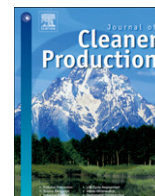




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Alternative models for environmental management in SMEs: the case of Ekoscan vs. ISO 14001[☆]

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ABSTRACT

In the case of SMEs, ISO 14001 and EMAS have been the most used models of reference for implementing Environmental Management Systems (EMSs). Their success has eclipsed that of other alternative SME models deployed in the European Union and Japan. In this paper the authors analyze the content and objectives of one of these models, the Ekoscan model, and compare it to the ISO 14001. Furthermore, a survey composed of 262 participating companies is presented, where motivations, obstacles and benefits of adopting both models in SMEs are compared. The article concludes that only the drivers differ in a significant way, since the perceived obstacles and benefits of adopting the respective models by the SMEs are similar (although their respective signaling and market value are different).

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1. Introduction

An Environmental Management System (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 tend to be based on international models of reference: the most used ones are the international ISO 14001 standard and the EcoManagement and Audit Scheme (EMAS), created within the European Union (EU).

According to the latest available official data from ISO (2008), by the end of 2007, the number of ISO 14001 certificates awarded exceeded 154,000 in over 140 countries. According to European Commission data from the end of 2007 (European Commission, 2008), more than 5900 sites and 3900 organizations had taken the EMAS standards on board. Both ISO 14001 and EMAS are also extending to small and medium-sized enterprises (SMEs) (European

Commission, 2008; ISO, 2005). According to the most recently published EMAS data (December 2008), 76% of all companies appearing on the European Union register were SMEs.¹ Owing to the fact that ISO do not publish results specific to the scale of companies and their ISO 14001 certification, the relevant data are not available. However, as indicated by Hillary (2004), the standards popularity in comparison with EMAS would suggest the percentage of SMEs registered to ISO 14001 is likely to be higher than for EMAS (Hillary, 2004).

SMEs are socially and economically important, since their 23 million companies represent 99% of all enterprises in the EU (57% of value added), provide around 65 million jobs and contribute to entrepreneurship and innovation (European Commission). As Andrea Vettori, Directorate-General for the Environment of the European Commission, has pointed out (Vettori, 2007), SMEs are responsible for 60–70% of all industrial pollution, 40–45% of air emissions, and water & energy consumption, and 70% of industrial waste production in the EU.

For years now, there have, at the heart of both the European Union and the Japanese Ministry of the Environment (the current Environmental Agency), been special awareness-raising policies regarding the challenges that need to be faced by European and Japanese SMEs when promoting environmental management in

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¹ Information supplied by the technical personnel at the European Commission's EMAS. We would like to express our gratitude to the persons involved for their collaboration.

Table 1
Main features of AMEMs for SMEs.

| | Acorn method | e + 5 | Ecoaction 21 | Eco-lighthouse | Ecomapping | Ecoprofit |
|--------------------------------------|--------------------------|---|---|---|---|---|
| Full name | Acorn method/ BS 8555 | Iniciativa e + 5 | The EcoAction 21 Certification and Registration Scheme | Eco-Lighthouse programme | Ecomapping | Ecoprofit International ^a |
| Promoting organisation | British Government | Fundación Entorno | Japanese Ministry of the Environment | Norwegian Ministry of Environment | Heinz-Werner Engel and the Eco-Council Institute | City of Graz and Graz University of Technology 1991 |
| Date of formation | 2003 | 1999 | 1996 | 1996 | 1997 | 1991 |
| Country | UK | SP | JP | NW | B | A |
| Orientation to cleaner production | ✓ | ✓ | | | ✓ | ✓ |
| Proof of legal compliance | ✓ | Vol. | ✓ | ✓ | ✓ | ✓ |
| Documented processes | ✓ | ✓ | ✓ | Vol. | Vol. | Vol. |
| Integration with ISO 9001 | | | ✓ | | ✓ | |
| Integration with EFQM | | | ✓ | | ✓ | |
| Integration with OHSAS 18001 | | | ✓ | | ✓ | |
| Period of validity (years) | 1 | 1 | 2 | 3 | 1 | – |
| Link | – | www. emas5.com | www. ecoaction21.jp | www.eco- lighthouse.com | www. ecomapping.org | www.ecoprofit- interreg3c.com |

Source: Compiled by the authors based on data from the organizations that promote each model and (Heras et al., 2008b).

^a In full "Ecological Project for Integrated Environmental Protection" (in German Ökoprotfit).

^b German Acronym for production-integrated environmental protect.

^c Promoted by State government in North Rhine-Westphalia.

their organizations. Thus, in Europe, projects have been carried out within the EU aimed at facilitating the implementation of an EMAS on the part of SMEs (EMAS Easy Project, 2008). The dissemination of specific models and standards for EMSs have also been promoted, resulting in a great diversity of alternative models for Environmental Management (AMEMs) in SMEs (Kahlenborn, 2004; ISO, 2005). Indeed, ISO, having witnessed the difficulties encountered by companies attempting to adopt the standard international framework (ISO, 2005), has also studied the alternative SMEs available. Given that the alternative programmes are so diverse—as highlighted by Wenk (2006) and Kahlenborn and Freier (2007)—there exists a real need to study the AMEMs for SMEs in depth, improving as a consequence existing transparency in terms of information.

As a result, the aim of this paper is to present a specific AMEM for SMEs (Ekoscan)—addressed for the first time in the field—with the specific objective of analysing whether or not the model in question is adopted in a different mode to ISO 14001. Consequently, the motivation behind, obstacles to and benefits for companies that have adopted the AMEM for SMEs are analyzed and are compared to the cases of other SMEs that have implemented and certified ISO 14001, in order to analyze the suitability of the SME specific models in question.

The remainder of this paper is arranged as follows. The following section of the paper presents a brief overview of the main AMEMs for SMEs. It then goes on to analyze the Ekoscan model and, within the comparative analysis between ISO 14001 and Ekoscan, the working hypotheses related are stated. The third section discusses the empirical methodology deployed during the study. The results of the aforementioned survey are synthesized in the fourth section, with discussion of the results following in the fifth section. The paper concludes with a summary of the main findings and suggestions of particular interest to those stakeholders involved in the promotion of EMSs.

2. Theory, concepts and research propositions

2.1. AMEMs for SMEs

In the literature various factors have been pointed out as being responsible for the emergence of AMEMs for SMEs (ISO, 2005; Kahlenborn and Freier, 2007). Two of the principal reasons are that EMAS and ISO 14001 initiatives have experienced limited success among SMEs and that due to the realization that systems

adapted to SME requirements represent a new business segment, SMEs, especially, require support when introducing environmental management initiatives.

SMEs, due to their size and the resources at their disposal, have clear disadvantages or diseconomies of scale when implementing EMSs based on ISO 14001 or EMAS. In contrast, in the literature these major advantages AMEMs for SMEs are mentioned (Wenk, 2006; Kahlenborn and Freier, 2007; European Commission, 2007):

- Less work required for documentation compared to EMAS/ISO 14001.
- Better adaptation to local/regional circumstances and/or to branch specific requirements.
- Dissemination of the approaches is enhanced through service packages provided by consultants.
- Where external certification exists, the costs are usually low and/or subsidized.
- Political/financial support.

Table 1 is a summary of AMEMs for SMEs. The initiatives have been adopted either by countries with a high volume of ISO 14001 certified countries (e.g. Spain and Japan) (Marimón et al., 2006), or by countries not noted for their ISO 14001 certification record but which have instead adopted the EMAS model (Heras et al., 2008a) (e.g. Germany). With regard to the contents of the table it is mainly concerned with the relevant environmental legislation and with formalising and systematising aspects of Corporate Environmental Management (CEM). The aspect of cleaner production is not particularly highlighted.

As several reports have pointed out (Kahlenborn, 2004; Kahlenborn and Freier, 2007), the total number of companies operating and using the AMEMs is very difficult to estimate, since many of them have no record of participants or participants are not certified, and the transparency in terms of information of many of the entities that promote these models does not appear to be the most suitable.² According to the data available (Heras et al., 2008b),

² The authors of this paper repeatedly requested the collaboration of these organizations and very few replied or agreed to collaborate by supplying the information required.

| Ecostage | QuH | Envi. Diploma | Green Network | PIUS | PREMA |
|--------------------|--|--|---------------------|--|--|
| Ecostage/Japan | Environmental Certification for the Skilled Trades | Environmental Diploma Göteborg | Green Network | Produktionsintegrierter Umweltschutz ^b | Profitable Environmental Management |
| Ecostage Institute | Chamber of Trade for Central Franconia | Environment Administration, City of Göteborg | Green Network | Effizienz-Agentur Nordrhein-Westfalen ^c | Federal Ministry of Economic Cooperation and Development |
| 1993 | 1997 | 1995 | 1994 | 2000 | 1995 |
| JP | G | SW | DK | G | G |
| ✓ | ✓ | ✓ | ✓ | Vol. | Vol. |
| ✓ | Vol. | Vol. | Part. | Vol. | Vol. |
| ✓ | ✓ | ✓ | | | ✓ |
| ✓ | ✓ | | ✓ | | ✓ |
| – | 2 | 1 | 2 | – | – |
| www.ecostage.org | www.hwk-unterfranken.de | www.10.goteborg.se | www.greennetwork.dk | www.nrwbank.de | www.premenet.net |

it would seem that the adoption of these specific models has not been significant. It would therefore seem that the models for SMEs are not forceful enough to deal with the major models of reference such as EMAS and ISO 14001. As can be seen in Graph 1, the AMEMs that appear to have been most successful (in terms of application) have been the Ecoaction 21 model, the Eco-Lighthouse model and the Ekoscan model.

2.2. The Ekoscan model

The Ekoscan model has been promoted in Spain, a country ranked third in the world in terms of ISO 14001 certificates in absolute terms behind China and Japan (ISO, 2008). As a result Spain is, in relative terms, the country in the world which has experienced the greatest intensity of ISO 14001 certification (Marimón et al., 2006). In fact, Ekoscan was created in the Basque Autonomous Region, one of the regions in Spain where ISO 14001 registrations are most highly concentrated (Heras et al., 2008c).

Ekoscan was created in 1998 by Ihobe, the publicly owned Basque Agency for Environmental Management, in order to improve the lack of environmental awareness-raising among industrial SMEs from the region (Heras et al., 2008c; Ihobe, 2007). Although the programme was launched in 1998, it was only at the beginning of 2003 that Ihobe took the decision to advance and enable the Ekoscan model to be certifiable. The aim set out by Ihobe for Ekoscan was to enable SMEs to improve their environmental

behaviour, as well as to comply with environmental legislation. By the end of 2007, 148 organizations had been certified, with a total of 156 sites (Heras et al., 2008c), 92% of them SMEs.

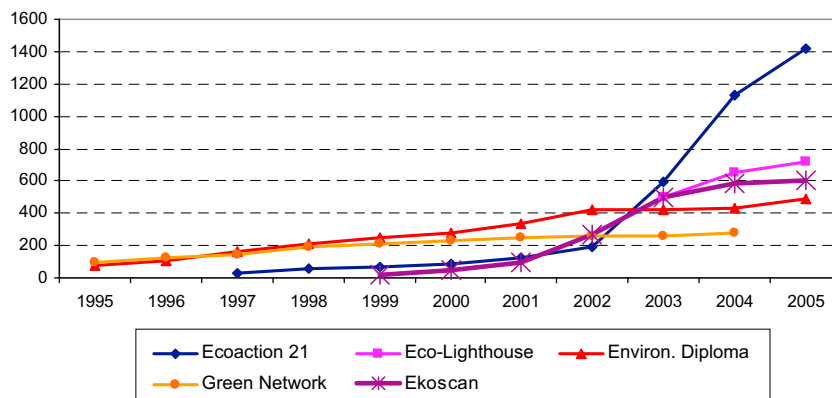
The Ekoscan standard involves drawing up an Environmental Improvement Plan (EIP), which is viable from both a technical and a financial standpoint. This process must comprise the following steps at least (Ihobe, 2004):

- Identification of potential minimization methods for each aspect selected.
- Selection of the specific methods to be analyzed.
- Documented analysis of the technical, financial and environmental viability of the measures considered, including the potential improvement results.
- Definition of the EIP.
- Approval of EIP by top management.

The requirements of the Ekoscan standard are structured into six sections, as shown in Table 2 and Table 1A (in the Appendix). These sections are in turn structured into four sections of a continuous improvement cycle.

2.3. Specific versus general models for SMEs: Ekoscan vs. ISO 14001

When comparing the Ekoscan standard with ISO 14001, the fact that both imply the existence of an internal EMS and that they are



Graph 1. Evolution of the main AMEMs for SMEs. Source: Put together by the authors based on data from the organizations that promote each model (Heras et al., 2008b).

both audited by the usual certifying bodies should be noted as a similarity.

As for differences, for ISO 14001 external audits are conducted at intervals of three years whereas for Ekoscan they are conducted on an annual basis. Likewise, with regard to ISO 14001, obtaining and maintaining certification does not necessarily imply improving environmental performance, as has been highlighted by different authors such as [Delmas \(2002\)](#) and [Boiral \(2007\)](#). This is in contrast to Ekoscan where the first certification and subsequent renewals are subject to improved environmental results ([Ihobe, 2004](#)). In addition, as far as the required level of compliance with legislation is concerned, it should be pointed out that it is less stringent under Ekoscan than under ISO 14001 during the first three audits, and more stringent under Ekoscan from the third year onwards, as we shall see in the following section.

In the case of ISO 14001 and EMAS, there has been an intense debate as to whether implementation of these models has resulted in an improvement in environmental performance of companies [e.g. [Delmas, 2002](#); [Boiral, 2007](#); [Barla, 2007](#); [Dahlström et al., 2003](#); [Steger, 2000](#); [Wagner et al., 2002](#); [Montabon et al., 2000](#); [Russo and Harrison, 2001](#); [Link and Naveh, 2006](#)]. For a review of the international literature, the work carried out by [Claver et al. \(2005\)](#), in which the authors confirmed the existence of very disparate results with regard to the adoption of environmental management initiatives and an improvement in environmental performance of companies, is of special interest. Furthermore, a more recent review of great interest by [Nawrocka and Parker \(2009\)](#) also suggests that the number of academic studies analyzing the outcomes of EMS is growing. The results of these studies so far, however, continue to be inconclusive. The authors conclude that this is resultant of the fact that no standardised definition of environmental performance is deployed and that the perceptual measurements that are applied are prone to bias. As a consequence, the researchers suggest that it would be more fruitful to research specific contexts in which EMS affect performance, rather than investigate the general question of whether EMS affect performance or not ([Nawrocka and Parker, 2009](#)).

In the case of Ekoscan, it should be pointed out that, in the [Ihobe](#) documentation, the standard is associated with a work methodology that incorporates cleaner production techniques as a tool for achieving improvement in the environmental behaviour of the company and reducing costs ([Ihobe, 2004](#)). As with ISO 14001 ([Hillary and Thorsen, 1999](#); [Fresner, 1998](#)), Ekoscan also incorporates the principles of cleaner production, but offers added value by ensuring that this principle is actually adhered to by the companies that implement and certify the standard. As has been stated, Ekoscan is a model of reference for implementing an EMS aimed at attaining results ([Ihobe, 2004](#)). It is a process-oriented tool for cleaner production, according to which environmental improvement results must be evidenced. In other words, the need to quantify the environmental improvement results attained, a requirement for annual renewal of the Ekoscan environmental certificate (not a requirement in the case of ISO 14001), is what sets it apart from ISO standard.

The degree of importance given to obtaining environmental results on the part of Ekoscan is such that the auditor of this standard must include them as a finding in the course of the audit carried out. In fact, the auditor's report contains a specific section in which the auditor includes the environmental results that back-up their recommendation for certification on the part of the company being audited. Thus, as is illustrated in [Table 3](#), those companies that have implemented Ekoscan have attained noteworthy savings.

2.4. Research propositions

Although in the academic literature there appear many studies that have addressed the issues of the motivation for, the obstacles

Table 2
Correspondence between Ekoscan and ISO 14001.

| Ekoscan | ISO 14001 |
|--|--|
| Management commitment (environmental commitment, Ekoscan manager and environmental improvement group) <i>(Participation of employees via appointment of an improvement group)</i> | Environmental policy Structure & Responsibility Communication |
| Assessment of the environmental situation at the organisation Scope. Identification of activities and/or products and/or services Identification of environmental aspects and the legal requirements Quantification of environmental aspects <i>(Data associated with internal and external costs)</i> | Environmental Aspects Legal & Other Requirements Environmental Aspects |
| Prioritising environmental aspects and selecting improvement objectives <i>(Costs as a prioritisation criterion)</i> | Environmental Aspects Objectives & Targets |
| Drawing up the environmental improvement plan <i>(Participation of the improvement group in the definition of the improvement plan, Plan deriving from analysis of financial, technical and environmental viability, plan for adaptation to legal requirements)</i> | Environmental Management Programme Communication Monitoring & Measuring |
| Monitoring of the environmental improvement plan and announcement of Results <i>(Need to ensure quantified improvement results associated with prioritised aspects, and make environmental results available to external stakeholders – external announcement)</i> | Monitoring & Measuring |
| Top management review of environmental management work | Management Review |

Source: Compiled by the authors based on data from Ekoscan and ISO 14001 standards ([Ihobe, 2004](#)).

Note: Specific requirements of the Ekoscan standard are shown in italics.

to and/or the benefits of adopting the EMS based on international models, such as EMAS and ISO 14001 (e.g. [Delmas, 2002](#); [Del Brío et al., 2002](#); [Giménez et al., 2003](#); [Florida and Davidson, 2001](#); [Rondinelli and Vastag, 2000](#); [King and Lenox, 2001](#); [González et al., 2008](#); [Melynk et al., 2001](#); [González-Benito and González-Benito, 2005](#); [Zutshi and Sohal, 2004](#)), the majority of the studies concerned do not differentiate between the adoption of the models by large companies or by SMEs. As a result, empirical studies concerning the adoption of EMSs in the specific case of the SMEs are relatively few ([Hillary, 2004](#); [Biondi et al., 2000](#); [Aiyub et al., 2009](#); [Biondi et al., 1997](#); [Bist, 2007](#)). The majority of these studies focus on an analysis of the drivers, barriers or obstacles and benefits/opportunities for EMS adoption in the SME sector. However, studies which include a comparative analysis between a general standard (ISO 14001 or EMAS) and an alternative model for SMEs (Ecoaction 21, Eco-Lighthouse, Ecomapping or Ecoprofit), focussing on the previously detailed factors, are not apparent in the literature.

In the theory based literature which specialises in the adoption of ANEMs for SMEs, special note is made of the fact that these models are considered more appropriate for the SMEs than the general models owing to the fact that they adapt better to the characteristics of the individual companies ([Bist, 2007](#); [Engel, 2004](#); [Friedman and Miles, 2002](#); [Nobutoshi, 2003](#)). Similarly, special note is also made of the fact that the motivation, the obstacles and the benefits that might be achieved as a result of their adoption are different from those achieved on the implementation and certification of models such as ISO 14001 or EMAS, exactly because they are specifically designed for SMEs ([Kahlenborn and Freier, 2007](#); [Heras et al., 2008b](#); [Matsumoto and Futawatari, 2005](#); [Koroljova and Voronova, 2007](#)). On the other hand, in

Table 3

Accumulated reduction of environmental impact due to the Ekoscan programme.

| | Measures | 2002–2004 Audits | | | 2005 Audits | | |
|------------------------|---|--|--------------------------|----------------|--|--------------------------|----------------|
| | | 52 Companies and 90 targets to improve | | | 45 Companies and 69 targets to improve | | |
| | | Reduction | Technological investment | Annual savings | Reduction | Technological investment | Annual savings |
| Material consumption | - Good operative practice - Change in raw materials - Optimization of the process | 2,300.6 Tn | 305,274.96 € | 234,968.01 € | 193.3 € | 15,468.35 € | 60,798.39 € |
| Water | - Good operative practice - Optimization of the process - Cambio tecnológico | 23,507.26 m ³ | 143,257.67 € | 27,754.31 € | 1,901.28 m | 1,850.92 € | 1,982.14 € |
| Non-hazardous residues | - Good operative practice - Optimization of the process - Internal/external reuse | 567.6 Tn | 61,875.64 € | 68,203.74 € | 261.15 Tn | 238,890 € | 242,935.25 € |
| Hazardous residues | - Good operative practice - Change in raw materials - Optimization of the process - Technological change | 154.9 Tn | 122,702.11 € | 73,731.83 € | 158.43 Tn | 109,045.15 € | 73,661.3 € |
| Energy consumption | - Good operative practice - Optimization of the process - Technological change | 1,197,868.16 kWh | 88,377.90 € | 80,857.44 € | 566,922 kWh | 13,132.85 € | 265,74.94 € |
| Packaging | - Good operative practice - Change in raw materials - Optimization of the process - Technological change | 2,499.5 Tn | 902,185.10 € | 217,806.87 € | 68.5 Tn | 24,300 € | 111,25.06 € |

Source: Compiled by the authors based on data from lhobe.

seven comparative case studies carried out previously by the authors relating to four SMEs that adopted the Ekoscan AMEM and another four SMEs that adopted ISO 14001 it was evidenced that the drivers, the obstacles and the benefits of adopting the two models were different (Heras et al., 2008c). Thus, the theoretical and exploratory qualitative information referred to above provides a basis for positing the following three working hypotheses:

H1. Ekoscan is adopted for motives which are different from those cited in the implementation and certification of ISO 14001 in SMEs.

H2. The obstacles to adopting Ekoscan are different to those cited in the implementation and certification of ISO 14001 in SMEs.

H3. The benefits of adopting Ekoscan for SMEs are different to those cited in the implementation and certification of ISO 14001 in SMEs.

3. Methodology

In order to contrast the hypotheses previously described, two objective field work subjects were selected: 1) SMEs from the Basque Autonomous Region that had implemented and been certified with ISO 14001 standard and 2) SMEs from the same region that had been certified with the Ekoscan standard.³ Field work started in mid-2006 with the planning and carrying out of interviews with different stakeholders and some case studies, selected in order to prepare the quantitative survey.

In the case of ISO 14001, relevant *pretests* were carried out with regard to the questionnaire. Once the definitive version was selected, it was sent by the authors with a letter of introduction to the 443 certified SMEs in the Basque Autonomous Region. Following a period of monitoring via telephone calls, the field work was finally completed in 2007, with 169 valid replies received in total, which equated to a response rate of 45.8%. The response rate signified a very high rate in the case of Spanish companies, since

there is not a strong tradition of collaboration on the part of companies with researchers (Dahlström et al., 2003). For the second questionnaire, sent only to companies that were Ekoscan certified, an even better response rate was obtained. Of the 121 requests for collaboration sent by lhobe, replies were received from 93 SMEs, meaning a response rate of 76.8%.⁴ Thus, the results were taken from a final sample of 262 ISO 14001 and Ekoscan companies.

During the long process that constituted quantitative field work, interviews and visits continued to be made to both ISO 14001 and Ekoscan certified SMEs. The field work was concluded definitively in mid-2008, when the phase involving the gathering of qualitative information from the visits to companies and the interviews carried out with different stakeholders from them (e.g. top management, middle management, operators and consultants) was deemed to have terminated (Heras et al., 2008c).

In the survey, as a result of noticing that there existed in the previous qualitative studies and the pretests undertaken a variety of motivational arguments and differing obstacles and benefits, with regard to SMEs, the researchers chose to employ open ended questions in an attempt to eliminate any distortions resulting from the closed replies being assessed (Alreck and Settle, 1995). Company satisfaction as regards the implementation and certification process was measured with reference to dimension 5 of the Likert scale (with the values 1–5 set on a sliding scale from the least to the most important respectively).

4. Results

4.1. Motivations

The main replies to the motivational question were relatively homogenous in the case of both questionnaires. Around 80% of them were classifiable into four sources of generic motivation, an

³ In order to select the SMEs, the number of employees criteria established in Recommendation 2003/361/EC of the European Commission was taken into account. The study focusses on those companies with less than 250 employees.

⁴ This questionnaire was designed and managed by lhobe, to whom we once again express our gratitude for sharing the information with the researchers.

Table 4
Comparison between motivations for implementing Ekoscan and ISO 14001.

| | Ekoscan | | | ISO 14001 | | |
|---|---------------|----------|---------|---------------|----------|---------|
| | Manufacturing | Services | Total | Manufacturing | Services | Total |
| Compliance with the environmental legislation in force | 13.2% | 10.0% | 11.8% | 13.2% | 9.8% | 11.3% |
| Improvement in the environmental situation of the company | 62.2% | 38.9% | 51.9%** | 36.8% | 16.7% | 25.8%** |
| Improvement in the external image of the company | 3.8% | 13.0% | 7.9%** | 10.6% | 25.8% | 18.3%** |
| Customer demands | 9.4% | 7.9% | 8.7%** | 22.1% | 22.4% | 23.1%** |
| Other external sources of motivation | 11.4% | 30.2% | 19.7% | 21.6% | 21.3% | 21.5% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Source: Compiled by the authors.

Note: Wilcoxon–Mann–Whitney test differences between Ekoscan and ISO 14001. ** $P < 0.01$; * $P < 0.05$.

indicator of the internal consistency of a comparative survey (Sánchez, 2000).

As is shown in Table 4, the main source of motivation that has led SMEs to implement the Ekoscan standard is related to an improvement in the environmental situation of the company (it is mentioned as a main factor by 51.9% of companies), followed at some distance by the factor related to compliance with the environmental legislation in force (11.8% of companies) and the coercive power of customers (8.7% of companies). In the last category, other motivational factors of an external type were mentioned (e.g. demands made by some public administrative bodies, mentioned by 3.8% of the companies).

Depending on which sector companies belonged to, different types of behaviour were detected regarding the motivation behind implementing Ekoscan. Attention should be drawn in this respect to two questions: on the one hand, the greater importance given by manufacturing companies than that given by service industry companies to the motivational factor related to an improvement in the environmental situation of the company (62.2% frequency as opposed to 38.9%), and on the other hand the greater presence of the factor involving the external image of the company in service industry companies (13.0% in the case of the latter as opposed to 3.8% in the case of industrial companies).

In the case of the motivation behind companies implementing ISO 14001, the replies were relatively heterogeneous. Attention should be drawn to the sources of generic motivation regarding an improvement in the environmental impact of the company—the principal motivation, mentioned by around a quarter (25.8%) of those companies consulted—and motivation related to the external image of the companies concerned (18.3%). Other sources of motivation mentioned were related to compliance with the legislation in force (11.3%) or demands made by some public administrative bodies (4.3%)—the latter question being included in an “other sources of external motivation” category along with other external motivational factors described by various stakeholders in the company.

When comparing different sources of motivation behind the implementation of Ekoscan and ISO 14001 (see Table 4), it is clear that the motivational factors which led the surveyed SMEs to implement the two models are quite different. With regard to three of the four common factors analysed the differences are statistically significant⁵ (a finding which confirms Hypothesis 1). Special mention should be made above all of the greater weight given by companies certified in accordance with Ekoscan to the factor

regarding an improvement in the environmental situation of the company over companies certified in accordance with ISO 14001 (51.9% and 25.8% respectively). Further, in both cases the fact that this motivational factor is far more significant among industrial companies than it is among service industry companies is confirmed.

Attention should also be drawn to the greater significance given to the factor related to the coercive power of customers in the case of ISO 14001 standard as opposed to the Ekoscan standard (23.1% and 8.7% respectively).

What is more, attention should also be drawn to the fact that over half the companies that implemented the Ekoscan standard (59.6%) had previously set out obtaining ISO 14001 certification as an objective. 40.4% had not previously considered ISO 14001 certification to be an objective. Industrial companies were those which had most considered the option of obtaining ISO 14001 certification beforehand (72.70%) with service industry companies less likely to have done so (46.02%).

4.2. Obstacles

As regards obstacles, replies from companies were more similar on analysis of the Ekoscan cases than they were on analysis of ISO 14001 cases (see Table 5).

Turning to the contrastive analysis, a significant statistical difference is only encountered in two of the seven factors considered for analysis with one of the factor categories being ‘Other Obstacles’, a category which included a host of different answers (a finding which in itself does not confirm Hypothesis 2). The weight given by companies that participated in the survey to the factor related to legal requirements and other related factors was, at 26.2%, less than that stated by ISO 14001 companies. These companies referred to this obstacle, in one way or another, as the main difficulty faced when implementing the standard on 37.4% of the occasions mentioned in the open replies received. In relation to both standards this specific factor was referred to more by industrial companies than it was by service sector companies. A general reference made, pertained to the difficulty experienced by companies in finding out about the applicable environmental legislation.

A second point to be made is that, in both the case of Ekoscan and ISO 14001, over 10% of SMEs referred to problems with internal adaptation when implementing EMSs. Among the main factors referred to in the replies given by companies was an allusion to problems related to the difficulty in internally incorporating the new management system to daily work routines and to the difficulty in managing documentation in the case of companies starting out from scratch. Likewise, the lack of awareness-raising regarding the environment and the difficulty in changing habits and customs both on the part of upper management at the companies and on the part of workers, was noticeably lower in the case of SMEs with regard to Ekoscan than to those regarding ISO 14001.

⁵ The significance level of the differences between Ekoscan and ISO 14001 was measured using the Wilcoxon–Mann–Whitney test. This method is a non-parametric test for assessing whether two independent samples come from the same distribution. The test can be used with samples of different sizes and for distributions sufficiently far from normal (Hollander and Wolfe, 1999; Daniel, 2000).

Table 5
Comparison between obstacles to implement Ekoscan and ISO 14001.

| | Ekoscan | | | ISO 14001 | | |
|--|---------------|----------|---------|---------------|----------|---------|
| | Manufacturing | Services | Total | Manufacturing | Services | Total |
| Being up-to-date and complying with legal requirements | 29.6% | 22.7% | 26.2%** | 43.3% | 29.3% | 37.4%** |
| Internal adaptation problems | 15.9% | 10.2% | 12.4% | 10.7% | 19.2% | 15.9% |
| Lack of awareness-raising | 13.7% | 5.8% | 9.6% | 11.1% | 15.5% | 13.7% |
| Procedures with public administration | 8.2% | 3.1% | 5.7% | 7.4% | 9.5% | 8.2% |
| Cost of implementation and certification | 4.7% | 2.2% | 3.3% | 6.7% | 8.7% | 7.7% |
| Training and awareness-raising of staff | 8.5% | 6.2% | 7.1% | 3.8% | 6.7% | 5.5% |
| Other obstacles | 19.3% | 49.8% | 35.8%** | 16.9% | 11.1% | 11.5%** |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Source: Compiled by the authors.

Note: Wilcoxon–Mann–Whitney test differences between Ekoscan and ISO 14001. ** $P < 0.01$; * $P < 0.05$.

On the other hand, those obstacles related to procedures involving public administration were also highlighted by a significant number of companies, both Ekoscan and ISO 14001 companies alike. Another obstacle of note is that of the investment and costs of some of the measures needed to be taken in order to implement and maintain the standard. The number of Ekoscan companies that cited this as the principal obstacle was lower than in the case of ISO 14001 companies.

4.3. Benefits

As for the benefits to which companies with Ekoscan draw most attention regarding implementation, it should be pointed out that the replies given by SMEs were less similar. Of special note was the benefit related to an improvement in the environmental efficiency of the company—an issue that was highlighted by 46.2% of SMEs. Indeed, in the case of industrial companies, 52.8% of them considered it to be the principal benefit.

Around a fifth of Ekoscan companies (17.0%) also highlighted the factor related to compliance with laws and regulations as the main benefit of implementing and certifying the model.

Special mention should also be made of the fact that it is the SMEs from the industrial sector that tend to more highly rate the act of complying with the environmental laws and regulations in force as a result of Ekoscan implementation (Table 6).

The replies given by SMEs with ISO 14001 were also highly consistent and referred almost entirely to the four main benefits of ISO 14001 that had been cited in the academic literature consulted: improvement in the external image of the company, improvement in compliance with laws and regulations, environmental efficiency improvement (e.g. reduction in consumption levels and residues) and minimization of internal company problems (e.g. leaks and dumping) and an improvement in internal efficiency (e.g. participation and awareness-raising of employees).

Attention should be drawn to the weight given by the SMEs consulted to an improvement in the environmental efficiency of companies that have experimented with ISO 14001, in aspects such as the management of processes and residues (33% of replies related to these issues) although the frequency of this factor was significantly lower among SMEs with Ekoscan. An improvement in the external image of the company (17.3% of replies) and an improvement in compliance with and knowledge of environmental legislation and regulations (accounting for 16.8% of replies) were also major factors. Another point that was highlighted, albeit to a lesser extent, was the improvement in the systemization and internal control of the company (1%), and the participation and environmental awareness-raising achieved among company staff (8.4%).

Turning to the contrastive analysis, which turns out to be less consistent. Owing to the greater variety of responses collected from the two questionnaires a significant statistical difference is only encountered in one of the four factors considered for analysis (a

finding which in itself does not confirm Hypothesis 3). It should be pointed out that the percentage number of companies citing the benefit of complying with environmental legislation and regulations in force is significantly higher than in the case of Ekoscan (23% and 16.8% respectively). There is also a significant difference in the perceived benefit certification bestows on the external image of SMEs (17.3% of companies mention this, whereas only 10.1% of Ekoscan companies do).

On the other hand, as far as the satisfaction levels of companies that have implemented Ekoscan and ISO 14001 is concerned, it should be pointed out that, among ISO 14001 certified SMEs consulted, the average level of satisfaction, measured on a scale of 1–5, was 3.89, whereas the average level of satisfaction of companies with Ekoscan, measured on a scale of 1–10, was 7.72 (3.86 if converted to a 1–5 scale). The similarity of these findings with regard to satisfaction with the process also supports a rejection of Hypothesis 3, if we consider the satisfaction of the process of implementation and certification to be a benefit of the same process.

5. Discussion

There is a great deal of theoretical literature regarding the study of the motivations leading companies to implement EMSs based on international reference models such as ISO 14001 and EMAS [e.g. Giménez et al., 2003; Florida and Davidson, 2001; González-Benito and González-Benito, 2005; Zutshi and Sohal, 2004]. These studies tend to markedly distinguish between two types of motivation: drives of an external nature (i.e. customer pressure) and drivers of an internal perspective (i.e. company's internal strategy). The empirical literature available on ISO 14001, although the findings are by no means conclusive, suggest that most studies stress the fact that sources of motivation are of an external nature. Specifically, attention is drawn to the influence of customer pressure and demands or those of other stakeholders [e.g. Giménez et al., 2003], as well as matters regarding the external image of the company [e.g. Zutshi and Sohal, 2004] or the influence of pressure exerted by public administration [e.g. Del Brío et al., 2002]. However, other studies stress the influence of factors of an internal nature [e.g. Florida and Davidson, 2001], such as an improvement in the environmental behaviour of companies, an internal improvement in the organisation, or employee motivation.

In the current study it is clear that, in the case of ISO 14001 companies, the SMEs tend toward placing a higher degree of significance on motivation of an external nature than that of internal motivation (63% of companies mention a type of motivation clearly external as one of their principal motivations). The SMEs indicate motivational drivers of a more "substantive" nature (Christmann and Taylor, 2006) with regard to implementing Ekoscan (41% of companies mention external motivation) such as in improvement in the environmental situation regarding the

Table 6
Comparison between benefits of implementing Ekoscan and ISO 14001.

| | Ekoscan | | | ISO 14001 | | |
|---|---------------|----------|---------|---------------|----------|----------|
| | Manufacturing | Services | Total | Manufacturing | Services | Total |
| Improvement in environmental efficiency | 27.3% | 33.8% | 30.2% | 32.1% | 34.6% | 33.2% |
| Compliance with laws and regulations | 29.1% | 15.3% | 22.9% | 16.7% | 15.8% | 16.8% |
| Workers' participation | 7.3% | 10.2% | 8.5% | 9.6% | 7.4% | 8.4% |
| Improvement in the image of the company | 8.4% | 12.3% | 10.0%** | 17.3% | 18.1% | 17.3%*** |
| Other benefits | 28.0% | 28.4% | 28.3% | 24.3% | 24.1% | 24.3% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Source: Compiled by the authors.

Note: Wilcoxon–Mann–Whitney test differences between Ekoscan and ISO 14001. ** $P < 0.01$; * $P < 0.05$.

company, than factors such as the coercive power of customers or the company image, which are deemed more important as driving forces behind ISO 14001.

Regarding the factor of obstacles, the most significant finding relates to the difficulty experienced by the SMEs in terms of the fulfillment of environmental legislation. However, other obstacles cited in the theory based literature as being significant for the SMEs on implementation of the EMS, such as lack of resources, lack of ecomanagement-targeted skills or EMS surprises (Hillary, 2004; Biondi et al., 2000), are not as frequently mentioned by the companies that participated in the surveys.

Fulfillment of the environmental legislation is one of the obstacles that is most cited in the surveys carried out on Spanish companies (Giménez et al., 2003; Fundación entorno, 1998; OECD, 1997; Ministerio de Medio Ambiente, 2006). In the researchers' opinion, in the case of the Ekoscan companies, this obstacle may be less of a problem than it might be in the case of ISO 14001 companies due to the consultational support provided by lhobe, both for the Ekoscan programme and via other programmes such as lhobe On-line and Legescan.⁶

With reference to the benefits provident of the adoption of these models by the companies, the significance attributed by the SMEs to the compliance with laws and regulations demands mention. The significance of this factor had previously been reported in the literature with regard to the case of ISO 14001 [e.g. Hamschmidt and Dyllick, 2001; Fryxell and Szeto, 2002; Schylander and Martinuzzi, 2006; Welch et al., 2002]. On the other hand, it should be noted that SMEs attributed less value to the image of the alternative model. It would seem evident that ISO 14001 standard has a far greater capacity to improve the external image of companies, despite the major effort made to promote Ekoscan on the part of lhobe and Basque public administration in terms of national and international promotion (Heras et al., 2008c). On the other hand, as far as the satisfaction of companies that have implemented Ekoscan and ISO 14001 is concerned, the slightly higher level of satisfaction with the implementation and certification process of ISO 14001 is possibly influenced by their better internal image and prestige – an issue that would seem to be one of the major weaknesses of the Ekoscan model. Indeed, from the surveys carried out on this case and the interviews that have been conducted with different stakeholders, we can clearly deduce the fact that there is less satisfaction on the part of SMEs with Ekoscan than those certified in accordance with ISO 14001. This is due to the fact that, although companies with Ekoscan feel very satisfied with the results attained, they are of the opinion that the Ekoscan certificate does not enjoy the appropriate image or financial and

social recognition, particularly at international level (Heras et al., 2008c).

Given the foregone analysis, it is, it would appear to the researchers, of significant import when comparing the obstacles and benefits of two models such as the Ekoscan and ISO 14001 to consider cost and the length of time implementation of the respective models would imply. According to field work, the average time required for companies to implement the Ekoscan is 4.5 months, and the total duration of consultancy provided is an average 56 h. The average cost of the consultancy service was 3.890 euros.

The cost and duration of the Ekoscan process are noticeably lower than that of ISO 14001. To illustrate this point, according to Watkins and Gutzwiller (1999), the cost of implementation and certification of an EMS in accordance ISO 14001 was estimated to be between 20,000 and 75,000 dollars per plant for companies with between 100 and 300 employees, while Kolk (2000) calculated this figure as being from 25,000 to 100,000 dollars per plant. In another survey carried out in the USA (NDEMS, 2003) it was estimated that the average cost approaches 64,000 dollars per plant. Darnal (2006) calculated the cost as being between 239 and 1372 dollars per employee while at the same time estimating certification costs as ranging from 29 to 88 dollars per employee. Schylander and Martinuzzi (2006) estimate it as being an average 76,000 euros. As far as the duration of ISO 14001 implementation and certification process is concerned, Babakri et al. (2004) calculates it as being a period of between 8 and 19 months in the case of US companies, whereas a German survey estimates it at 13–15 months (Clausen et al., 2002).

Nevertheless, it should be taken into consideration, as noted by Zobel (2007) and by Ammenberg et al., 1999, that in the case of the SMEs there might exist alternatives to the traditional adoption of EMSs based on ISO 14001, such as the joint EMS and groups certification approach. This consists in a cost-effective approach for EMS implementation in SMEs. Comparisons have indicated that the cost for this joint adoption is at least 50% lower than in an individual case (Ammenberg et al., 1999). Furthermore, the results of the field work undertaken for the current study seem to confirm that the two models propose the values of different markets. This would appear to be most clearly the case when we take into consideration reduced market recognition or market reward (Hillary, 2004) with regard to the AMEM for SMEs (in particular internationally but also on a national level).

The subsequent reduced market value results in a much limited signaling capacity for the Ekoscan certificate model as seems to have been the case for other AMEM for SMEs (Heras et al., 2008b; Nobutoshi, 2003; Matsumoto and Futawatari, 2005). In practical terms this fact could lead a company to decide against certifying the EMS, influenced by the reduced level of added value that the particular certification type is considered to contribute, something that is very uncommon for certifiable models such as ISO 14001 and ISO 9001 (Heras et al., 2008c).

What can be considered certain, is that the effect clearly limits the potential of these alternative models when compared to ISO

⁶ lhobe-line is a free information service that advises companies on environmental aspects such as industrial waste management, emission and waste reduction and environmental legislation; Legescan is a free support service for companies to help them comply with legal administrative requirements.

14001 and EMAS. This is especially the case with regard to the potential for signaling and therefore reducing information asymmetries between suppliers and potential buyers, regulators, and local communities, which is, according to several authors (Boiral, 2007; Toffel, 2007), the main characteristic of this kind of certifiable model.

6. Conclusions

From the field work carried out we have concluded that only perceived motivational factors that lead SMEs to implement and certify alternatives models to ISO 14001 (such as Ekoscan) are significantly different. In terms of perceived obstacles to and the benefits of implementation, obtained by the SMEs, results for the two models are similar. It should be noted that the cost of adopting the AMAMs are less.

The SMEs cite drivers of a more “substantive” nature as a factor in the implementation of AMEMs, such as an improvement in the environmental situation regarding the company, rather than factors such as the coercive power of customers or the company image, which are deemed more important as driving forces behind ISO 14001. As for obstacles, no significant differences were found. Attention is drawn to the difficulty on the part of SMEs in knowing what environmental legislation was applicable and therefore how to comply with it. In the case of Ekoscan, this obstacle would seem to be less important than in the case of ISO 14001 due to the substantial back-up provided by the local Public Administration. As far as benefits are concerned, although similarly no significant statistical differences are clearly seen to exist, special mention should be made of the supremacy of the factor related to an improvement in the environmental situation mentioned by SMEs, with its limited external impact in comparison to that of an internationally established certificate such as ISO 140001 being a weak point of the AMEM.

With reference to the field work undertaken the researchers would like to mention limitations with regard to the survey which were a consequence of the methodology used to obtain the quantitative information. The research methodology deployed, even though it may be conventional and generally accepted, does have limitations. As is the case with the vast majority of quantitative studies, the information used in this paper is based on the perceptions given by specialized managers who had taken part in the EMS introduction process. Any analyses of the effect of EMSs conducted in this way are subject to possible weakness and methodological distortion, a bias problem that Wayhan and Balderson (2007), Wayhan et al. (2002) and Heras et al. (2002) have pointed out in the case of Quality Management, and Nawrocka and Parker (2009) have detailed in the case of CEM. With a view to avoiding this problem, the authors believe it would be interesting to analyze the benefits of EMSs or their influence in terms of environmental performance, based on objective environmental data. Such an approach has already been adopted by a few pioneering studies published in the field [e.g. Russo and Harrison, 2001; Boiral, 2007].

As regards the future, it remains to be seen whether Ekoscan and the other AMEMs for SMEs will be able to achieve the critical mass needed to deal with major models of reference or whether, conversely, it will be the general simplified models for SMEs (such as the case of EMAS Easy) that will face a brighter future in the field of CEM.

In this respect, the fact that ISO has been determined to respond to this challenge should be highlighted. The fact is that for a long time now an effort has been made to adapt to ISO 14001 standard in order for it to be on the SMEs’ agenda (ISO/TC207/SC1/SME), by means of ISO 14005 standard project. Within this process, special

mention should be made of the fact that the will is there “to encourage the participation of SME representatives in standards development, that features of ISO 14001 which are particularly difficult for SMEs to comply with should be taken account, that it is advisable to review *light initiatives* (highlighted in the original), and to look into how to differ from ISO 14001 approach” (ISO/TC207/SC1/SME). Attention should also be drawn to the fact that the Directorate-General for Enterprise and Industry of the EU suggested to the European Centre for Normalization that it consider the Ekoscan model as a reference point in defining the foundations for the future ISO 14005 environmental standard.

At the present time, the Ekoscan model is an interesting initiative, partly owing to its simplicity and partly because it focuses on a fundamental aspect on which models for implementing EMSs need to focus: an improvement in environmental performance. In our opinion, a simple standard geared towards environmental improvement similar to Ekoscan, but with the legitimacy, impact and market value of a standard emanating from ISO, could be established in the not-too distant future as a major reference point for SMEs from the EU and from the rest of the world.

Appendix

Table 1A
Structure of the Ekoscan standard.

| |
|---|
| 1. Title |
| 2. Background |
| 3. Purpose and Scope |
| 4. Reference Standards |
| 5. Definitions |
| 6. Requirements |
| 6.1. Management Commitment (Commitment to the Environment, Ekoscan Manager and Environmental Improvement Group) |
| 6.2. Assessment of the Environmental Situation at the Organisation |
| 6.2.1. Definition of Scope. Identification of Activities, Products or Services |
| 6.2.2. Identification of Environmental Aspects, Legal Requirements and Environmental Performance Indicators |
| 6.3. Prioritising Environmental Aspects and Selecting Improvement Objectives |
| 6.4. Drawing up the Environmental Improvement Plan |
| 6.5. Monitoring of the Environmental Improvement Plan and Announcement of Results |
| 6.5.1. Monitoring of the Environmental Improvement Plan |
| 6.5.2. Announcement of Environmental Improvement Results |
| 6.6. Top Management Review of Environmental Management Work |

Source: (Ihobe, 2004).

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