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Sustainable Development

Sustainable Development of Port Operation
The Role of Education and Training

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List of Acronyms

EMS	Environmental Management System
ESPO	European Seaports Organization
PERS	Port Environmental Review System
AUTH	Aristotle University of Thessaloniki
OPRC	Oil Pollution Preparedness Response and Cooperation
HNS	Hazardous and Noxious Substances
SDM	Self Diagnosis Methods
EPF	Eco Ports Funds
SWOT	Strength , Weakness, Opportunity and Threat

1- Introduction

The period when port authorities were more concerned with the effect of environmental elements on their activities than with the impacts of port operations on the quality of the environment has long passed. It has now become imperative that the environmental issues of a port's activities are managed effectively in terms of both day-to-day operations and long-term development. By definition, environmental issues are often trans-boundary, involve several systems in terms of aspects, significance and pathways, and their effects may impact on air, soil, sediment, water and ecosystems.

Each port may be considered as unique in terms of geography, commercial profile, hydrographic and operations, although it is acknowledged that ports often share common environmental challenges in terms of the growing requirement to demonstrate sustainable development and environmental protection. The traditional definition of a port as "the area, where traffic changes between land and sea modes of transport" has been modified to demonstrate the indispensable role that ports play in the logistic chain. Ports are now "...a mixture of industry and services that serve specific production and distribution processes" (Stavrakouli and Wooldridge 2004). In addition, ports are coming under pressure from the global market forces and the local political forces for redevelopment (El-Hibir 2004). These new challenges make commercial ports subject to environmental protection and sustainable development by putting in place the functional organization necessary to effectively discharge the Port Authority's environmental responsibilities in a practicable and cost-effective manner. In this framework, port sustainable development can be defined as the situation in which the port is able to meet its own needs without endangering its own future. Nowadays, the concept of sustainable development is incorporated as the major component of the environmental policy statement of many port authorities and environmental performance is a key component of Corporate Social Responsibility.

The apparent dilemma of "protection of the environment in the port area or development of the port" has been a recurrent theme. In recent years, experiences worldwide prove in practice that this dilemma does not make any real sense if ports adopt the following principles into their corporate policy (Palantzas *et al*, 2005):

- . Efficient economic performance
- . Ecological sustainability

. Social responsibility

The biggest challenge between policy objective and the attainment of environmental targets has been the availability of practical tools and methodologies for implementation.

2- Description

The port sector can demonstrate a positive and pro-active program of environmental management initiatives, particularly over the last twelve years (Wooldridge 2004). The port sector's policy in Europe is currently to encourage compliance with legislation to high standards through voluntary schemes of self-regulation. In terms of development, the impacts of the ports activities and operations on the environment is coming under growing scrutiny from a wide range of stakeholders, including local communities and international legislators (Beresford et al 2004). Port authorities are increasingly aware of the costs in terms of both poor public relations and publicity, and financial penalties, of neglecting their environmental duties and of failing to put effective environmental strategies in place. Ports are working towards "a level playing field" in terms of enforcement of environmental standards. Consequently, ports have a wide range of reasons to respond to the new demands of environmental management and sustainable development as shown in the following table (Wooldridge 2004):

- | | |
|-----------------------|----------------------------|
| . Compliance | . Investor and shareholder |
| . Port development | . Director's liability |
| . Risk management | . Cost and cost saving |
| . Customers | . Market opportunity |
| . Community | . Positive image |
| . Insurance and banks | . Influence policy |

In this context, the "Green paper on seaports and maritime infrastructure" (EC 1997), the European policy for transportation (EC 2001a)], the Communication on the quality services in seaports as a key issue for European transportation (EC 2001b) and the identification of transportation as a key factor of the European sustainable development strategy (EC 2001c) raise, on the one hand the important role of ports in environmental protection and on the other, the ports' need to incorporate environmental dimension into their planning and development. While expansions of port facilities can make a significant contribution to economic and transportation development and the growth of a port, it may also create a wide range of potential adverse effects on the surrounding environment.

Self-regulation in the sector's policy refers to the various forms of Environmental Management System (EMS) that many ports throughout Europe and the World are developing and implementing, as a tool to assist in fulfilling their environmental responsibilities and duties. As stated above, the greatest challenge that lies in the gap between an environmental statement of intent or policy and the achievement of actual environmental protection is implementation. This is best achieved by the development and application of structured EMS (Wooldridge et al 1999). Internationally, the trend is that many of the more progressive and proactive port authorities are moving the environmental imperative to the heart of their business plan and high up the agenda for action plans. Successive surveys, conferences, workshops and media reports confirm the growing status of environmental management and sustainable development as a major consideration and activity for a rapidly growing number of port authorities worldwide.

The Strategic Environmental Assessment of transportation development plans (EC 2001d), the Directive on the assessment of the effects of certain public and private projects on the environment (EC 1997b) and the Environmental Code of Practice published by the European Seaports Organization (ESPO 2003) have had a major influence on policy development in both ports. Ports operate in a highly competitive business environment that is not limited solely to port operations, but also extend to transportation and supply chains.

The logistics chain also implies that a port's competitiveness becomes increasingly dependent on external co-ordination and control by outside actors (ESPO 2004a). It must be acknowledged that such a concentration of activities and operations has the potential to generate negative effects such as road congestion in and around ports, the use of scarce land, pollution (oil spills) and risks to safety, health and the general environment. The port area accommodates also activities of third parties, leasing land plots and facilities from the port authority (EC 2001e and f).

As European seaports are vital to the European Union both in terms of trade and transportation, the demand for transportation services keeps increasing and the transportation system needs to be optimised to meet the demands of enlargement and sustainable development (EC 2001g), as set out in the conclusions of the Gothenburg European Council (EC 2001g). A modern port's operation must be sustainable from an economic and social as well as an environmental viewpoint. The delivery of this sustainable operation must be based, as in other

industrial sectors, on the provision of high quality services with respect to the protection of environment. In addition, as ESPO highlights in its Seaport Policy (ESPO 2004b), "services provided in seaports should be equally competitive, market oriented, efficient, safe, secure and environmentally sustainable".

3- General Analysis

3.1 PROGRESS THROUGH PARTNERSHIP

The two major Hellenic (Piraeus and Thessaloniki) ports in Greece sought cost-effective and practicable methods to demonstrate compliance with legislation and a positive environmental response to increased stakeholder pressure. The ports of Piraeus and Thessaloniki are today the most proactive, among the Greek ports, in the field of introducing progressively the concept of the integrated environmental management in their corporate policy, as both of them were recently certified according to the EcoPorts Foundation's Port Environmental Review System (PERS, in 2004 and 2003 respectively).

Collaboration between research teams from the Aristotle University of Thessaloniki, Piraeus University, and Cardiff University, UK in partnership with the port authorities of Thessaloniki and Piraeus was formed and has produced positive and cost-effective results to mutual advantage. Three main research projects were initiated and realized for the two ports i.e. GREENPORTh (4/2002 – 7/2003) and GREENPORTh II (1/2005 – 1/2006) commissioned by Thessaloniki Port Authority, and OLPIS (3/2004-3/2005) commissioned by the Port Authority of Piraeus.

Project coordinator on the above mentioned projects was the thematic research network "SUPPORT" network of AUTH. SUPPORT ("sustainable port") is a research network of collaborating Laboratories of AUTH established by its Research Committee. SUPPORT also involves various external collaborating Research Units among which are the Universities of Piraeus and Cardiff. The main benefits and achievements obtained from the research projects are summarized in the following table:

- . Identification and update of Register of legislation related to environmental issues (International, EU, Hellenic)
- . Identification of significant environmental aspects and impacts (e.g. dust, waste, water run-off, noise).
- . Development of action plans for prevention of environmental

accidents and reduction of risk

- . Planned cost savings through energy efficiency, reduction of water consumption and efficient waste handling.
- . Profits expected through greater competitiveness and efficiency.
- . Improvement of the port's public image.
- .

- . Raised awareness of employees to environmental issues and the concerns of the local community

- . Opportunities for contact between key port stakeholders, local administration, general public and environmental pressure groups in order to promote a more transparent management system

By building on the PERS experience, the Port Authorities have been encouraged to consider the application of the ISO 14001 or EMAS.

- . Therefore, the PERS process is considered as a sound intermediate step in developing a formal environmental management system.

The phased program of collaborative research and development between the Port Authority and the University partners delivered substantive elements that helped to put in place the stated environmental policy. These include the following key components:

- A- Development and implementation of a Waste Management Plan for Ships in compliance with EC Directive 2000/59/EK
- B- Certification of the port in compliance with the EcoPorts Foundation's Port Environmental review System (PERS).
- C- Development of an Oil Contingency Plan in accordance with OPRC Convention (International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990, IMO)
- D- Generation of a Hazardous and Noxious Port Contingency Plan according to HNS protocol (Protocol on Preparedness, Response and Cooperation to pollution Incidents by Hazardous and Noxious Substances, 2000)
- E- A first phase of energy auditing of electricity and oil consumption
- F- Plan to monitor Safety and Health issues
- G- Program to monitor and mitigate problems caused by dust emissions
- H- Integrated port waste management plan

The Piraeus Port Authority (PPA) has been similarly proactive in collaborative, research-led initiatives in cooperation with the Universities of Piraeus, Thessaloniki and Cardiff (UK). As a long-standing member of the EcoPorts Partnership, PPA has commissioned research and development designed to achieve continuous

improvement of environmental quality through the establishment of an annual monitoring program, certification under the Ecoports Foundation's PERS scheme, compliance with the requirements of ship's waste management, dedicated projects related to the quality of seawater and air, production of a noise map, and the development of an electronic data base for port environmental management.

The port authorities of Thessaloniki and Piraeus were amongst the first in Europe to be awarded the EcoPorts Foundation's Certificate for achieving compliance with the Port Environmental Review System (PERS). The system was developed by port partners of the then, EcoPorts Project that was part funded by the EC. The specification of the new standard was laid down by the ports as a proactive step towards a more comprehensive system such as ISO or EMAS (Journee and Wooldridge, 2005). PERS was designed specifically to assist port managers in implementing a cost-effective and practicable management system that would help them to follow the ESPO Environmental Code of Practice. Ports that adopt this voluntary system have the option of independent review by Lloyd's Register in order to qualify for Certification. PERS is increasingly seen as an important demonstration of its environmental credentials.

4. Actualization

4.1- PRACTICAL STEPS FOR IMPLEMENTATION OF 'PERS'

The two ports are amongst the first in Europe to achieve Certification under the PERS scheme, the port authorities and their collaborative university research partners gained useful, practical experience in the actual implementation of the system. This is in accord with the ethics of EcoPorts Foundation's approach, that is, 'ports assist ports' in the non-competitive subject that is environmental management.

4.2 The first step - the "Self Diagnosis Method" (SDM)

The Self Diagnosis Method (SDM) was first developed in the ECO-Information European research project and was finalized by the ECOPORTS Foundation (EPF). The main purposes of the SDM are to assist port managers to carry out a periodic review of the performance of their environmental management program in comparison with their own baseline data and the European benchmark, and to identify priorities for action on the basis of a SWOT (Strengths, Weakness, Opportunity and Threat) analysis and GAP analysis (Comparison of ports current provisions compared with other, formal EMS). The SDM

may be viewed as a checklist of components that should normally be present in a credible environmental management program. It is designed as an 'at-a-glance' summary, and can be independently and confidentially analyzed through the EPF. The checklist prompts a response on the following components:

- Environmental policy
- Management organization and personnel
- Environmental training
- Operational management
- Emergency planning
- Monitoring and records
- Environmental audit and review

Completion of SDM provided a concise overview of the current situation and focused the management effort into the key areas requiring attention in preparation for PERS.

4.3 Practical steps of "PERS"

The methodology followed for both ports concerning PERS' formulation and development is summarized in the following:

- A- Set up of a joint, competent group of academic specialists and qualified experts from the Port Authority.
- B- Organization of a series of consultation activities, workshops and training Courses with the port personnel involved.
- C- Organization of a series of frequent meetings and interviews with all stakeholders involved in the process
- D- Completion of the SDM, jointly by the port executives and the research team.
- E- Formulation of the PERS requirements.

After completing the SDM, a copy of it was submitted for confidential analysis to the ECOPORTS Foundation and a feedback on both ports' performance relative to the European benchmarks and identification of points for consideration was received.

The main practical steps followed in both ports in order for the "PERS" System to be compiled and effectively applied were as follows:

- A- The formulation of an Environmental Policy, that is, the public statement by the port authority in relation to the strategic environmental management of the port. It also provides the framework for action and establishes the environmental objectives and targets.

- B- The compilation and analysis of the existing environmental situation within the port and the identification of all the environmental impacts from its operation. For each port activity the significant environmental aspects were identified and all the relevant legislation was collected (international, Hellenic, local, ThPA, PPA, Harbor Master). Thus, each executive and worker inside the port was able to acquire knowledge of the environmental issues relevant to their job description. Moreover, appropriate indicators of environmental performance were selected, allowing the follow-up of the progress of the port's response to the environmental challenges.
- C- The designation of responsibilities and the authorization of appropriate port employees with specific responsibilities.
- D- The regular review of conformity with the environmental policy and the current legislation, so that it is proved that the progress of the port authority in environmental protection is in line with its environmental policy and the relevant legislation. Procedures for the determination of new objectives, actions and initiatives were also developed
- E- The production of an Environmental Report. The main aim of the Environmental Report is to provide information on the overall management of environmental issues that concern the port to all port personnel, the local community and other interested groups.
- F- The most important stage of preparation for the application of PERS constituted the recording and analysis of the existing environmental situation in each port, as well as the major environmental impacts that its operation can have on the local inland. For this purpose, in parallel, a detailed review of the legal framework that is valid in Greece (including the existing international and EC legislation) was completed. The compilation of the Register or Inventory of the Significant Environmental Aspects, and that of Regulations were found to be the key to the PERS process.

5- Discussion

5.1 BENEFITS AND EXPERIENCES ASSOCIATED WITH THE PERS APPLICATION

Experience confirms that the scheme acts as an effective and practicable tool for port environmental management and contributes substantially to continuous improvement of the port environment. The voluntary, self-regulation scheme of PERS makes it flexible, familiar and well understood by the port authority and the port personnel. Furthermore, PERS gives the opportunity for the port authority on one hand, to identify its environmental challenges and priorities and on the other, to respond in a timely, practical and cost effective manner to legislative and stakeholder's pressures.

Thus, based on practical experience from the two major Hellenic ports,

the main benefits and experiences gained applying the PERS System (in joint application with the SDM Questionnaire) are summarized as follows:

- A- Identification of the legal framework (International, EU, Hellenic) related to environmental issues. Set up of a mechanism for keeping updated with environmental developments and better compliance with legislation.
- B- Recognition of the actual environmental situation and identification of the environmental priorities within the port (e.g. dust, waste, water run-off, and noise).
- C- Identification of the appropriate action plans to respond to legislative liabilities and responsibilities. Also, identification of business risk and prevention of environmental accidents.
- D- Potential cost savings through energy efficiency, water consumption and waste handling.
- E- Enhanced efficiency through greater competitiveness.
- F- Improvement of the port's public image.
- G- Wider recognition of the port's environmental credentials.
- H- Raised awareness of environmental issues and responsibilities throughout the Authority.
- I- Opportunities for improved contact with key port stakeholders, local administrators, the general public and environmental pressure groups promoting a more transparent relationship

Building on the PERS experience, the Port Authority has been encouraged to consider the application of ISO 14001 or EMAS in selected port areas. The PERS process is considered as a positive intermediate step in the implementation of a comprehensive Environmental Management System and the experience of its implementation has built internal capacity backed by the collaborative partnership.

6-Recommendation

6.1 THE ROLE OF RESEARCH, EDUCATION AND TRAINING

6.1.1 from theory to practice

It is widely acknowledged that the development of tools and methodologies for effective environmental management must be based on sound theories and principles, but that these in turn must be evaluated and validated in the applied and uncompromising regime of the commercial port area. It may be suggested that the most positive results are produced by the combination of university research in collaboration with the experience of port professionals.

Research and Development activities carried out in conjunction with

port operations can contribute to the body of knowledge such as , (natural, social and applied science), deliver specific remedies and solutions to applied problems, and assist with the development of management skills through dedicated educational and training schemes. Indeed, it is arguable that investment in training is one of the most cost effective actions that a port authority can take to actually implement best practice.

The twenty-four hour operation of a port area provides one of the most demanding challenges for the development of practicable methodologies, and a most stimulating opportunity for participants in training schemes. In this case, universities spend hours providing a formal teaching and learning experience through lectures and laboratory sessions, and yet, there is no substitute for 'hands-on' experience and direct involvement in applied, professional practice. The ten-year collaboration between PPA and the Universities of Piraeus and Cardiff, and the more recent cooperation between ThPA and its academic partners, has produced tangible results and experience to the mutual advantage of all parties involved.

Joint projects can benefit the port authority by providing cost effective R & D program, the execution of monitoring program, access to state-of-the-art research equipment and software, delivery of port-specific solutions and the building of internal capacity. Universities benefit from the opportunity to validate research in an applied context and students (undergraduate, post graduate and post doctorate) obtain invaluable experience in terms of broadening their knowledge and increasing their depth of understanding. Such collaboration between the port sector and universities means that the next generation of managers will not only be mindful of the environmental imperative but also trained in the practicalities of delivering effective management.

There is a wide range of skills that can be demonstrated and taught to both employees and university students within the port area. Topics can include:

- . Safety and survey logistics
- . Program planning and execution
 - Deployment and recovery of equipment and instrumentation
- . Permits and authorization
- . Experimental design
- . Field observation and target notes
- . Ship-borne surveys and sampling
- . Site surveys, mapping and monitoring

- . Analysis and interpretation of results
- . Report writing and presentational techniques
- . Team working and communication
- . Data and information gathering in port area (tenants and operators)
- . Data processing and imaging techniques
- . Introduction to EIA, EMS and Risk Assessment

The rationale is that if the educational system is to produce academically qualified people competent to make a rapid transition to professional practice, then learning schemes should include transferable skills and the development of personal aptitude relevant to the industrial sector of specialization. Fieldwork and offshore training have long been recognized as effective methodologies for reinforcing knowledge and developing applied skills, therefore, if such a syllabus as listed above is to be carried out as a teaching and learning exercise, it should be delivered to where the results are of direct interest and value to the host authority. Once the necessary authorization, safety and insurance issues have been agreed, collaboration between the port sector and the universities can serve both the educational and management requirements.

7- Conclusion

A series of tools and methodologies are available to assist port managers to comply with environmental legislation and regulation. The ports of Thessaloniki and Piraeus have been active within the EcoPorts framework and have enhanced their environmental management program through collaborative efforts with university groups to mutual advantage. The experience gained by all participants has made a substantive and demonstrable contribution to the objective of continuous environmental improvement in support of sustainable development.

Building on the PERS experience, the Port Authority has been encouraged to consider the application of ISO 14001 or EMAS in selected port areas. The PERS process is considered as a positive intermediate step in the implementation of a comprehensive Environmental Management System and the experience of its implementation has built internal capacity backed by the collaborative partnership.

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