ENVIRONMENTAL MANAGEMENT SYSTEMS FOR PORT AREAS

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Abstract: This paper is a report the two main environmental management system (EMS) standards EMAS and ISO 14001 environmental performance indicator for port industry. The European Union (EU) is considered by some to have the most extensive environmental laws of any international organization. Protection of the environment is a well-established policy in the European Union. The environment has become a critical issue in business today. Since the applications of logistics are generally positive for the efficiency of transport systems, it has been suggested that logistics are environmentally friendly. Therefore organizations systematic environmental programs are planned and documented way to manage the case.

Keywords: Environmental management systems, EMAS, ISO 14001

Introduction

Europe constitutes the densest port regions worldwide. It has more than 1200 commercial seaports along the 70,000 km of coastal zone, and over 200 ports in its inland waterways. According to the latest 2011 figures, more than 60,000 merchant ships called at European ports, which represented approximately 3.7 billion tonnes of cargo. Bulk carriers accounted for 70% of it, container ships 18% and Ro–Ro vessels 7%, the rest being other general cargo. A total number of 385 million passengers pass by ports every year and about 1.5 million of workers are employed directly in European ports (EC, 2013).

Environmental Management Systems (EMS) consists of a collection of internal policies, assessments, plans and implementation actions (Coglianese, & Nash, 2001). The ISO 14000 series of standards or the International Standard for Environment was released in September 1996 and comprises of two main parts: (i) specification with guidance for use and (ii) general guidelines or principles, systems and supporting techniques (Zutshi & Sohal, 2004). The reactive (or traditional) safety management approach is useful when dealing with technological failures, or unusual events (ICAO, 2013). An environmental management system helps organizations identify, manage, monitor and control their environmental issues in a "holistic" manner (ISO, 2015). The international standard ISO 14001 designed by the private body called International Organization for Standardization (ISO), and the Eco Management and Audit Scheme (EMAS) regulated by the European Regulation EC 1221/2009 (Testa et al., 2014). Port areas are hazardous areas of intense intermodal consideration as all the transport modes coalesce there. In most cases port areas are situated next to urban areas and/or other areas of special environmental attention due to the presence of protected species or even due to recreational purposes. Environmental Management System specifically for ports that can also be used by companies. Port development indicators are also included in operational indicators and they relate to operations carried out at sea, on land or both, be planned and executed with careful consideration of their environmental impacts (Puig, Wooldridge, & Darbra, 2014).

Environmental Management

Environmental management system has become one of the main tools used by companies to handle the environmental aspects and the impacts that their activities have on the environment. The first version of ISO 14001 (Environmental Management System: Requirements with guidance for use), the EMS standard from the International Organization for Standardization (ISO) was launched in 1996 (Lucila M. S. Campos, 2012). The ISO 14000 family of standards provides practical tools for companies and organizations of all kinds looking to manage their environmental responsibilities. Voluntary standards such as ISO 14001 were developed to overcome weaknesses in traditional regulatory instruments (McGuire, 2014). EMAS and ISO 14001. These schemes provide a third-party guarantee of environmental "excellence", which is able to give an advantaged position (with respect to their competitors) to those organizations that, by adopting EMAS or ISO 14001, commit themselves to improve the environmental performance (Iraldo, Testa, & Frey, 2009). In 1987, the World Commission on the Environment and Development of the United Nations published the report "Our Common Future" in which sustainable development is defined as the principle of "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (To & Lee, 2014). ISO 14001 or EMAS, provide benefits on

environmental and economic performances (Fresner & Engelhardt, 2004). Effective port environmental management needs to take into account the potential impacts on the environment, mitigating options, methods of prediction, information on environmental indicators and legislation (PPRISM, 2012). The ECOPORTS project also develops tools that will help port administrations to put the recommendations of the 2001 Environmental Review into action (for instance, the Port Environmental Review System (PERS) can be used as a standard for the implementation of these recommendations) (ESPO 2003). In 1974, the European Commission set up a Port Working Group, consisting of port authority representatives from Europe's major ports. Early 1993, the European Sea Ports Organisation was born out of this working group, as an independent lobby for seaport interests (ESPO, 2012). As part of the Environmental Performance Review, the environmental priorities of the sector have been redefined. Priority issues change their ranking with time but certain components retain their significance for the sector (ESPO, 2013).

In 1994, the Europen Sea Ports Organisation (ESPO) published its first Europen Enviromental Code Of Practise. This code was intended to be an expression of the collective commitment of the European port administrations to environmental improvement (Hooydonk, 2006). ISO 14001:2015 specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance (ISO, 2015).

ISO 14001-EMAS

The ISO 14001 is an international environmental standard that specifies requirements related to an EMS to allow the organization to devise its policy and objectives while considering the legal requirements and information concerning significant environmental impacts (L. M. S. Campos, Heizen, Verdinelli, & Miguel, 2015). One of the most widely used voluntary approaches involves the adoption of the certified environmental management system (EMS) called ISO 14001 (Arimura, Darnall, Ganguli, & Katayama, 2016). There are two main reference standards that set requirements for an EMS: the international standard ISO 14001 designed by the private body called International Organization for Standardization (ISO), and the Eco Management and Audit Scheme (EMAS) regulated by the European Regulation EC 1221/2009 (Testa et al., 2014). The first step aims at testing if EMAS and, more in general, an Environmental Management System, are really able to produce an improvement in environmental performance as perceived by the organization. The second step aims at investigating if and how this performance, especially when strengthened by a third-party registration such as EMAS, can really give an organization better position on the four most important competitive leverages: innovation, marketing, productivity and intangible assets (Fig. 1) (Iraldo et al., 2009).

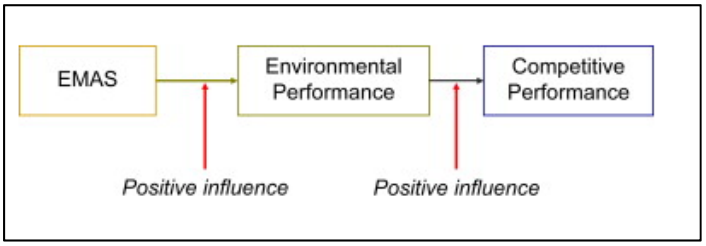

Figure1. The conceptual framework.

The Self Diagnosis Method

The Self Diagnosis Method (SDM) is designed to support port managers in their efforts to regularly review the environmental management performance in their port. The diagnosis generated through this analysis can determine both the enabling factors and the barriers to the implementation of effective environmental management systems (Romero, Asmus, Milanelli, Buruaem, & Abessa, 2014). 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 (Table 1) (Darbra, Ronza, Casal, Stojanovic, & Wooldridge, 2004).

Table 1. 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

Results and Discussion

The first remark to be made is that all the priorities of the 2013 top-10 remain in the top-10 of 2016. There are just some variations in the ordering of the priority items. The relationship with the local community, port development and water quality primarily appear to be gaining importance. On the other hand, the handling of port waste, and dredging appear to move down the top-10 scale. Air quality remains the number one priority of the European ports, as in 2013. This is fully in line with the maintenance of air quality as a top priority also of the EU policy agenda and the various ongoing policy initiatives that include the implementation of the Sulphur Directive and the ongoing political process on the air quality package. Energy consumption becomes the second priority issue of the European ports. Since 2009, the importance of energy consumption has raised year over year as. One of the reasons for this increase is, of course, the direct link between energy consumption, and the carbon footprint of the ports and Climate Change. Noise is the third concern by priority and its importance has also grown smoothly since 2004. The relationship with local community climbs at the number four of priorities as the ports grant their license to operate and to grow from their local communities. Another interesting fact is that there are three issues that have appeared consistently in the priority list of the port sector over the last 20 years, although they are not in the top positions of the table 2. These issues are port development (land), dredging operations and dust (ESPO, 2016).

Table 2. Top 10 environmental priorities of the European port sector over time.

	1996	2004	2009	2013	2016
1	Port Development (water)	Garbage / Port waste	Noise	Air quality	Air quality
2	Water quality	Dredging: operations	Air quality	Garbage/ Port waste	Energy Consumption
3	Dredging disposal	Dredging disposal	Garbage / Port waste	Energy Consumption	Noise
4	Dredging: operations	Dust	Dredging: operations	Noise	Relationship with local community
5	Dust	Noise	Dredging: disposal	Ship waste	Garbage/ Port waste
6	Port Development (land)	Air quality	Relationship with local community	Relationship with local community	Ship waste
7	Contaminated land	Hazardous cargo	Energy consumption	Dredging: operations	Port development (land related)
8	Habitat loss / degradation	Bunkering	Dust	Dust	Water quality
9	Traffic volume	Port Development (land)	Port Development (water)	Port development (land)	Dust
10	Industrial effluent	Ship discharge (bilge)	Port Development (land)	Water quality	Dredging: operations

A set of 10 key management indicators has been developed for this purpose in cooperation between ESPO, EcoPorts and PORTOPIA. These have also been monitored back in 2013 and the 2016 review comes to update the figures and to show their evolution. Table 3 below shows the percentage of positive responses to each of these 10 indicators in the review of 2013 and 2016, so that the variations over time are demonstrated Clear positive trends can be demonstrated over time for the majority (7/10) of the selected indicators while one stays stable and 2 decline. The rise in the percentage of ports that are certified by a recognised Environmental Management System (EMS), such as ISO 14001, PERS and/or EMAS, from 54 to 70 % between 2013 and 2016 is particularly impressive. On the other hand the results show an 11 % decrease in the percentage of ports that have an environmental training programme for their employees and this clearly requires further investigation by ESPO. The results demonstrate that the big majority of European ports have implemented an Environmental Policy (92 %), maintain actual inventories of applicable environmental legislation (90%) and of their significant environmental aspects (89%), define objectives and targets for environmental improvement (89%), have documented environmental responsibilities of key personnel (85%) and monitor their environmental impact (82%). The trends are also positive on communicating efforts with 2 out of 3 of the respondent ports producing a publically available environmental report on a regular basis. The table 4 below shows the Environmental Management Index of European ports in 2013 and in 2016 respectively. The evolution confirms the positive trends identified. (ESPO/EcoPorts, 2016).

As stated above, the overall improvement over time of European ports in environmental management is well demonstrated by the increase in the percentage of ports that achieve certification under one or more of the established environmental management systems (EMS). A total of 64 ports out of the 91 that contributed to the review are EMS certified, being 46 of 5 them under ISO 14001, 5 under EMAS and 26 under the EcoPorts Port Environmental Review System (PERS) as shown in the following figure 2. Some ports are certified under more than one system (ESPO/EcoPorts, 2016).

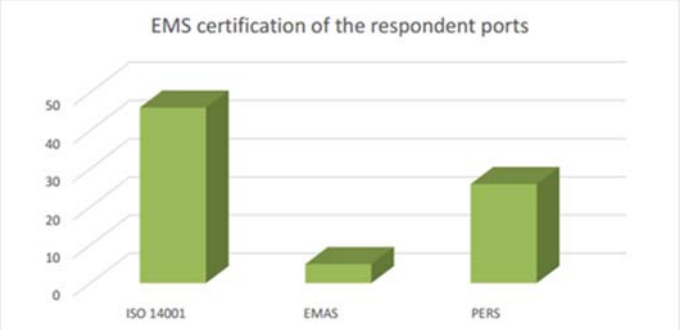

Figure 2. EMS certification of the respondent ports

Table 3. Percentages of positive answers and 2013-2016 variations on key environmental management indicators

	Key Environmental Management Indicators	2013 (%)	2016 (%)	Changes 2013-2016
A	Certified Environmental Management System (EMS)	54	70	+16
B	Existence of an Environmental Policy	90	92	+2
C	Environmental Policy making reference to ESPO's policy documents	38	34	-4
D	Existence of an inventory of relevant environmental legislation	90	90	-
E	Existence of an inventory of Significant Environmental Aspects	84	89	+5
F	Definition of objectives and targets for environmental improvement	84	89	+5
G	Existence of an environmental training program for port employees	66	55	-11
H	Existence of an environmental monitoring program	79	82	+3
I	Documented environmental responsibilities of key personnel	71	85	+14
J	Publicly available environmental report	62	66	+4

Tablo 4. Environmental Management Index 2013 - 2016

	2013	2016
Environmental Management Index	7.25	7.72

The products currently provided by ECOPORTS gradually lead to the level required to attain ISO 14001 or EMAS certification (Fig. 3), although all of them may also be considered as tools that stand on their own.(Darbra et al., 2004).

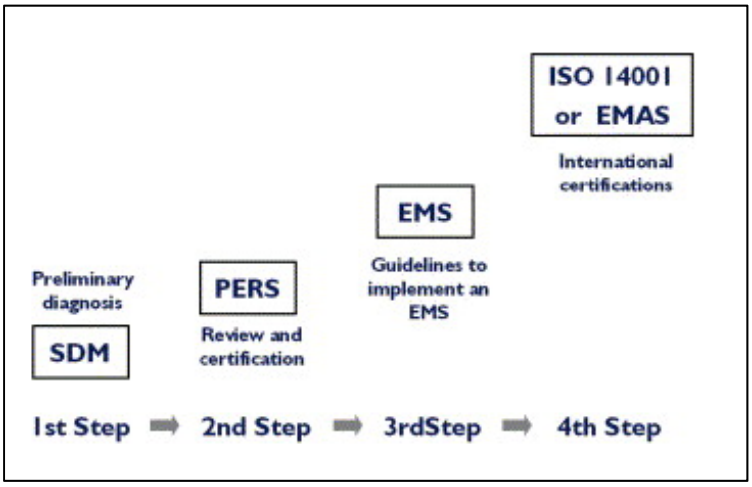

Figure 3. Diagram showing the relationship between the ECOPORTS tools and the international standards.

Conclusion

The vital importance of the ports industry for EU trade is demonstrated by the statistics: the maritime sector is responsible for over two thirds (70%) of all trade between the Community and the rest of the world, as well as 41% of goods traffic within the Community (Short Sea Shipping). Ports are the gateway for the movement of millions of passengers each year and a wide range of goods (including vehicles, fresh food, steel, timber, building materials, machinery and manufactured goods) and raw materials (oil, petroleum, chemicals, ores, grain and animal feedstuffs) which are needed to fuel the European Union's economy (ESPO, 2004). The EC PORTOPIA project has gained data and insight on Environmental Performance Indicators for inland ports (Seguí, Puig, Quintieri, Wooldridge, & Darbra, 2016).

A sustainable port is one in which the port authority together with port users, proactively and responsibly develops and operates, based on an economic green growth strategy, on the working with nature philosophy and on stakeholder anticipation, starting from a long term vision on the area in which it is located and from its privileged position within the logistic chain, thus assuring development that anticipates on the needs of future generations, for their own benefit and the prosperity of the region that it serves (Vellinga, 2013). Among various motivations for green activities, the rise of environmental awareness can be critical to the development of a firm's green strategies (Luan, Tien, & Chen, 2016).

Maritime ports, especially those connected with or situated far inland in estuaries connected with navigable inland waterways and railways, can also play a significant role in reducing CO_2 emissions, but will also have to face the effects of climate change (EC, 2011). International Maritime Organization (IMO) has recognized that provision of reception facilities is crucial for effective MARPOL implementation, and the Marine Environment Protection Committee (MEPC) has strongly encouraged Member States, particularly those Parties to MARPOL as port States, to fulfil their treaty obligations on providing adequate reception facilities. MARPOL Annex VI, first adopted in 1997, limits the main air pollutants contained in ships exhaust gas, including sulphur oxides (SO_X) and nitrous oxides (NO_X), and prohibits deliberate emissions of ozone depleting substances (IMO, 2011).

Implementing ISO 14001can be time-consuming and incur some initial costs but the benefits outweigh the expense (Davies, 2005). Future research should deeply measure how certified organizations implement the requirements included in the environmental management system standards such as EMAS and ISO 14001.

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