



## EMAS and ISO 14001: the differences in effectively improving environmental performance



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### ARTICLE INFO

#### Article history:

Received 8 August 2013  
Received in revised form  
19 December 2013  
Accepted 20 December 2013  
Available online 28 December 2013

#### Keywords:

EMAS  
ISO 14001  
Environmental performance  
CO<sub>2</sub> emissions

### ABSTRACT

Despite the importance that environmental management systems have in the environmental policy agenda, the debate on their effectiveness to improve environmental performance (e.g. the reduction of polluting emissions) is still open among researchers and practitioners. Furthermore, no previous quantitative works have addressed the comparative study of the effectiveness of the two main reference standards that set requirements for an environmental management system: the international standard ISO 14001 and the European EMAS scheme. In order to fill this gap, this research paper investigates the impacts of EMAS and ISO 14001 on the reduction of carbonic anhydride emissions on 229 energy intensive plants in Italy. By applying a rigorous statistical method, the results suggest that the implementation of an environmental management system in energy intensive industries has a clear influence on environmental performance both in the short and in the long term, but a different effect of ISO 14001 and EMAS on environmental performance occurs.

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### 1. Introduction

An environmental management system (EMS) is a worldwide tool potentially applicable by any kind of organization in order to improve the management of their environmental aspects and reach a continuous improvement of environmental performance. 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. The success of both standards relies on their highly flexible requirements which allows any organization to set up an EMS according to its internal characteristics and to identify the most effective solutions to improve their performance. The implementation of an EMS improves certain procedural aspects of environmental management such as recording and use of information, knowledge and implementation of authorization requirements, plant maintenance, management and training and process operation (de Oliveira et al., 2010; Franchetti, 2011).

The potential benefits associated to EMS adoption make it a fundamental tool within the environmental toolbox that a policy maker should use in an integrated manner to combine

environmental protection and a more sustainable consumption and production. The choice of the European Commission to design a policy instrument based on the concept of Deming cycle (i.e. EMAS) is an undoubtable proof of the relevance that EMS standards have in the European environmental policy. Moreover, Member States and local authorities are supporting EMAS and ISO 14001 adoption through several regulatory relief and incentive measures such as extension of environmental permit duration, inspection reduction, fiscal benefit (among others Wätzold et al., 2001).

Despite the importance that EMS standards have in the environmental policy agenda, the debate is still open among researchers and practitioners on their effectiveness in terms of improvement of environmental performance (see, for a recent review, Heras-Saizarbitoria and Boiral, 2013). Many research focused on the ability of ISO 14001 to generate a positive effect on performance by using different methods of analysis such as case study (Zenga et al., 2005; Newbold, 2006), statistical analysis by primary (Gomez and Rodriguez 2011; Nishitani et al., 2012; Zobel, 2013) and self reported data (Comiglio and Botta 2012; Boiral and Henri, 2012; Schoenherr, 2012). Unfortunately, they found contrasting evidences.

On the contrary, very few research studies have been carried out on the effect of EMAS adoption because of both its limited geographical scope until 2010, and the lower level of adoption than ISO 14001 in Europe (Rennings et al., 2003; Iraldo et al., 2009). Also

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in these cases, authors reached not univocal results (Wagner, 2002; Daddi et al., 2011).

In order to contribute to the current debate on this topic, this research paper aims to compare the impacts on the improvement of CO<sub>2</sub> emissions of both the adoption and maturity of EMAS and ISO 14001. In order to overcome a typical bias affecting the research based on survey, we used a recent European database on the pollutant emissions of plant and estimate the impact of EMSs by a logistic model. The present study contributes and extends prior studies by analysing a large sample consisting of 229 energy intensive and highly pollutant manufacturing plants in Italy. What is more, the study provides for the first time, to the knowledge of the authors, a test on the simultaneous influence on environmental performance of the two most important EMS schemes.

The remainder of this paper is arranged as follows. After a description of the similarities and differences between EMAS and ISO 14001 (section two), and a review of the relevant literature on the effectiveness of both standards (section three), the fourth section provides details on the source of data used to construct the sample. The next section outlines the measurement of variables and the estimation methodology, whose results are detailed and commented in the fifth paragraph. Finally, the last section provides the main conclusions emerging from our work, as well as the discussion of their implications, limitations and needs for further research.

## 2. EMAS and ISO 14001 similarities and differences

EMAS Regulation (Reg. 1221/2009) and the ISO 14001 standard are the main international references for the companies that aim to implement an Environmental Management System (EMS) and obtain an environmental certification for their productive processes. EMAS is a European Regulation while ISO 14001 is an international standard issued and updated by ISO. The revision process of the EMAS scheme revealed a continuous effort by the European Commission to align the two schemes (mainly in terms of requirements) and to highlight the differences (mainly in terms of institutional legitimation of external communication) between them.

In detail, the first version of EMAS (EMAS I) was issued in 1993 when key principles like pollution prevention and the voluntary approach to the improvement of environmental performances were included in the environmental policies of the European Union. The first version of ISO 14001, based on the iterative plan-do-check-act logic of quality management systems, was issued by the ISO in 1996. In the first period, there was a sort of competitiveness between the two standards since they pursued the same aim but with some differences (Morrow and Rondinelli, 2002). For this reason, the European Commission issued a “bridging document” between ISO 14001 and EMAS in order to help ISO 14001-certified companies to adopt an EMS according to the EMAS scheme. Next, in 2001, the European Commission officially recognized ISO 14001 as the reference standard for the implementation of an EMS and also to obtain the EMAS registration by including the entire text of the ISO 14001 standard as an annex of the revised version of EMAS Regulation (EMAS II). A second important alignment was to extend the scope of EMAS from some manufacturing sectors to all organizations, according to the approach followed by ISO 14001. Finally, the third revision of the EMAS Regulation in 2009 (EMAS III) aligned the two systems through the extension of the EMAS regulation to non-EU countries.

Despite these efforts to make the two standards more compatible, some differences remain.

First, the nature of the two schemes is different. EMAS is issued by a public body while the ISO 14001 standard is a private norm. For

this reason, public bodies are formally involved in the EMAS scheme (i.e. the National EMAS Competent Body and the public control authorities). In the ISO 14001, the certification is issued by private authorities (environmental verifiers) and it is not formally approved by a public body. However, the private certifiers are verified by each country’s standards overseer: e.g. British Standards Institute, American National Standards Institute.

Second, ISO 14001 has had international validity since its first issuing while EMAS extended its scope outside of Europe only in 2010. This explains why ISO 14001 is the only EMS standard adopted in countries such as the United States and Japan and it is adopted significantly more often than the EMAS scheme in multinational companies.

Third, the EMAS Regulation sets more stringent requirements on external communication than does ISO 14001. EMAS-registered organizations have to carry out yearly updates of the publicly available document called the “Environmental Statement,” which includes key performance indicators of significant environmental aspects, environmental objectives and other relevant information on their EMS. The data reported in the Environmental Statement has to be validated by an accredited environmental verifier during the certification audit. For this reason, EMAS is considered a better tool to communicate the environmental commitments of companies to external stakeholders.

Fourth, EMAS is experimentally applied not only in the organizations but also at the territorial level. Article 37 of the Regulation describes the so-called “cluster approach,” which has been applied in some European experiences (Daddi et al., 2010) (See Table 1 for details).

ISO 14001 requirements related to EMS were integrated in the EMAS scheme by its second revision (EMAS II) in 2001. Despite this integration, EMAS provides some additional details on how to manage some specific issues clearly described in the annex II of Regulation 1221/2009. (see Table 2).

Even if EMAS provides these further specifications on EMS, some of them are addressed also by companies certified ISO 14001. An example is the need to consider the environmental laws of the country where the certificate is issued or the requirement to draw up of an initial environmental review that, even if not mandatory in ISO 14001, can be considered a practice adopted by many organizations certified according to this standard.

The differences between the two schemes were also revealed by Neugebauer (2012) that found different external pressures affecting the adoption of the two standards: the choice to adopt ISO 14001 is mainly induced by external stakeholders while the implementation of EMAS is mainly influenced by internal motivations.

## 3. Contrasting evidence on the effect of ISO 14001 and EMAS on environmental performance: a literature review

The difficulty of assessing the link between certified EMS and environmental performance stems from a number of

**Table 1**  
Main differences between the two certification standards.

Topic	ISO 14001	EMAS
<i>Nature Validity</i>	Private standard Valid at international level since its first issuing in 1996	Public Regulation Valid in Europe until 2009 and at international level since 2010
<i>External communication</i>	It is not a mandatory	It foresees to make available for the public an Environmental Statement
<i>Scope</i>	Organisations of all sectors	Organisations of all sectors and experimentally applied in industrial clusters

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