attain the level required in order to be certified. Ports are in general very complex organizations. They

Table 2  
Progress in port environmental management

Environmental management component	1996 <sup>a</sup> (%)	1999 <sup>b</sup> (%)	2003 <sup>c</sup> (%)	Percentage change (1996–2003)
Does the port authority have an environmental plan?	45	52	62	+17
Does the plan aim for 'compliance-plus'?	32	41	45	+13
Does the plan aim to raise environmental awareness?	44	62	56	+12
Is environmental monitoring carried out in the port?	53	60	69	+16
Does the plan involve community and stakeholders?	53	60	56	+3
Is ESPO code available in port?	41	48	54	+13
Does port have designated personnel?	55	65	55	No change

Note. Successive surveys represent different numbers and identities of respondent ports, the results should be interpreted with caution. The trends are more reliable as indicators of progress than the actual percentage figures.

<sup>a</sup> ESPO Survey 1996. After results of ECO-information (1999).

<sup>b</sup> ECO-information (1999).

<sup>c</sup> ESPO Survey 2003 (interim results).

may vary greatly in size and in their commercial importance (ranging from small fishing and tourist harbours to extremely large macro-systems, such as Rotterdam, Marseilles, etc.). Their organizational structure cannot be defined in an unambiguous way, since it depends (mainly) on their size and on national and regional legislation. This makes meeting standard ISO 14001 quite a hard and long process.

In 1993 the European Community issued the EMAS (Eco-Management and Audit Scheme), to regulate the "participation by companies in the industrial sector in a community eco-management and audit scheme" (European Parliament and the Council of the European Union, 1993). It was repealed in 2001 and replaced by a new version of the regulation (European Parliament and the Council of the European Union, 2001). As with ISO 14001, the application of this scheme is voluntary, and it can be applied to any kind of organization. Moreover, the 2001 edition incorporates ISO 14001 as a requirement for those organizations wishing to gain the EMAS accreditation. Apart from having to implement an EMS after the ISO requirements, organizations aiming for the EMAS are to prepare an Environmental Review and an Environmental Statement. These additional tasks make EMAS a very difficult challenge for ports and port communities, even more difficult than ISO 14001.

In spite of such difficulties in implementing state-of-the-art standards, ports cannot ignore the challenge of environmental management. For these reasons, in recent years port authorities have shown a growing interest in the means that help them to improve their environmental management. In Europe, this interest is best shown by the activities of the European Sea Ports Organisation (ESPO). Founded in 1993, the ESPO has worked extensively through several initiatives. In 1994 the ESPO published the Environmental Code of Practice (ESPO, 1994), which aimed to express

the ports' collective commitment to environmental improvement. It recommended that ports "comply with the letter and spirit of environmental legislation and abide by internationally agreed conventions, directives and resolutions intended to protect the environment" and said they should "initiate steps to consider the potential for the improvement of environmental standards beyond those currently required under legislation". In 2001 the ESPO Environmental Review was produced (ESPO, 2001), as a revision and follow-up to the Code of Practice, with explicit recommendations for ports to: prepare a publicly available environmental policy setting out their strategies and methods for achieving their environmental aims; to review their plans regularly to take legislative and other changes into account; to produce a publicly available annual environmental review; to consider what environmental monitoring is required to assess their environmental progress; to establish a number of relevant environmental indicators and targets to measure progress; and to consult adequately within the local community on its environmental programme. In September 2003, ESPO published the new Code of Practice (ESPO, 2003) which recommends more specific environmental practices and goes further in order to improve the environmental performance in ports.

Recently, a Port Environmental Review System (PERS) has been prepared within the framework of the ECOPORTS project (EcoPorts Foundation and ESPO, 2003). The PERS has the following features:

- It is designed to assist ports in implementing the recommendations of the ESPO Environmental Review (2001).
- It defines a *basic* standard of good practice for the port sector. The experience gained by applying the PERS can be useful for those ports aiming for higher

steps, such as ISO 14001 or EMAS, because the structure of the document closely follows the ISO 14001 requirements.

- As a voluntary option, ports and port authorities may apply for the PERS Certificate of Verification. This is an important characteristic as the PERS allows ports to show evidence of their good practice just as ISO and EMAS do, but as the system is specifically designed for ports, it is easier to acquire the certificate.
- The sections of the PERS are:
  1. Port profile.
  2. Environmental policy statement.
  3. Register of environmental aspects and legal requirements/performance indicators.
  4. Documental responsibilities and resources related to environmental aspects.
  5. Conformity review on legal requirements and policy.
  6. Environmental report.
  7. Selected examples of best practice.

In 2001, the Port of Valencia released an “implementation guide for port facilities” (Autoridad Portuaria de Valencia, 2001). This document is intended to provide a set of guidelines to help port facilities (including port authorities), to design, establish and eventually certify an environmental management system following the requirements of ISO 14001 and EMAS. The tool operates on two possible levels: single port facilities situated inside the port area, including the port authorities, or the port area as a whole. It is the first attempt to solve the problems arising from the complexity and ambiguity of the port system when looking at it from the environmental management perspective. At present, this tool has been introduced into the ECOPORTS package. It can be considered as a link between the PERS and international standards.

### 3. The Self Diagnosis Method

The Self Diagnosis Method has been designed to support port managers in regularly reviewing environmental management performance in their port. The tool serves to compare the present environmental management performance with the results of the previous years and to assess areas for possible improvement. The SDM is essentially based on a checklist which concentrates on the status of the port’s environmental management. The main objective is to review management activities and procedures with regard to the environment, and the way the port authority currently deals with its significant environmental aspects. The results should comprise a list of points for attention, and can be used to detail the port’s environmental strategy and to report the results obtained (see Section 5).

The Self Diagnosis Method was first developed within the framework of the ECO-information European research project (1997–1999) (ECO-information, 1999; Casal et al., 1999) by 25 ports and two research teams (ECO-information, 1998). The SDM is a continuous use, active tool for environmental management in European ports.

The first version of the Self Diagnosis Method was tested by its application in over 60 European ports of different sizes and characteristics. The results were satisfactory and critical comments collected from port managers have been used to modify and improve the tool. The main modifications arising from these suggestions are as follows.

*The previous document proved to be too long and complex.* An effort has been made to reduce (by 25%) the number of questions, without losing significance and to make the document friendlier.

*Language and terms did not appear to be well defined.* In the new version the language and terms of ISO 14001 have been used. A glossary (together with several examples, a checklist of activities and environmental aspects, etc.) has been included in Guidelines for ECO-PORTS Tools and Methodologies.

*There was no explanation of why ports should undertake the SDM (benefits of applying it).* The Introduction has been modified in order to highlight benefits and advantages.

*The SDM should be a practical first step towards meeting ISO 14001 and/or EMAS.* The presence of important ISO 14001 and EMAS requirements has been reviewed. The structure of the new version of the SDM is practically parallel to the order of the standard ISO 14001 (see Table 3).

With all these improvements and modifications, the new version of the SDM was discussed with port environmental managers in a series of working sessions and as a result of these, further slight modifications were introduced. After this, the SDM was applied to a set of ports (among which Amsterdam, Barcelona, Dover, Genoa, Gothenburg and Rotterdam) and again slight modifications were introduced. It is now considered to be a finished product ready for use. The next step is likely to see the implementation increased from 60 to over 150 European ports. This spread adoption is important in creating the ‘level playing field’ that will reduce the disparity in environmental efforts, and encourage all ports to opt for a standard of competence in environmental management. The environmental solutions developed in each port will vary according to their geographical context, but SDM provides the evidence that will allow to prioritise their individual responses.

As a tool, the SDM essentially stands on its own, but at the same time, it has been designed in harmony with the other tools produced within the framework of the

Table 3  
Relationship between the structure of the SDM and ISO 14001

SDM section	ISO 14001 section
1. A. Environmental policy document	4.2
1. B. Environmental policy scope	4.2
1. C. Environmental regulations and port activities	4.3.1, 4.3.2
1. D. Objectives and targets	4.3.3
1. E. Resources and budget	4.4.1
2. A. Responsibilities of the environmental management representative	4.4.1
2. B. Responsibilities of key personnel	4.4.1
2. C. Individual environmental responsibilities	4.4.1
3. Environmental training	4.4.2
4. A. Internal communication	4.4.3a
4. B. External communication	4.4.3b
5. A. Management programs and action plans	4.3.4
5. B. Standard operating procedures and working instructions	4.4.6
5. C. Environmental management manual	4.4.4
5. D. Environmental documentation management	4.4.4, 4.4.5
6. Emergency planning	4.4.7
7. A. Environmental monitoring	4.5.1–4.5.3
7. B. Monitoring of management program	4.5.1–4.5.3
8. A. Environmental audit	4.5.4
8. B. Review	4.6

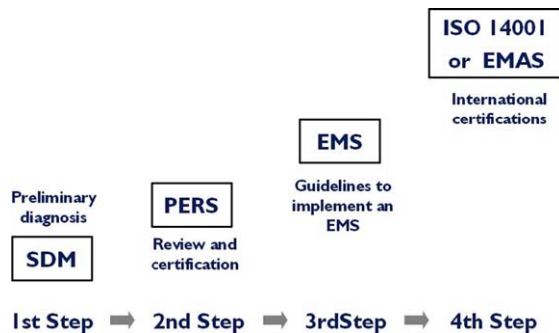


Fig. 1. Diagram showing the relationship between the ECOPORTS tools and the international standards.

ECOPORTS project, so the PERS and the SDM are mutually consistent. Detailed consideration of the results obtained from the SDM is very helpful for completing the PERS. For example, the Self Diagnosis Method helps to highlight the most important shortfalls in environmental management: this is useful to set environmental objectives, which in turn is a requirement of the PERS.

The products currently provided by ECOPORTS gradually lead to the level required to attain ISO 14001 or EMAS certification (see Fig. 1), although all of them may also be considered as tools that stand on their own.

An SDM training program has been designed for port managers. This program has been tested successfully in several ECOPORTS regional sessions around

Europe (Spain, Cyprus, Holland and the United Kingdom).


#### 4. Description of the SDM

The Self Diagnosis Method consists of two sections, the Port Profile and the Environmental Management and Procedures.

*Port Profile.* The objective of this section is to provide a complete definition of the main features of the port and of its activities (see Fig. 2), gathering essential information about the port. It consists of five subsections:

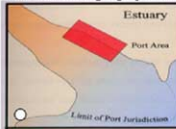
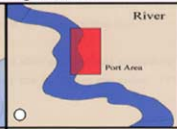

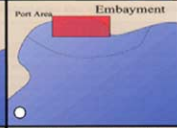


- *Legal status and port operators.* This establishes the legal position of the port and who carries out each activity (operating terminals, stevedoring, cargo handling, etc.).
- *Port location and port area.* This describes the physical features of the port (geographical setting, port extension, port navigable water, etc.), the use of surrounding land, and the coastal and marine characteristics.
- *Port business.* Brief quantitative description of tonnage, number of containers per year and number of passengers per year.
- *Main commercial activities and cargo handling.* A checklist of commercial activities (chemical industry,

**Port Location and Port Area**



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Please tick the geographic setting of the Port

 <p>Estuary</p>	 <p>River</p>
 <p>Marine Inlet</p>	 <p>Embayment</p>
 <p>Protected Coast</p>	 <p>Engineered Coastline</p>

Other location: \_\_\_\_\_

Please describe the area of the Port

Area of Port's land (km<sup>2</sup> or specify units): \_\_\_\_\_

Further detail: \_\_\_\_\_

Port jurisdiction limit onshore (km or specify units): \_\_\_\_\_

Further detail: \_\_\_\_\_

Area of Port's navigable water (km<sup>2</sup> or specify units): \_\_\_\_\_

Further detail: \_\_\_\_\_

Port jurisdiction limit offshore (nautical miles): \_\_\_\_\_

Further detail: \_\_\_\_\_

Length, largest vessel (m): \_\_\_\_\_

Draught, largest vessel (m): \_\_\_\_\_

Tidal range (m): \_\_\_\_\_

Maximum draught (m): \_\_\_\_\_

Total quayage (m) : \_\_\_\_\_

Fig. 2. Port profile.

Ro-Ro, etc.) and cargo handling (dry bulk, liquid bulk, etc.).

- *Main cargoes.* A checklist of cargoes (animal feed, chemicals, etc.).

Finally, there is a space for “other remarks”. Generally, filling in this section is very easy, as it only requires very specific data or ticking boxes in the checklists. There is a space left so the user can introduce any additional information if necessary.

Environmental management and procedures. This is the core of the SDM, as it can be considered a comprehensive and structured checklist on environmental management issues. It is preceded by an Answer Key giving brief instructions on how to fill in the questionnaire. There are three types of questions: Yes/No, Yes/Partial/No, and Ranked questions (in which the user is asked to rank the degree to which the port has achieved a given task).

“Environmental Management and Procedures” is divided into eight subsections:

- *1. Environmental policy.*
  - *1. A. Environmental policy document.* Questions about the existence of an environmental policy and the main issues included in it (commitments to continual improvement, reduction of resource consumption, etc.).
  - *1. B. Environmental policy scope.* This analyzes the different issues covered by the environmental policy. (Is the policy intended to implement the ESPO Code of Practice? Does the policy explicitly refer to waste produced in the port?).

- *1. C. Environmental regulations and port activities/ aspects.* This asks about the existence of an inventory of relevant environmental regulations, and of an inventory of environmental aspects. There is a checklist for the different activities: bunkering, dredging, land traffic, waste management, cargo handling operations, cargo storage, port-based industry, fisheries, etc., in order to make sure that the port is aware of all the aspects deriving from its activities.
- *1. D. Objectives and targets.* Questions about objectives and targets specified by the port (whether they have been defined, published, etc.).
- *1. E. Resources and budget.* This is about the allocation of financial resources for environmental purposes (training, monitoring, etc.).
- *2. Management organization and personnel.*
  - *2. A. Responsibilities of the environmental management representative.* This specifies the responsibilities of the environmental manager.
  - *2. B. Environmental responsibilities of key personnel.* This establishes which employees are responsible for the key functions in those areas for which the port authority is responsible.
  - *2. C. Individual environmental responsibilities.* This asks if and how individual responsibilities are documented.
- *3. Environmental training.* Questions about the environmental awareness of the employees and about the existence and characteristics of environmental training.

- 4. *Communication.*
  - 4. A. *Internal communication.* This enquires about the procedures used to communicate environmental port information between key internal personnel.
  - 4. B. *External communication.* This enquires about the procedures used to communicate relevant environmental information to interested parties (e.g. whether brochures and newsletters are used, whether there is a website with environmental information, etc.).
- 5. *Operational management.*
  - 5. A. *Management programs and action plans.* On the existence/features of management programs and action plans.
  - 5. B. *Standard operating procedures and working instructions.* On the methods for dealing with non-compliance of standards, both internal and external.
  - 5. C. *Environmental management manual.* About the existence and contents of the environmental management manual.
  - 5. D. *Environmental documentation management.* On the management of the relevant environmental documentation (updating procedures, officer/manager in charge of the maintenance of the documentation, etc.).
- 6. *Emergency planning.* This inquires about the contents of emergency and incident plans (actions, responsibilities, equipment, communication procedures).
- 7. *Monitoring and records.*
  - 7. A. *Environmental monitoring.* This asks about issues related to environmental monitoring programs.
  - 7. B. *Monitoring of management program.* On how the monitoring of the environmental management plan is carried out.
- 8. *Review and audit.*
  - 8. A. *Environmental audit.* About carrying out environmental audits and their scope.
  - 8. B. *Review.* On what procedures are used to review the port environmental management program.

Moreover, a glossary of environmental management terminology is included in the Guidelines for ECOPORTS Tools and Methodologies. The glossary helps port managers to deal, not only with the SDM, but also with other ECOPORTS tools.

The first version of the SDM (ECO-information, 1998) contained one additional section: “Issue specific strategic questions,” which contained a set of questions on how the port deals with the management of ten important environmental issues (those in Table 4). The ten issues included in this section of the SDM were

Table 4

List of environmental issues included in the “Issues specific strategic questions” of the SDM 1998

Air quality
Dredging
Dust
Energy use
Habitat loss
Health and safety management
Noise
Soil contamination
Waste management
Water quality

chosen based on the ESPO Environmental Questionnaire 1996 and on additional considerations (e.g. Health and Safety and Energy Use were added after their inclusion in European policies). The experience acquired through using it in a number of ports indicated that it would be advisable to reorganize the SDM into two tools, as the port authorities have expressed an interest in focussing only on those aspects that concern them. Therefore, this second part is now being modified to become an independent and complementary tool (strategic overview of significant environmental aspects, SOSEA), which is currently undergoing testing.

## 5. Outputs for ports

Once a port has completed the SDM, the results can be introduced into a database for their analysis by the ECOPORTS scientific team. Four basic types of feedback are obtained:

(1) Baseline results: a report on the answers given (e.g. percentages of positive answers in each section). Apart from providing the port with a general idea of how it is carrying out its environmental management, the baseline results allow periodical self-evaluation of the port’s environmental improvement by comparing them with the answers given in previous years.

(2) An effective comparison of the environmental management performance against a European benchmark: a database containing the answers given by all the ports participating in ECOPORTS is constantly updated. It is thus possible to know how all the ports answered each question (which proportion answered positively, negatively, etc.). The individual port’s answers are compared with this European benchmark, so as to make clear where the port stands in relation to the European situation.

(3) GAP analysis: to identify gaps between current management and the requirements of European and international standards (PERS, EMAS and ISO 14001). For example, an environmental policy is a requirement for the PERS, EMAS and ISO 14001 standards, so if the port does not have one, a gap is detected and reported to

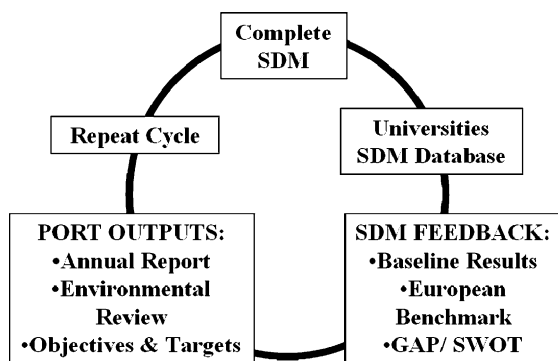


Fig. 3. The SDM process: inputs and outputs.

the port with the SDM feedback document. In this way, the SDM is a complete checklist covering the main requirements of international standards and thus helps ports to comply with them.

(4) SWOT analysis: an identification of points of *strength–weakness–opportunity–threat* in the environmental management of the port. Carrying out an analysis using the SWOT framework can be used to help a port understand its greatest opportunities for improving environmental practice. The SWOT analysis is essentially based on the results of the comparison with the European benchmark and the GAP analysis. For example, if the port has given a negative answer to a question where the European benchmark is 80% (which means 80% of the ports has answered positively), there is a good chance to improve and so it can be classed as an *opportunity*. On the other hand, if the port's answer is positive and the European benchmark is 40%, this is one of its strengths.

Other benefits can be derived from this basic feedback, such as identifying sources of environmental and business risk, checking compliance with environmental legislation, increasing the environmental awareness of the port authority, etc.

The port can gather together all the information provided in outputs and deliverables. For example some results may be incorporated into the port's Annual report or Environmental Review. Another possibility could be to use the feedback to help the port set its environmental objectives and targets.

This process can become cyclical since it can be repeated yearly in order to improve the environmental management performance of the port (see Fig. 3), which is one of the principles of ISO 14001: continual improvement.

## 6. Conclusions

The Self Diagnosis Method has been designed within the framework of the ECO-information (1997–1999) and ECOPORTS (2002–2005) European projects as a

tool to review environmental management performance in sea ports. It has been devised using a practical approach and a trial-and-error process through its application in a number of ports.

It can be applied by the port environmental manager without any specific difficulties in a session of 5–7 h. The specific benefits are:

- Assessment of port environmental context and management.
- Periodical self-evaluation of the port's environmental improvement.
- Checking compliance with environmental legislation.
- Effective comparison of port environmental performance against a European benchmark.
- Monitoring the quality of current environmental management, to identify points of strength/weakness/opportunity/threat and relevant environmental management gaps.
- Identifying business risk.
- Motivating the port authority towards improved environmental management and raising staff environmental awareness.

The SDM is part of the ECOPORTS tool package, which has a harmonious design as the tools are mutually consistent and based on ISO 14001/EMAS requirements. They can be considered as gradual steps along the path to the implementation and certification of an environmental management system. The SDM approach, very specific to the port sector, may be considered also as a good example of a tool able to fill the gap between the environmental management international standards (which lack specifications in order to attain a general scope) and a concrete industrial environment.

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