

# **Evaluation of Italian Companies' Perception about ISO 14001 and EMAS III: Motivations, Benefits and Barriers**

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Accepted version

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Please cite as:

Murmura, F., Liberatore, L., Bravi, L., & Casolani, N. (2018). Evaluation of Italian companies' perception about ISO 14001 and Eco Management and Audit Scheme III: motivations, benefits and barriers. *Journal of Cleaner Production*, 174, 691-700.

<https://doi.org/10.1016/j.jclepro.2017.10.337>

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# **Evaluation of Italian Companies' Perception about ISO 14001 and EMAS III: Motivations, Benefits and Barriers**

## **Abstract**

In recent decades the adoption of Environmental Management Systems, as frameworks for integrating corporate environmental protection policies and programs, started to become a growing practice among both domestic and multinational companies around the world. Therefore this research wants to present the results of an empirical survey carried out among Italian companies which are certified with the Environmental Management System ISO 14001 and the European Eco Management and Audit Scheme (EMAS). The aim is to identify the type of companies that have implemented an EMS standard, to examine the motivations that have prompted them to introduce it, to state the benefits and barriers perceived and to evaluate differences and similarities between these two systems. The research was carried out through a questionnaire proposed to 1657 certified organizations and 190 companies participated. The Analysis of Variance; chi-test ( $\chi^2$  test) and Pearson's correlation were used to analyze the items of motivations, benefits and barriers. The results of the survey show that EMAS certification seems to be strictly correlated to ISO 14001; in fact the majority of companies which operate in International markets have both standards; moreover companies of larger size opened up primarily to certification compared to those of smaller size and are prompted to certification for different reasons. Time also is a relevant discriminating factor. As for the analysis of perceived benefits and barriers, this showed an important relation of similarity between ISO 14001 and EMAS. The research gave the contribution on how to manage effectively the firm attention to environmental issues.

**Keywords:** ISO 14001; EMAS; Environmental Management Systems; Quality; Environment.

## **1. Introduction**

In the early seventies, because of the sudden oil crisis the theme of sustainability has gained high social importance. The Institute of Supply Management (ISM) defines sustainability as "the Triple Bottom Line – the integration of social, environmental, and economic objectives" (ISM, 2008).

As for environmental sustainability, the first steps were made in the 1970s, when in Europe state and regional programs, laws on air and water pollution protection, waste disposal and protection of nature were approved. In these years both in Britain (1972) and Germany (1976), a comprehensive legislation on protected natural areas, had been developed. Even in Italy it can be seen the signs of this growing sensitivity in 1975, when for the first time the Ministry for Cultural Heritage and Environment was established and an year later the Merli law on the regulation of water discharges was implemented, while in 1979 the Inter-Ministerial Committee for the Environment (CIPA) was born. But it is in the 90s that the environmental sensitivity makes a qualitative leap and the environment becomes a global issue. The watershed is the Summit on Environment and Development in Rio de Janeiro in 1992, in which the Framework Convention on Climate Change, the Convention on Biodiversity, the Declaration on Forests and the Agenda 21 were approved: these are the cornerstones of the "change of course" towards the development of environmental sustainability. Always in 1992 environmental sustainability comes in Europe, with the Maastricht Treaty and the fifth European Environmental Action Program (ACCREDIA, 2016).

This orientation of international politics has gathered definitely a growing awareness on these environmental sustainability issues, and it also has a stimulant role, and a strong impact in the creation of a new demand for more environmentally friendly goods and services.

This is the context which gave rise to a real generation of environmental certifications; since in the last decades, sustainability had drawn a lot of attention. All the companies that wanted to remain competitive in the global market increasingly adopted Environmental Management Systems (EMS). An EMS is a systematic process that corporations and other organizations use in order to implement environmental goals, policies and responsibilities, as well as regular auditing of its elements (Cascio, 1996). EMSs are based normally on international or regional models of reference: the most widely used are the international ISO 14001 standard and the European Eco Management and Audit Scheme (EMAS). Since its introduction in 1996, the ISO 14001 standard has become a reference model in the field of environmental management. With 324,148 certified organizations in the world in 2014, this standard seems to be garnering the same success as the referential ISO 9001 standard, which is already adopted by over 1,100,000 organizations (International Organization for Standardization, 2014). The Eco-Management and Audit Scheme (EMAS), was born three years before ISO 14001, but compared to this standard is primarily used in Europe, actually in 11,692 sites and 3,822 organizations (European Commission, 2016). Moreover with the introduction of EMAS III that came into effect on January 2010 the scheme allows Member States to enable EMAS registration for organizations from outside the European Union (EMAS Global) (<http://ec.europa.eu/environment/emas>).

There is a great deal of theoretical literature available regarding the sources of motivation that lead companies to implement different self-regulation initiatives in their organizations, such as the ISO 14001 standard or the EMAS III. Some studies stress the fact that sources of motivation of an external nature are the ones that lead companies to implement an EMS (Bansal and Roth, 2000; Chan and Wong, 2006; Corbett and Kirsch, 2001; Shin, 2005; Uchida and Ferraro, 2007). The alternative theory consequently focuses on explaining the sources of motivation that lead companies to implement self-regulation mechanisms from an internal perspective (Heras-Saizarbitoria and Landin, 2011; King et al., 2005; Neumayer and Perkins, 2005). Furthermore there is a great deal of literature which considers the benefits (Boiral and Henri, 2012; Kostic et al., 2013; Ratiu and Mortan, 2014) and barriers (Boiral and Henri, 2012; Heras-Saizarbitoria and Landin, 2011) perceived from the implementation of an EMS.

However, there are no studies that consider together both ISO 14001 and EMAS III EMS standards in the Italian context, in order to analyze if they are perceived as different or substitutable ones. Thereby the research tries to cover the literary gap about the effectiveness of the joint use of these two standards, continuing and developing the research line on motivation, benefits and barriers perceived by companies which implement EMSs. In particular, it has been used the term perception concerning the evaluation of the experience of Italian companies deriving from their internal implementation of EMSs. Size and time of certification are used as a discriminating factor in order to understand similarities and differences among those companies integrating and developing the works of Biondi et al. (2000), and Neugebauer (2012).

This study starts following the lines of other studies in Italian context which investigated the performance of EMSs; in detail the research of Daddi et al., (2011), which considered how the EMAS scheme could improve the environmental performance of Italian organizations and the study of Salomone (2008) which explored the connection between EMS and Quality, Occupational Health and Safety, and even Social Responsibility management systems. This research has the aim to

analyze together the ISO 14001 and EMAS III EMSs in order to consider not only what are the advantages and disadvantages of implementing them separately, but also to develop them together in an organization, and also what are the type of motivations which had led Italian companies to implement both of them together.

Therefore the research:

- makes a comparison between EMAS III and ISO 14001 standards as for the motivations, benefits and barriers perceived by Italian certified organizations;
- investigates if the company size or the years of certifications are factors that influence the perception of EMS standards;
- correlates the items (motivations, benefits, barriers) of companies with both certifications.

The target is to figure out if both standards can be adopted to achieve a greater advantage, so that managers can obtain recommendations on how to manage effectively the firm attention to environmental issues.

## **2. Literature review**

### ***2.1 Environmental Management Systems: ISO 14001 and EMAS III***

At the beginning of the new millennium the adoption of EMS as frameworks for integrating corporate environmental protection policies and programs, started to become a growing practice among both domestic and multinational companies around the world (Morrow and Rondinelli, 2002). An increasing number of Multinational Corporations (MNCs) have adopted and certified their EMS (Sabatini, 2000) which are in practice designed and certified according to main reference International and European standards such as ISO 14001 (Biondi et al., 2000; Boiral and Henri, 2012; Comoglio and Botta, 2012; Matuszak-Flejszman, 2009; Testa et al., 2014) and the European regulation Eco-Management and Audit Scheme (EMAS) (Biondi et al., 2000; Iraldo et al., 2009; Iraldo et al., 2013; Morrow and Rondinelli, 2002).

Among EMS, the ISO 14001 standard was published on 1 September 1996, and provides the basic international framework for the establishment of an EMS, defined as part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining an environmental policy (Abarca, 1998; Corbett, 2006; Curkovic and Sdroufe, 2010; Curkovic et al., 2005; Darnall, 2006; Darnall et al., 2008; Lally, 1998). As for EMAS, it was adopted in 1993, 3 years before ISO 14001, as a step towards the European's goal of sustainable development. Coming into force in April 1995, this voluntary scheme was open initially only to European organizations and sites operating in the industrial sector. In 2001, the legislation underwent a revision, which brought the adoption of EMAS II that included an extension of the scope of EMAS to all types of organizations, both in the public and private sector that seek to improve their environmental performance. With the introduction of EMAS III, coming into force on January 2010, Member States were allowed to enable EMAS registration for organizations from outside the EU. The revision aims to increase participation in the scheme, establishing the scheme as a benchmark for EMSs and allowing organizations to upgrade their management systems to EMAS (Kostic et al. 2013; Ratiu and Mortan, 2014).

The differences between ISO 14001 and EMAS have been the subject of considerable debate in both the practitioner and academic literature (Biondi et al., 2000, Morrow and Rondinelli, 2002, Freimann and Walther, 2002; Testa et al., 2014). At the beginning the two standards were seen as competitors, since they pursued the same aim, providing good environmental management, but with some differences. Indeed, while ISO 14001 focuses on improving the management system, EMAS organizations engage to the continuous improvement of their environmental performance beyond legal requirements (Curkovic and Sdroufe, 2010). This includes stricter requirements on the measurement and evaluation of environmental performance against objectives and targets, as well as regular internal and third-party audits that determine whether the planned improvements of environmental activities have been achieved.

## ***2.2 Motivations for implementing EMS***

As for motivations there are two main theoretical approaches to this issue (Heras-Saizarbitoria and Landin, 2011). From one perspective, it is suggested that self-regulation mechanisms are adopted because of pressures of an external nature (Bansal and Roth, 2000; Chan and Wong, 2006; Corbett and Kirsch, 2001; Shin, 2005; Uchida and Ferraro, 2007); in this case organizations are considered to be passive participants that respond to external pressures and expectations. Specifically, companies pay attention to the influence of customer pressure and demands (Chan and Wong, 2006; Murmura and Bravi, 2016; Murmura et al., 2016; Müller et al., 2009; Neugebauer, 2012; Singh et al., 2015) or those of other interest groups (Corbett and Kirsch, 2001; Müller et al., 2009; Neugebauer, 2012), as well as to the importance of obtaining an external environmentally-friendly image (Hamschmidt and Dyllick, 2001; Neugebauer, 2012; Poksinska et al., 2003; Schylander and Martinuzzi, 2007; Singh et al., 2015), or because of pressure exerted by public administration (King et al., 2005; Shin, 2005; Uchida and Ferraro, 2007).

This perspective is criticized by academics who argue that organizations are dynamic and active and are able to respond in different ways according to their resources and capacities.

Consequently, the alternative theory focuses on explaining the sources of motivation that lead companies to implement self-regulation mechanisms such as the ISO 14001 standard or EMAS, from an internal perspective. This includes factors such as the company's internal strategy and its capacities (Ervin et al., 2012; Neugebauer, 2012; Ruddell and Stevens, 1998; Singh et al., 2015), which may constitute a source of sustainable competitive advantage (González-Benito and González-Benito, 2005; Neugebauer, 2012; Singh et al., 2015), improvement in the environmental behaviour of companies (Fryxell and Szeto, 2002), an internal improvement in the organization efficiency (Florida and Davidson, 2001), employee motivation (Ruddell and Stevens, 1998) and costs saving (Fryxell and Szeto, 2002; Quazi et al., 2001).

Finally there is a part of the literature that emphasizes the joint presence of both external and internal reasons for the adoption of an EMS; among the strongest motivations there is prevention of potential negative environmental impacts, improvement of employee environmental awareness, and answer to customer demand (Ervin et al., 2012; González-Benito and González-Benito, 2005; Ruddell and Stevens, 1998; Singh et al., 2015)

Bansal and Roth (2000) focused on ISO 14001 and make a distinction between three types of motives that lead companies to implement the ISO 14001 standard: ethical motives, as a response to the feeling related to environmental responsibility, competitive motives linked to the search for a

competitive advantage, and then relational ones which emerge from the desire of companies to become legitimized and to improve the relationship existing between the company stakeholders. Along similar lines Neumayer and Perkins (2005) identified internal motivations related to efficiency such as, an improvement in performance, productivity and profitability and, on the other hand, external or institutional motives related to the social pressure exerted by different agents to persuade company managers to adopt certain practices.

### ***2.3 Benefits and barriers of EMS***

Evaluating the effects of implementing an EMS, most studies tend to highlight the positive nature of these impacts and the fact that ISO 14001 and EMAS III certification improves environmental performance (Daddi et al., 2011; Da Fonseca, 2015; Eng Ann et al., 2006; Granly and Welo, 2014; Kostic et al. 2013; Melnyk et al., 2003; Potoski and Prakash, 2005), while other studies question these benefits (Altin and Altin, 2014; Barla, 2007; Boiral, 2007; Christmann and Taylor, 2006; Curkovic and Sdroufe, 2010; Ervin et al., 2012; King et al., 2005; Kostic et al. 2013).

Among the major benefits perceived there is the possibility to manage environmental costs and liabilities that bring to cost saving (Kostic et al., 2013), improved employee and managerial awareness (Kostic et al., 2013; Ratiu and Mortan, 2014), reduction of trade barriers and increased competitive advantage (Heras-Saizarbitoria and Landin, 2011; Ratiu and Mortan, 2014), risk prevention (Boiral and Henri, 2012; (Kostic et al., 2013), compliance with legal requirements (Heras-Saizarbitoria and Landin, 2011; Ratiu and Mortan, 2014), achieving of continuous improvement in the firm environmental performance (Heras-Saizarbitoria and Landin, 2011; Ratiu and Mortan, 2014) and an higher level of information sharing (Heras-Saizarbitoria and Landin, 2011). Considering the negative aspects of the adoption of EMS it can be cited the difficulty to measure the standard efficiency, the increase of bureaucratization and firm costs, the problem of increasing employee awareness on environmental themes and the vagueness of the standards (Boiral and Henri, 2012; Campos et al., 2014; Curkovic and Sdroufe, 2010; Ratiu and Mortan, 2014).

Considering in detail ISO 14001 and EMAS III, the nature of the two schemes is different, because EMAS is issued by a public body while the ISO 14001 standard is a private norm. Moreover 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; for these reasons also the benefits and barriers perceived could be different. Some authors bring to attention that organizations which choose EMAS registration have better environmental performances than those which choose ISO 14001 certification (Clausen, 2002; Ratiu and Mortan, 2014). Other authors have noted that, although ISO 14001 does not ensure a legal compliance nor a performance improvement, it is used as an image-building effort by organizations that are already complying with regulations. (Campos et al., 2014; Ratiu and Mortan, 2014; Rondinelli and Vastag, 2000).

Studies that have found a positive relationship between foreign customers and ISO 14001 adoption are those of Nishitani (2010) and Daddi et al (2013) which state that ISO 14001 is essential for the continuous access to foreign markets, that many multinational enterprises require ISO 14001 in the global supply chain. For example, small companies are quite often suppliers of large enterprises; but if they do not have an environmental management system it will be extremely hard for them to compete on the market and retain their position as suppliers of large multinational organizations.

Moreover, holding an ISO 14001 certificate reduces the risk linked to the purchase of products and services of a given company and increases consumer confidence. On the contrary studies show that organizations with EMAS record superior results for eco-management in comparison with other systems and they can benefit of a preferential treatment in the selection of procedures regarding contracts, loans granting, closing insurance contracts and accessing European funds (Kostic et al., 2013; Gara and Muhlberger, 2006; Ratiu and Mortan, 2014).

However with the amendment of EMAS (EMAS II and EMAS III) the differences between the two references were significantly reduced significantly and the rivalry was defused. The revision process of the EMAS scheme revealed a continuous effort by the European Commission to align the two standards (mainly in terms of requirements) and to highlight that even if some differences still remain, the two standards do not exclude each other out and their benefits start to become mutual (Ratiu and Mortan, 2014).

### **Material and methods**

The research was carried out through a questionnaire proposed to 1657 organizations certified ISO 14001 and EMAS III; 190 companies participated and have been considered in the sample, obtaining a response rate of 11.5%. The survey began 15<sup>th</sup> January, 2016 and answers have been accepted until 1<sup>st</sup> April 2016. The administration of the survey took place by e-mail, through Computer Assisted Web Interviewing (CAWI). ISO 14001 companies contacted are all certified by a Certification Body (CB) accredited by the “Italian Accreditation Body” called Accredia. The information needed to contact companies has been obtained from the Accredia database through its website ([www.accredia.it](http://www.accredia.it)); while information about EMAS organizations have been identified from the list of registered EMAS organizations to the website of the Italian Institute for Protection and Environmental Research ([www.isprambiente.gov.it](http://www.isprambiente.gov.it)).

The questionnaire has been divided into three sections. Section A investigates the sample profile of companies considering their size, turnover, sector and target markets. Section B was reserved to companies ISO 14001 certified. In this section, after having considered the years since they have the certification, it has been investigated the reasons that prompted the company to be certified, the benefits and barriers perceived and whether or not they have additional International standards. Section C was reserved to companies EMAS III certified; they had to answer the same issues shown in section B, considering this time the EMAS certification. Finally companies which owned both standards were asked to answer jointly sections B and C.

In data processing we have used SPSS 23.0 program, Statistical Package for Social Science. The statements proposed in each section were evaluated with a likert scale from 1 to 5, where 1 corresponds to “not at all important”, 2 is “unimportant”, 3 “indifferent”, 4 “quite important” and 5 “very important”. Descriptive analysis was used to describe the sample profile of respondent companies, and the Analysis of Variance (ANOVA) was performed using F-tests to statistically test the equality of means (Markowski, 1990).

The ratio between the number of companies that perceived motivations, benefits and barriers with points 4 and 5 of likert scale and the total number of companies was calculated for Micro-Small and Medium-Large companies; chi-test ( $\chi^2$  test) was then applied to the results to analyze if the two group were statistically different. The test was then replied dividing the sample in companies certificated from less than 3 years and those from more than 3 years (Agresti and Kateri, 2011).

Pearson's correlation was used to compare the statements between ISO 14001 and EMAS III companies' groups (Benesty et al., 2009).

## 4. Results and discussion

### 4.1 Sample profile

In Table 1 the sample composition is represented. Considering in particular the type of businesses of the respondent companies, a relevant percentage in both cases has to deal with the management of energy and the environment (21.9% for ISO 14001 companies and 24.6% for EMAS III ones); as for the mechanical sector, companies are more ISO 14001 (20.0%) than EMAS III certified (13.1%) as well as in the sector of public administration and associations, while among the companies which work in the agricultural sector there are more EMAS III certified ones. Relevant percentages work in other trade areas not specified in the research. Among the ISO 14001 companies, 42.4% are located only in Italy and 57.7% in the European and International markets, while the percentage of EMAS III companies in foreign markets is even more relevant and it accounts for 63.3% of the total certified companies. The companies adopting ISO 14001/EMAS III standard are in majority small and medium enterprises.

**Table 1. Sample composition of EMS certified companies.**

		<b>ISO 14001</b> (n=177)	<b>EMAS III</b> (n=135)
Type of business (%)	Environmental and energy management	21,9	24,6
	Mechanics	20	13,1
	Agriculture and food production	8,8	11,5
	Chemical/pharmaceutical industry	6,9	6,9
	Public institutions and association	8,8	1,5
	Other	33,8	42,3
Localization (%)	Only in the Italian market	42,4	36,7
	In the Italian and European market	16,5	17,2
	In Internationals markets	41,2	46,1
Dimension (%)	Micro (<10 workers)	6,8	8,9
	Small (10-49 workers)	33,3	36,3
	Medium (50-250 workers)	42,9	37
	Large (> 250 workers)	16,9	17,8

To better detail the sample profile of companies, it has been considered how long companies are certified according to these two EMS standards (Table 2); it can be observed that the mean age of ISO 14001 companies is a bit higher than the one of EMAS III, exactly less than one year of difference for manufacturing companies, two years between the service companies and 1.8 years for the other ones. Although the EMAS is a standard born three years before the ISO 14001, companies



have adopted it more recently. Moreover the results show that manufacturing companies got the certifications earlier than the service and other ones.

**Table 2. Relation between time of certification and business sectors (years).**

	ISO14001		EMAS III	
	mean	std. deviation	mean	Std. deviation
Manufacturing	10,2	4,44	9,8	4,24
Service	9,5	4,71	7,5	4,44
Other	8,9	3,78	7,1	3,79

Subsequently the study investigates if the respondents own other International standards (Table 3). More than half companies hold another certification in addition to ISO 14000/EMAS III. ISO 9001 and OHSAS 18001 are the most diffuse certifications.

**Table 3. Presence of other International Standards (%).**

	ISO14001 certified companies	EMAS III certified companies
ISO 9001	67,8	59,6
OHSAS 18001	51,4	50,0
SA 8000	9,8	8,8
ISO14001	-	94,9
EMAS	72,7	-
Other	39,3	29,4

#### ***4.2 Environmental Management Standards: perception in Italian companies***

In this section the main motivations that prompted companies to be ISO 14001 and EMAS III certified, have been investigated, analyzing the benefits and barriers that these standards brought to their organizations.

First of all it has been considered the reasons for certification (Table 4), comparing the companies ISO certified with those EMAS III certified; the only relevant item from a statistical point of view, in terms of different motivation that prompted companies to certification is "the improvement of workers' safety". It is a more relevant motivation for those companies ISO 14001 certified. In addition to this it can be seen from Table 4 that for the two groups the major motivations appear to be "the guarantee that the company operates respecting the environment with a socially responsible strategy", followed by "the improvement of corporate image" that is the most relevant motivation among those EMAS certified and "the alignment to environmental legal requirements". The opportunity of reducing business costs is not a motivation that had prompted companies to certification.

**Table 4. Reasons that prompted companies to be ISO 14001/EMAS III certified.**

	ISO 14001		EMAS III		F	t	Sig. (2-tailed)
	Mean	Std. Deviation	Mean	Std. Deviation			
Customer satisfaction and customer needs	3,6	1,16	3,5	1,1	0,539	0,544	0,587
The improvement of corporate image	4,2	0,84	4,4	0,81	0,051	-1,127	0,261
The improvement of workers' safety	4	1,05	3,7	1,13	4,81	2,356	0,019
The alignment to environmental legal requirements	4	1,09	4	1	1,189	0,327	0,744
The guarantee that the company operates respecting the environment with a socially responsible strategy	4,5	0,85	4,3	0,92	2,007	1,177	0,24
The integration of the others company's Quality Management Systems with its Environmental Management System	3,8	1,28	3,6	1,2	0,484	0,878	0,381
The opportunity to reduce business costs	3,2	1,18	3,1	1,17	0,061	0,517	0,606

With regard to benefits and barriers perceived (Table 5), there are no statistically significant differences in perception. However, it can be highlighted that among the benefits perceived as more important there are “the greater compliance with legal requirements”, followed by a “decreased risk of environmental accidents” and a major corporate image.

On the contrary limitations are not so accentuated, not exceeding values of 3 and the most cited are “an increase in complexity of corporate procedures” and “the rising of business costs” (Table 5).

**Table 5. Benefits and barriers of ISO 14001/EMAS III perceived by certified companies.**

		ISO 14001		EMAS III		F	t	Sig. (2-tailed)
		Mean	Std. Deviation	Mean	Std. Deviation			
Benefits	The reduction of business costs	2,8	1,12	2,7	1,18	2,186	0,455	0,649
	An improvement of corporate image	4	0,9	4,1	0,93	0,238	-0,243	0,808
	Staff motivation from an environmental point of view	3,7	0,97	3,7	0,93	0,11	0,074	0,941
	Greater compliance with legal requirements	4,2	0,98	4,1	0,99	0,329	1,544	0,124
	Better relationships with suppliers	3,3	1	3,2	0,99	0,39	0,683	0,495
	Better relationships with customers	3,8	1,03	3,6	1,14	2,855	0,941	0,348
	Decreased risk of environmental accidents	4,1	1	3,9	1,03	0,003	1,823	0,069
	Improvement of the company performance management	3,9	1,04	3,9	0,94	0,969	-0,313	0,754
Barriers	Failure to improve business performance in environmental terms	2,4	1,05	2,4	0,95	1,276	-0,293	0,77
	Rising in business costs	3	1,06	3	1,08	0,847	0,107	0,915

Difficulty in applying the environmental standard	2,6	1,04	2,7	1,11	0,944	-1,042	0,298
Difficulty to motivate staff on environmental issues	2,9	1,08	3	1,05	0,029	-0,142	0,887
Increasing complexity of corporate procedures	3,1	1,07	3	1,14	1,331	0,591	0,555

Subsequently reasons, benefits and limitations of ISO 14001 and EMAS III have been analyzed using as a stratification factor the company size (Table 6). Two groups of companies have been created: Micro-Small and Medium-Large ones. The reasons that pushed Micro-Small companies to be ISO 14001 certified are more of an internal type (e.g.) the opportunity to reduce costs and to integrate their Quality Management System with the Environmental companies, while Medium-Large ones are prompted more by external ones. Motivations for EMAS are more linked to the improvement of the company's image and the respect of the environment and the differences between Micro-Small and Medium-Large companies are less accentuated. Concerning to EMAS, small companies perceive as important the possibility of improving the safety of workers. The improvement of the company's image as a result of the application of an EMS in Medium-Large companies is statistically more accentuated than in Micro-Small both in ISO 14001 and EMAS III certified companies ( $\chi^2$  ISO 14001=7,312;  $\chi^2$  EMAS III=7,354). In ISO 14001 certified companies there are more statistically significant differences in the definition of motivations that prompted companies to certification between Micro-Small and Medium-Large ones.

**Table 6. Reasons that prompted Micro-Small and Medium-Large Companies to be ISO 14001/ EMAS III certified ( $\rho$ = number of companies that perceived the statements as positive reasons / total (n)).**

	ISO 14001			EMAS III		
	Micro-Small	Medium-Large	$\chi^2$ test	Micro-Small	Medium-Large	$\chi^2$ test
Customer satisfaction and customer needs	0,41	0,59	5,165 *	0,59	0,53	n.s.
The improvement of corporate image	0,40	0,61	7,312 **	0,82	0,97	7,354 **
The improvement of workers' safety	0,41	0,59	5,165 *	0,71	0,53	n.s.
The alignment to environmental legal requirements	0,41	0,59	5,165 *	0,69	0,70	n.s.
The guarantee that the company operates respecting the environment with a socially responsible strategy	0,40	0,60	6,655 **	0,79	0,84	n.s.
The integration of the others company's Quality Management Systems with its Environmental Management System	0,65	0,72	n.s.	0,56	0,65	n.s.
The opportunity to reduce business costs*	0,51	0,40	n.s.	0,39	0,41	n.s.

\* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; n.s.= not significant.

As for the benefits, the size influences only a little their perception (Table 7). It can be underlined that Micro-Small companies which have the ISO 14001 standard have perceived more than the others the compliance with legal requirements.

Considering the limits (Table 7), Micro-Small companies perceive in a greater extent the cost both of ISO 14001 and EMAS III, while Medium-Large companies perceive more than Micro-Small

ones the difficulty to motivate staff on environmental issues. In ISO 14001 certified companies, Medium-Large comparing with Micro-Small ones perceived in a more accentuated way the rising in business costs as a barrier to be certified ( $\chi^2=6,716$ ) and the difficulty in applying the environmental standard ( $\chi^2=4,992$ ).

**Table 7. Benefits and barriers perceived by Micro-Small and Medium-Large ISO 14001/EMAS III certified Companies ( $p$ = number of companies that perceived the statements as high benefits or barriers / total (n)).**

	ISO 14001			EMAS III			
	Micro-Small	Medium-Large	$\chi^2$ test	Micro-Small	Medium-Large	$\chi^2$ test	
Benefits	The reduction of business costs	0,24	0,26	n.s.	0,23	0,34	n.s.
	An improvement of corporate image	0,76	0,79	n.s.	0,77	0,80	n.s.
	Staff motivation from an environmental point of view	0,63	0,69	n.s.	0,54	0,66	n.s.
	Greater compliance with legal requirements	0,86	0,81	n.s.	0,75	0,78	n.s.
	Better relationships with suppliers	0,47	0,40	n.s.	0,41	0,37	n.s.
	Better relationships with customers	0,69	0,62	n.s.	0,57	0,64	n.s.
	Decreased risk of environmental accidents	0,75	0,80	n.s.	0,71	0,77	n.s.
	Improvement of the company performance management	0,69	0,77	n.s.	0,71	0,73	n.s.
Barriers	Failure to improve business performance in environmental terms	0,17	0,10	n.s.	0,12	0,10	n.s.
	Rising in business costs	0,47	0,26	6,716 **	0,46	0,30	n.s.
	Difficulty in applying the environmental standard	0,25	0,11	4,992 *	0,26	0,26	n.s.
	Difficulty to motivate staff on environmental issues	0,25	0,36	n.s.	0,31	0,37	n.s.
	Increasing complexity of corporate procedures	0,48	0,39	n.s.	0,43	0,42	n.s.

\* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; n.s.= not significant.

Afterwards, it has been used time of certification as a stratification factor, in order to examine the different perception of certified companies for over three years compared to those certified more recently. It was decided to take a 3 years discrimination threshold as it is the period usually granted by Accredia for the updating of companies' management systems, when a standard is updated. Considering the differences in motivations to get ISO 14001, companies certified from less years considered in a major way the integration with other systems, while the EMAS earlier certified ones have considered as more important the possibility to reduce business costs, than in the past (Table 8). No statistically significant differences were observed between companies at the beginning phase of the certification (0-3 years) and the rest of the sample across the different statements.

**Table 8. Effect of years of certification on reasons that prompted Companies to be ISO 14001/EMAS III certified ( $\rho$ = number of companies that perceived the statements as positive reasons / total (n)).**

	ISO 14001			EMAS III		
	0-3 years (n=38)	More than 3 years (n=224)	$\chi^2$ test	0-3 years (n=32)	More than 3 years (n=165)	$\chi^2$ test
Customer satisfaction and customer needs	0,59	0,58	n.s.	0,68	0,53	n.s.
The improvement of corporate image	0,86	0,86	n.s.	0,84	0,92	n.s.
The improvement of workers' safety	0,73	0,75	n.s.	0,68	0,59	n.s.
The alignment to environmental legal requirements	0,68	0,73	n.s.	0,60	0,72	n.s.
The guarantee that the company operates respecting the environment with a socially responsible strategy	0,91	0,90	n.s.	0,72	0,84	n.s.
The integration of the others company's Quality Management Systems with its environmental management system	0,82	0,63	n.s.	0,64	0,60	n.s.
The opportunity to reduce business costs	0,45	0,44	n.s.	0,52	0,37	n.s.

\* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; n.s.= not significant.

Analyzing the benefits of companies certified from more time (Table 9), the ones certified ISO 14001 perceive in a greater way the reductions of costs and the improvement of the company performance, while the perceived benefits of image decrease over time; on the contrary EMAS ones perceive more staff motivation and a decrease in the risk of environmental accidents. For both standards it is perceived through the years an improvement in the relationship with suppliers, but a reduction in the management of customer relationships.

As for barriers (Table 9) while for the ISO it is perceived through the years an increase of the failure to improve business performance in environmental terms, an increase in the difficulty to motivate staff on environmental issues and also more complexity of procedures, this perception is exactly opposite for EMAS companies. Staff motivation from an environmental point of view is perceived as a more important benefits from companies EMAS certified from more than 3 years ( $\chi^2=4,282$ ).

**Table 9. Effect of years of certification on benefits and barriers perceived by ISO 14001/EMAS III certified companies ( $\rho$ = number of companies that perceived the statements as high benefits or barriers / total (n)).**

	ISO 14001			EMAS III			
	0-3 years	More than 3 years	$\chi^2$ test	0-3 years	More than 3 years	$\chi^2$ test	
Benefits	The reduction of business costs	0,18	0,26	n.s.	0,24	0,30	n.s.
	An improvement of corporate image	0,86	0,77	n.s.	0,76	0,79	n.s.
	Staff motivation from an environmental point of view	0,73	0,66	n.s.	0,40	0,65	4,282 *
	Greater compliance with legal requirements	0,82	0,83	n.s.	0,68	0,79	n.s.
	Better relationships with suppliers	0,23	0,45	n.s.	0,32	0,40	n.s.
	Better relationships with customers	0,73	0,64	n.s.	0,68	0,59	n.s.

	Decreased risk of environmental accidents	0,73	0,79	n.s.	0,64	0,76	n.s.
	Improvement of the company performance management	0,59	0,76	n.s.	0,68	0,73	n.s.
Barriers	Failure to improve business performance in environmental terms	0,09	0,14	n.s.	0,16	0,09	n.s.
	Rising in business costs	0,41	0,33	n.s.	0,48	0,35	n.s.
	Difficulty in applying the environmental standard	0,14	0,17	n.s.	0,28	0,25	n.s.
	Difficulty to motivate staff on environmental issues	0,27	0,32	n.s.	0,40	0,33	n.s.
	Increasing complexity of corporate procedures	0,36	0,43	n.s.	0,52	0,40	n.s.

\*p≤0.05; \*\*p≤0.01; n.s.= not significant.

Finally, considering the group of companies that have both certifications (n=128), the item identified for motivations, benefits and barriers have been correlated (Table 10, 11, 12), finding that there is a very strong correlation among all items. This means that there are only minor differences in perception of the two standards in those companies that have both of them.

**Table 10. Correlation between ISO 14001 and EMAS III motivations to certification (among those companies that have both certifications).**

		EMAS III statement response						
		A1	A2	A3	A4	A5	A6	A7
ISO 14001 statement response	Customer satisfaction and customer needs (A1)	0,703**						
	The improvement of corporate image (A2)		0,715**					
	The improvement of workers' safety (A3)			0,718**				
	The alignment to environmental legal requirements (A4)				0,717**			
	The guarantee that the company operates respecting the environment with a socially responsible strategy (A5)					0,712**		
	The integration of the others company's Quality Management Systems with its Environmental Management System (A6)						0,678**	
	The opportunity to reduce business costs (A7)							0,761**

\*\* p<0,01

**Table 11. Correlation between ISO 14001 and EMAS III perceived benefits (among those companies that have both certifications).**

		EMAS III statement response							
		A8	A9	A10	A11	A12	A13	A14	A15
ISO 14001 statement response	The reduction of business costs (A8)	0,754**							
	An improvement of corporate image (A9)		0,674**						
	Staff motivation from an environmental point of view (A10)			0,639**					
	Greater compliance with legal requirements (A11)				0,763**				
	Better relationships with suppliers (A12)					0,814**			
	Better relationships with customers (A13)						0,813**		
	Decreased risk of environmental accidents (A14)							0,800**	
	Improvement of the company performance management (A15)								0,663**

\*\* p<0,01

**Table 12. Correlation between ISO 14001 and EMAS III perceived barriers (among those companies that have both certifications).**

		EMAS III statement response				
		A16	A17	A18	A19	A20
ISO 14001 statement response	Failure to improve business performance in environmental terms (A16)	0,728**				
	Rising in business costs (A17)		0,810**			
	Difficulty in applying the environmental standard (A18)			0,772**		
	Difficulty to motivate staff on environmental issues (A19)				0,713**	
	Increasing complexity of corporate procedures (A20)					0,714**

\*\* p<0,01

## 6. Discussion and conclusion

The results suggest a number of interesting points. The differences between ISO 14001 and EMAS have been analyzed in various researches (Biondi et al., 2000; Freimann and Walther, 2002; Morrow and Rondinelli, 2002; Testa et al., 2014) but sometimes with conflicting conclusions. In this study, EMAS certification seems to be strictly correlated to ISO 14001; in fact the majority of companies which operate in International markets have both standards. This is confirmed by Mori and Welch (2008), that stated that those organizations more active in international business are more likely to be certified and to have certified earlier. Moreover as it was supposed to be, because of differences in their organizational and financial structure, Medium-Large enterprises opened up primarily to certification compared to Micro-Small ones. The results of the research show a surprising evidence related to the fact that the percentage of EMAS III certified companies that

work in International markets is greater than ISO 14001 companies; this permit to conjecture that the EMAS III certification is used by Italian companies as a good tool for internationalization even if the initial nature of the standard was purely European. Therefore, it may follow that the 2010 EMAS upgrade that allowed Member States to enable EMAS registration for organizations from outside the EU, reached the target of increasing the participation in the scheme, establishing it as a benchmark for EMSs and allowing organizations to upgrade their management systems to EMAS as stated in literature (Kostic et al., 2013; Ratiu and Mortan, 2014).

According to Ervin et al., (2012) and Singh et al., (2015) employees play a very important role in environmental standard application: about 30% of respondents declared that their little motivation in applying a EMS is a relevant internal limitation. Compared to previous researches in which it was said that companies had more external motivations to get ISO 14001 certified and internal ones to get EMAS III certified (Neugebauer, 2012; Ratiu and Mortan, 2014), actually in the Italian context, such motivations seem to coincide between the two standards, while the research shows that such differences can be perceived among Micro-Small companies that approach to the certification for more internal reasons, while Medium-Large ones are prompted by more external ones related to image and social and legal aspects. Moreover environmental protection and the improvement of corporate image are the main benefits perceived both by ISO 14001 and EMAS III certified companies. Environmental conscience and branding are perceived as important reasons to obtain these certifications and this is confirmed by the work of Poksinska et al. (2003) and Santos et al. (2015). This study, also confirm that complex organizations (Medium-Large ones) as stated by Testa et al., (2014), obtain higher benefits from the implementation of an EMS. Difficulties in applying the ISO 14001 environmental standard are more perceived as a limit by Micro-Small companies, while for EMAS certified companies the dimension seems not to discriminate this topic. As for the cost of certification it can be seen that Micro-Small companies perceive in a greater extent the cost both of ISO 14001 and EMAS III, while Medium-Large companies perceive more than Micro-Small ones the difficulty to motivate staff (Santos et al., 2015) on environmental issues. EMAS goes beyond ISO 14001 in various aspects and requires truly voluntary commitment which may be part of the reasons why it is outcompeted by ISO 14001 (Neugebauer, 2012). But these aspects seem not to influence directly the perception of the motivations beyond the choice of these standards. On the contrary a point that clearly emerges from this research is that if a company is larger it has the opportunity to capture the larger gains in efficiency that are associated with a rigorous distribution of goals, resources, roles and responsibilities. Smaller organizations usually have smaller potential for improvements because efficiency is by nature under strict control. Nevertheless the increase in the complexity of corporate procedures is a limitation that clearly emerged both in companies with ISO 14001 and EMAS standard, as highlighted in previous researches (Boiral and Henri, 2012; Campos et al., 2014; Curkovic and Sdroufe, 2010; Psomas et al., 2011; Ratiu and Mortan, 2014).

Furthermore the analysis of the correlation between these items in companies that have both certifications shows that there is a very strong relation among all them: the technical differences between the two certifications do not affect their perception from companies which have both standards. Considering benefits, the items most correlated, are the ones related to better relationships with suppliers, customers and the perception of decreased risks of environmental accidents, while for limits the most similar perception refers to rising in costs.

Sanz-Calcedo et al., (2015) argued that the implementation of an integrated quality and environmental management system requires (Salomone, 2008) a certain tactic: in fact while the two



standards for some aspects offer certain similarities, they do not show a common methodology for the development of an integrated system; nevertheless ISO 14001 and EMAS III seem actually perfectly integrated for many Italian companies.

Future researches have the intention to discriminate the sample by business sectors in order to understand if these results are confirmed in a specific Italian business sector, and to expand the reference sample of certified companies at an European level, trying to analyze if companies in other European nations perceive ISO 14001 and EMAS III in the same way as Italian ones.

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