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DO ENERGY MANAGEMENT SYSTEMS ADD VALUE TO FIRMS WITH ENVIRONMENTAL MANAGEMENT SYSTEMS?

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Abstract

Integration of the management of energy and environmental systems was suggested by the scholarly literature in the early phase of dissemination of ISO 14001, as a potential way to improve the environmental performance of companies. Nevertheless, there has been little empirical work reported in the literature that explores this proposition in depth, or sheds light on relevant issues such as the additional effect of an Energy Management System when an Environmental Management Systems has previously been adopted. This lack of research is now even more evident as the adoption of Energy Management Systems is gaining momentum after the launch of ISO 50001 in 2011, following the example set by ISO 14001. The present work aims to shed light on these issues based on an in depth, empirical, exploratory study carried out in eight Spanish organizations. The findings make it possible to anticipate the benefits and potential pitfalls of the adoption of Energy Management Systems in companies that already have environmental certification.

Keywords: energy management systems, environmental management systems, integrated management systems, ISO 14001, ISO 50001

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1. Introduction

Energy management and energy efficiency issues are attracting more and more attention in the scholarly literature related to environmental management (Aughney and O'Donnell, 2015; Böttcher and Müller, 2016; Gheorghe et al., 2017; Vikhorev et al., 2013; Zhu et al., 2015). Similarly, in the practitioner field, energy management is becoming a priority as organizations endeavor to cut down energy waste, in compliance with regulatory requirements, and improve their corporate image (Antunes et al., 2014; Inrona et al., 2014).

In a clear analogy to the worldwide trend to adopt Environmental Management Systems (EMS)

among organizations in all sectors (Daddi et al., 2014; Dragomir, 2008; Heras-Saizarbitoria and Boiral, 2013; Herghiligi et al., 2014), one of the main approaches related to the implementation of energy management practices in organizations has been the adoption of Energy Management Systems (EnMSs). The most important milestone in this vein has been the launch in 2011 of the ISO 50001 reference standard to adopt EnMSs. From its inauguration, ISO 50001 has been adopted in various industrial and commercial activities worldwide. The certification of ISO 50001 grew rapidly in a single year, from 459 in 2011 to 1981 in 2012, an annual growth rate of 332% (ISO, 2013). Europe has the highest regional share followed by East Asia and the Pacific. Europe's share of ISO 50001

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certification was 79% and 89% in 2011 and 2012 respectively.

As recently emphasized by Böttcher and Müller (2016), the research community has only just started to analyze EnMSs, conceptually and empirically, and the suitability and effectiveness of standards for such systems. This is information that is needed not only by the scholars but by the companies and policy makers and standardization bodies that are increasingly promoting the adoption of these systems (e.g. NSAI, 2014). Among many other issues that have attracted the attention of practitioners (e.g. Levinson, 2012) and policy makers (e.g. US Department of Energy, 2014) is whether the adoption of an EnMS by organizations that already have a certified EMSs (e.g. against ISO 14001) is worthwhile. This issue has been rarely addressed in the specialized scholarly literature. In the early dissemination stage of ISO 14001, Amundsen (2000) claimed that energy management should be a central element of environmental management, but, as Amundsen (2000) and Böttcher and Müller (2016) note, the interrelationship of EMSs and EnMSs has not been addressed to date, and this research avenue would certainly provide fertile ground for research. In addition, this avenue is also related to the fertile research line that analyzes the process of integration of different function-specific management systems into a single and more effective Integrated Management System (IMS), a topic that has received more and more attention in the scholarly literature (Bernardo et al., 2009, 2012; Bernardo, 2014; Gianni and Gotzamani, 2015; Simon et al., 2011; Zeng et al., 2007, 2011) due to its relevant and practical implications.

Taking into account this research gap, this article contributes to the literature by shedding light on the adoption process of EnMSs and, specifically, to the value added offered by the adoption of an EnMS based on ISO 50001 for companies that already have a certified EMS based on ISO 14001. The results are based on the case studies carried out in the Spanish companies.

2. Literature review and research objectives

2.1. ISO 50001 and ISO 14001: the global standards for EnMSs and EMSs

Energy management is a term that is used very heterogeneously in the scholarly literature (Böttcher and Müller, 2016). The concept can be defined as the “measurement, monitoring, control, and improvement activities for energy and carbon performance to support the achievement of a company's overall goals” (Böttcher and Müller, 2016). Likewise, an EnMS is defined in the ISO 50001 standard as “the set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives” (ISO, 2011). This definition was based in the previous definition of an EMS by ISO 14001 which referred to it as “the 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 the environmental policy” (ISO, 2004).

The launch of ISO 5011 in June 2011 was a milestone for the fostering of EnMSs. ISO 50001 has international recognition and is now considered the main international reference worldwide to implement and certificate an EnMS. Nevertheless, it is important to underline that ISO 50001 is not the first energy management standard in the world. Earlier there were approximately 14 regional and/or local energy management standards. The research conducted by Anisimova (2013) concluded that the previous energy management standards have many features in common. This is not accidental, since all the previous energy management standards before ISO 50001 were developed by individuals working in the ISO management model for continuous improvement (McKane et al., 2008). The structure of ISO 50001 is designed according to other ISO management system standards, in particular ISO 9001 for Quality Management Systems (QMSs) and ISO 14001 for EMSs. Like other meta-standards of ISO (e.g. ISO 9001, ISO 14001), ISO 50001 is based on the Plan-Do-Check-Act (PDCA) framework for continuous improvement to incorporate energy management into everyday organizational practices.

ISO 50001 is closely aligned to ISO 14001. Like their main predecessors, ISO 50001 is not a performance standard but a procedural standard. ISO 50001 requires an organization to develop and implement an energy policy, identify significant areas of energy consumption and commit to a continual improvement in energy performance, but it does not specify any particular performance criteria and focuses on the identification of significant energy uses and continuous improvement in energy performance (Gopalakrishnan et al., 2014). Nevertheless, this new international standard places more emphasis on the continual improvement of energy performance, including energy efficiency, energy use and consumption (NSAI, 2014). Some practitioners argue that although it is a process standard, there is more focus on performance (e.g. Welch, 2014). In Table 1 the most relevant differences between the main global standards for EMS and EnMS, namely, ISO 14001 and ISO 50001, are summarized.

2.2. Adoption and integration of EnMSs and EMSs

The differences between the main standards for EnMSs and EMSs have been examined in the practitioner literature. Welch (2014) underlines the further benefits of ISO 50001 compared to ISO 14001, arguing that ISO 14001 has not been able to engage energy managers fully. ISO 14001 focuses on impact related to the environment, and is not conducive to other energy drivers, is not as strong as ISO 50001 on performance, has fewer documentation requirements, and, finally, has a stronger focus on metrics and

measurement (Piñero, 2009). Campbell (2012) states that ISO 50001 is more specialized: it has been designed solely for the management of energy and includes a number of requirements not covered by ISO 14001. Although energy is included as an aspect in the majority of organizations with a certified EMS based on ISO 14001, no particular emphasis on energy is found in that standard, and it is often overlooked as organizations concentrate on the more obvious environmental aspects, such as chemicals and waste. Adopting an EnMS in accordance with ISO 50001 includes the need to establish baselines of energy use and energy performance indicators as well as the usual objectives and targets which exist in an EMS (Campbell, 2012). Similarly, there are specific clauses relating to design (covering facilities and production lines, etc.) and procurement, including specifying energy purchasing requirements. Although both ISO 14001 and ISO 50001 are process standards, it is clear that ISO 50001 focuses more on performance (Welch, 2014).

From an empirical perspective, the results and benefits associated with the implementation and certification of EMS based on ISO 14001 have been extensively analyzed in the academic literature (Heras-Saizarbitoria and Boiral, 2013). In the case of ISO 50001, despite the growing number of certificates around the world, especially in Europe, the literature on the adoption of certified EnMS is still scarce. As recently underlined by Antunes et al. (2014), despite the growing “interest in energy management standards, the gap between academic literature on energy management and current implementation practices persists”. The previous empirical research on companies' energy management shows that companies

seldom address this activity systematically (Böttcher and Müller, 2016; Thollander and Ottosson, 2010) and regarding EnMSs, there are only a few case studies that very broadly suggest that the adoption of ISO 50001 results in lower energy intensity (e.g. Chiu et al., 2012; Wessels, 2011). Focusing on the more specific literature addressing the outcomes obtained from certified EnMSs by companies that already have a certified EMS, the research gap is even more evident.

In his pioneering study carried out in ten energy intensive companies in Norway, Amundsen (2000) analyzed the integration of EMSs and EnMSs, and found the former was not typically integrated into the practices of the latter. Amundsen (2000) argued that, a priori, the adoption of an EnMS should provide further benefits to firms with an EMS as companies do not focus on energy as an integrated part of environmental management. This claim was made in the very early stage of dissemination of the main standards for EMSs (e.g. ISO 14001), and as a result, things may have changed as companies improve their EMSs and the outcomes related to them mature and develop (Heras-Saizarbitoria et al., 2016). In his empirical study based on the European Business Environment Barometer (EBEB) survey of 2001, with almost 2,100 firms in manufacturing industries, Wagner (2008) found a significant positive relationship between the implementation of an EMS and energy management activities. But this evidence was not focused on certified EMSs, was not obtained by a specific survey but from data from a general opinion survey, and it also covered a period of time in the early stage of dissemination of EMSs.

Table 1. Comparison of ISO 14001 and ISO 50001

[Source: Developed by the authors based on BSI (2011), Campbell (2012), Duglio (2011), and Welch (2014)]

<i>Issue</i>	<i>ISO 14001</i>	<i>ISO 50001</i>
Focus	Focuses on the management of the environmental aspects of the organization	Focuses on energy management, including energy efficiency, energy use and energy consumption
Aims and objectives	The objectives, to manage and improve the environmental aspects, are not very detailed	The objectives are more detailed. Gives a greater level of detail of what shall be included in an energy review including a review of past, present and expected energy consumption, concluding an energy baseline and identification of energy performance indicators (EnPIs)
Responsibility	General perspective. Management responsibilities not specifically called out	Puts more emphasis on senior management responsibilities; moves roles and responsibilities “up front”
Checking	There is a general approach in order to establish the requirement to be monitored, measured and analyzed	Is more specific in this clause stipulating a minimum requirement to be monitored, measured and analyzed, which includes significant energy uses and the relevant variables and other outputs of energy review; energy performance indicators (EnPIs); effectiveness of the action plans in achieving energy objectives and targets; and evaluation of rate of actual versus expected energy consumption
Management review	General approach to the management reviews without specifications on expected outputs	More clarity on expected outputs from management reviews. The requirement for the verification of actions taken (and reporting of the verified results) are strengthened

More recently, Böttcher and Müller (2016) analyzed the effect of the adoption of ISO 50001 based EnMSs using data from German automotive suppliers that were ISO 14001 certified but of whom only 31 (29%) declared that they had non-certified EnMSs and 14 (13%) had a certified EnMS. The results of the study indicate that overall the EnMSs made a positive contribution to the energy efficiency or performance of the companies. Furthermore, the effect was found to be stronger in the case of certified EnMSs. The authors stressed that undergoing the certification process might help companies to integrate energy efficiency into operations and ensure that a fully functional EnMS is put into place. Nevertheless, the quantitative nature of the methodology used by Böttcher and Müller (2016) did not allow them to shed more light on the extent to which the process of adoption of a certified EnMS adds value to an EMS, and no previous empirical study has addressed this specific issue. This is surprising, considering that the debate on whether the adoption of an EnMS in organizations that already have a certified EMSs (e.g. against ISO 14001) is worthwhile has attracted an understandable level of attention on the part of both practitioners (e.g. Levinson, 2012) and policy makers (e.g. US Department of Energy, 2014).

Furthermore, this research avenue is especially interesting as in both the scholarly and practitioner fields there is a growing belief that the integration of multiple management systems adds value to the sustainable development of organizations (e.g. Bernardo et al., 2012; Gianni and Gotzamani, 2015). As recently underlined by Bernardo (2014) the integration of management systems in order to get IMSs is considered the best management practice when an organization has multiple management systems in place. IMSs contribute to the synergistic benefits for the adopting organizations (e.g. Simon et al., 2012; Zeng et al., 2011). For example, Zeng et al. (2011) found the following main benefits of implementing IMSs: decreased paperwork; decreased management cost; decreased complexity of internal management; simplified certification process; and promotion of continuous improvement. Therefore,

taking into account the gap in the literature on the integration of EnMSs and EMSs the present study may also shed light on this issue.

Considering the previous evidence from the literature, we posit the following research questions for our exploratory work:

Research Question 1 (RQ1): How are certified EnMSs adopted in firms with certified EMSs?

Research Question 2 (RQ2): Do certified EnMSs add value for firms with certified EMSs?

In order to address these main research questions, an empirical exploratory study was undertaken focused on companies with both an EnMSs and an EMS certified against ISO 50001 and ISO 14001, respectively.

3. Methods

Research of a descriptive, mainly exploratory, nature was planned, to facilitate greater understanding of the subject, and to identify propositions that are capable of generalization in relation to the practices observed (Eisenhardt, 1989; Yin, 2003). This methodology is particularly advisable in situations, such as the current one regarding dissemination of EnMSs, in which, as has been made clear in a review of literature on the subject, there is very little empirical literature regarding their adoption.

The methodological scheme for the research is summarized in Fig. 1. A series of semi-structured in-depth interviews were conducted with the managers in charge of the EnMSs and EMSs in the organization. The protocol for the interviews consisted of a list of concepts and questions central to understanding the adoption of ISO 5001 and EnMSs. This was used as a general guide; the protocol for the interviews is given as Appendix of the article. The interviews were based on a semi-structured script. This approach proved to be sufficiently open, and was consistent with the inductive method for analyzing information chosen and, consequently, did not distort the evidence obtained (Yin, 2003). To protect the anonymity of the study participants, all company names in this research are replaced with numbers.

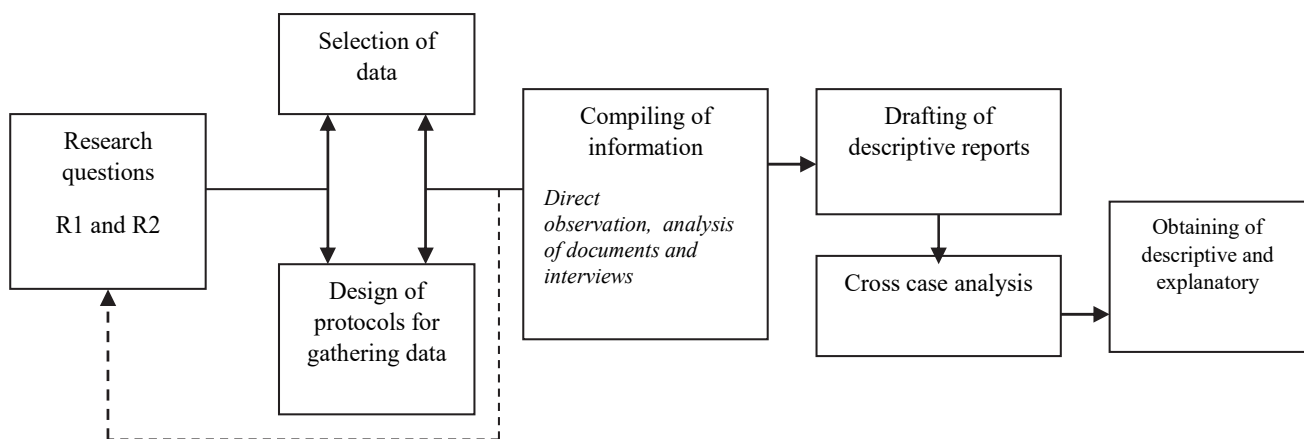


Fig. 1. Methodological scheme for the research [Source: Developed by the authors based on Yin (2003)]

The fieldwork was carried out in Spain, and was developed between September 2013 and January 2014. The case organizations were chosen from a larger sample of all the Spanish companies that at the date of planning of the study had an EMS certified against ISO 14001 and a certified EnMS against ISO 50001 (41 companies). A preliminary study was conducted with 12 of those companies but finally the in depth study focused in eight cases. The selection criteria for the eight case studies were as follows: (1) The organizations adopted certified EMSs and EnMSs, (2) represent several industries with different products or services, production processes and locations, (3) access to the documentation and key informants and (4) they were willing to participate.

Interviews were conducted face to face and by telephone. Interviews by phone were needed to adapt to the distance and availability of some participants. Nevertheless, as suggested by several authors (e.g. Holt, 2010), the combination of face to face and telephone interviews has no significant impact on the type of data collected. The interviews lasted on average 50 min each. The companies made a very broad range of documentation available for research related to their EMSs and EnMSs (e.g. policies, procedures, records, performance). As recommended in the specialist literature on the subject (e.g. Yin, 2003), the validity of factors was supported in the course of the research by the use of diverse sources of information (direct observation, consultation, interviews, and internal and external documentary information). Internal validity was guaranteed by the search for common patterns that explain the phenomena, while reliability was assured by using semi-structured interviews of the same type and with an assessment protocol of cases against each factor. External validity was increased using multiple case studies and utilizing triangulation; that is, comparing the information obtained from different sources (e.g. interviews and internal documentation).

4. Results and discussion

4.1. Summarized results by case study

4.1.1. Firm 1

4.1.1.1. Overview of the organization

Set up in 1955, it was initially devoted to manufacturing magnetic sheets. At the end of the nineties, it began to focus on large commercial profiles and rods and it was taken over by a multinational in 1998. It has 405 employees on its staff, plus another 145 employees who work in subcontracted companies. As far as previous experience in meta-standards certification is concerned, ISO 9001 was adopted in 1992, and then the ISO 14001 standard in 2002. In 2012 ISO 50001 was adopted.

4.1.1.2. Motivations

According to the company, the idea of

implementing an EnMS was to “attempt to reduce costs and increase the company's competitive capacity”. The company's heavy reliance on electric energy, whose price has been rising rapidly in Spain, could be identified as a motivating factor. The European Commission was drawing up guidelines on energy efficiency which indicated, according to the company, “that the future of environmental management would move in that direction”. In 2008 the European Commission published the Communication “*Energy efficiency: delivering the 20 % target*” (EC Directive, 2008), recommending a 20% reduction in primary energy by 2020.

4.1.1.3. Implementation

In relation to the documentary databases pertaining to the EnMS and the EMS, there is no integration of the two management systems. The company failed to implement the EnMS by taking the structure of the EMS as a reference point, because, according to those interviewed, it is a system that is more geared towards improving performance. It should be pointed out that there are two different people in charge of managing the two systems.

The person responsible for the implementation of the EnMS in the company said, “It did not take us very long to get ready for the implementation of ISO 50001 because it was very similar to the Spanish UNE 16001 standard”. The main problem was that there were no other companies to use as a reference and the consultancy firms were not really up-to-date on such matters.

According to the interviewees, the implementation of the standard placed more importance on replacing the out-of-date machinery with new technology, rather than conducting a systematic and detailed analysis of “the small, incremental improvements related to energy management which could be made in the company”. To this end, a thorough external audit of the plant was conducted in 2009, which detected the facilities and machinery that consumed the most energy at the time.

4.1.1.4. Outcomes

In the opinion of those interviewed, EnMS adoption provides clear added value to the EMS. They point out that in the latter case energy-related issues are listed, but are not covered in detail to the same extent as they are in the EnMS. According to one of the interviewees, “everything ended up in generalizations [with the EMS]”.

The adoption of the EnMS has contributed very positively to the capacity by detecting unnecessary consumption. The main area of energy saving detected in this phase focused on the fusion furnace which consumes 70% of the electricity consumption of the production plant. The company has gradually set targets in two different ways: operational improvements which do not involve investment and strategic or more far-reaching improvements involving investment.

4.1.2. Firm 2

4.1.2.1. Overview of the organization

This is a supermarket with 35 employees that belongs to a big business group with more than 35,000 workers and over 2,000 points of sale in Spain. Firm 2 opened its doors in 2012 and it was designed as the prototype of an energy-efficient supermarket of the group. This supermarket was also the first in Europe to obtain ISO 50001 certification. Moreover, it is the first European Supermarket to obtain BREEAM (Building Research Establishment Environmental Assessment Methodology) certification. Previously the company was certified with ISO 9001, which was combined with ISO 14001. Firm 2 had also implemented the SA 8000 standard in the area of Corporate Social Responsibility (CSR).

4.1.2.2. Motivations

The main reason for implementing ISO 50001 was to pre-empt Spanish energy regulation, since the group's policy is that if there are European directives on energy saving yet to be imposed, there must be attempts to pre-empt the compulsory implementation of such directives. Thus, rather than "gradually taking one-off measures", the decision was made "to start from scratch with a store that was yet to open its doors, as a prototype, so that the results of this store would later serve as an example which the other supermarkets could look to".

4.1.2.3. Implementation

With regard to a comparative analysis of Firm 2 supermarket, the general group takes a set of stores called mirror shops as a reference for the implementation. They have practically the same surface area as Firm 2 supermarket and are located in places with similar weather conditions. What is most striking about the ISO 50001 adoption in Firm 2 supermarket is that it was conducted from plans, i.e. during the store's project design phase, before the store was in operation.

They are not equipped with the two integrated management systems but rather, in practice, administer them as two different documentation systems and plan to keep things as they are. ISO 50001 is managed by the Energy Department via a central service attached to the chain whereas ISO 14001 is administered by the Maintenance Department at the centre where it is implemented with the support of the Environmental Department at head office.

4.1.2.4. Outcomes

The company understands that the "investment made is quite considerable", although there is the conviction that it will be cost-effective in the long term, given that between a 47% and 62% energy saving is being made in relation to the mirror shops.

Energy management was previously viewed by the company as being more decentralized, rather than as a unit. There were many specific actions that were disseminated that derived from the annual

management plans of different departments, with priorities sometimes being found. The added value gained by ISO 50001 involves dealing with such discrepancies.

Interviewees think that the paperwork load is greater for the EMS based on ISO 14001 as it refers to a broader system, as opposed to ISO 50001 which focuses resources on improving energy efficiency. In the latter case, an effort has also been made to monitor energy systems "to ensure proper interpretation of indicators and to act on control parameters geared towards improving energy performance".

4.1.3. Firm 3

4.1.3.1. Overview of the organization

Firm 3 is an educational establishment with 73 employees and 410 students where different levels of education are taught to students between the ages of 12 and 18, including general and vocational training. Courses leading to the Higher Diploma in Energy Efficiency began in 2009-2010. Management standards were first adopted at the school due to the demands of the regional public administration. ISO 9001:2000 had to be adopted in order to qualify as a vocational training center, and needed to be implemented in 2003-2004 in order to provide such a level of education. Having achieved this first objective, the dynamics of adopting management systems became part of the establishment's strategy. Thus, the ISO 14001 certificate was also obtained in 2007.

Adopting ISO 14001 was an extremely significant step towards the subsequent adoption of ISO 50001. Having previous experience in relation to the improvement in energy efficiency obtained with ISO 14001, a specific energy management system, was implemented in 2009, and the company was also certified as being compliant with the Spanish UNE 16001 standard. ISO 50001 was implemented when UNE 16001 was due to be renewed in 2011. All the meta-standards adopted to date are combined in a single, integrated management system.

4.1.3.2. Motivations

The main reason for implementing ISO 50001 is pedagogic; the organization deems it its pedagogic duty is to display good energy practices, especially as studies relating to energy efficiency are taught, namely, the Energy Efficiency Diploma. This decision relates to the establishment's strategy, given the importance placed on contributing to environmental awareness and energy saving. On the other hand, as it is a small establishment, it is understood that "it should be different from others" and the organization's management is strongly committed to certifiable meta-standards for such purpose.

4.1.3.3. Implementation

A local consultancy firm conducted an internal audit in order to implement ISO 50001. It is believed that this consultancy firm did not know enough about

the new standard at the time and, consequently, the result was unsatisfactory. Although it is the same person in the organization who administers both management systems, they are not equipped with integrated documentary databases.

4.1.3.4. Outcomes

As for the added value gained by the EnMS, those interviewed point out that much clearer improvements have been obtained in “energy performance and, consequently, environmental performance of the organization, despite the fact that we are referring in all cases to a relatively major improvement and that, in both cases, adoption (of the EnMS and the EMS) might be difficult to justify”. In comparative and efficiency-based terms, they understand that the EnMS would seem to contribute more as “from a pedagogical standpoint it enjoys the same advantages of showing sensitivity towards environmental sustainability for our main stakeholders – such as students and public administrative bodies within the milieu”. Likewise, the EnMS is a system that is “much clearer and better focused on environmental improvement” and “simpler to explain and analyze with our students” so as to develop the ultimate pedagogical goal of adoption.

4.1.4. Firm 4

4.1.4.1. Overview of the organization

Firm 4 is a car manufacturing company. It was set up in 1950 and merged with a multinational group with activities in more than 75 countries in 1986. The company exports over 80% of its vehicles. Firm 4 employs 14,000 professionals and has three production centers. Firm 4 has a great deal of experience in ISO Management Systems. First, ISO 9001 was implemented, which was subsequently combined with ISO 14001. While preparations were being made to obtain the UNE 16001 certificate in 2011, an alternative, in the form of the ISO 50001 standard, was approved.

4.1.4.2. Motivations

The company had been following a defined environmental policy for some time, although there was no specific orientation towards energy efficiency. In 2006, a step was taken to this effect and a specific working party was set up to improve energy saving at the production plants - plants which consume large amounts of energy.

Since then, action has been taken aimed at energy saving in order to reduce costs and increase the company's competitive capacity. ISO 50001 implementation and certification has constituted some of the action taken.

4.1.4.3. Implementation

Three people at the plants were trained to take charge of the ISO 50001 standard, who subsequently passed on the knowledge by training the person responsible for energy in each area (some 15 people in

total). There are working groups in the company designed to organize regular meetings where the staff are informed of the new standard being adopted. There are also internal communication channels through which workers are supplied with information on energy efficiency and management.

As far as integration of EnMS and EMS is concerned, they have not been completely integrated. Even though they share several things on the databases (e.g. procedures, registers), other matters are administered separately. ISO 14001 is administered by the environmental department alongside process management, whereas ISO 50001 is administered by the maintenance department. As they are administered by two different departments, the person in charge and the responsibility structure are also different. As regards the initial external consultants and auditors who implemented and certified ISO 50001, those interviewed stated that they were ISO 14001 auditors with basic training in energy efficiency. They also say that auditors would now seem to be more specialized or are accompanied by suitable technicians.

4.1.4.4. Outcomes

In Firm 4 they are clear that the EnMS provides respect for the EMS. Until such time as an EnMS was implemented, the energy question only appeared in a couple of indicators they controlled, such as energy consumption in kWh/car produced or general consumption levels. Since implementation of ISO 50001, an energy working party has been created and they set out very specific objectives in different parts of the workshop (specifically, in five areas and with five people in charge per area). In the opinion of those interviewed, the EnMS provides far more. They are of the view that ISO 14001 is geared more towards complying with laws and regulations. For instance, the EMS enables them to control emissions by controlling, among other factors, what is dumped by the treatment plant they have installed. This ensures they comply with regulations while at the same time fostering social and environmental responsibility, as well as helping them to avoid paying fines - and of course it also enables them to save. However, the purpose of the EnMS is a direct one – it is not a matter of complying with a regulation, but rather, the main reason is to save on costs, with the resulting benefits this provides.

4.1.5. Firm 5

4.1.5.1. Overview of the organization

It was established in 1912 and its main activity is maintaining street lighting. Its most important clients are people living in municipalities and their local councils. There are now approximately 260 staff employed in Firm 5. Before implementing ISO 50001, the ISO 9001 had been obtained in 1999. Later, in 2004, ISO 14001 was certified. With the help of the latter, two years later, the company subscribed to the EMAS European regulation. In 2008, OHSAS 18001 was adopted.

4.1.5.2. Motivations

The reason for implementation in this case is for clients. It is not due to the pressure exerted by them on the company, but on the contrary, the company highlighted that “the aim is for Firm 5 to serve as a good example”. In this way, it is thought that if ISO 50001 is implemented, clients will trust that “we are a company which can help its clients reduce electricity consumption”.

4.1.5.3. Implementation

Firm 5 has integrated two management systems and the same employee is in charge of managing both systems. As regards the results, less electricity has gradually been consumed over recent years, although this matter has been controlled since 2006 within the framework of the company's adherence to the EMAS. Owing to the fact that ISO 14001 and the EMAS had already been implemented, there was exhaustive control of energy consumption and monitoring before ISO 50001 was adopted in 2012.

4.1.5.4. Outcomes

Owing to the special situation in which the firm finds itself regarding previous development of the EMS and also to the nature of its main activity, it believes that implementation and certification of an EnMS does not provide so much added value in terms of the initial situation, as the EMS in place was already highly-developed and established firstly with regard to ISO 14001, and secondly with regard to a more demanding option of EMAS (Testa et al., 2014).

According to those interviewed, the noteworthy improvements obtained have been due to the continuous improvement adopted by the firm in implementing standards, some of which have been measures that it later wished to promote among its client firms. For instance, as regards the EnMS, extremely simple commercial software has been implemented to control energy consumption - software that is also recommended by the company and which it urges its clients to use.

4.1.6. Firm 6

4.1.6.1. Overview of the organization

This is a firm that manufactures and sells components for heating, domestic hot water supply, water heating and electrical household appliances. It has around 600 employees. An EMS in accordance with ISO 14001 was implemented in 2001 and an EnMS in accordance with ISO 50001 in 2013. The EMS was adopted in accordance with the policy pursued by the holding company of which the firm forms a part, whereas ISO 50001 was implemented for the specific purpose of reducing consumption. It should be stressed that this firm's EMS has received widespread recognition. For instance, it received a national environmental award and is now on the verge of achieving zero dumping from their plant. All this is due to the fact that the environmental policy is a key factor for the firm and the group to which it belongs.

4.1.6.2. Motivations

Adopting the EnMS has resulted in their making major investments with a view to improving the firm's energy efficiency. For instance, all the firm's lighting has been changed (6,000 tubes operating 24 hours a day), which has meant a €400,000 euro investment. LED lighting has also been introduced in a specific section which saves 60% of energy consumption, and these investments continue within the framework of the EnMS.

Every year, energy audits are carried out and annual conclusions draw information from them to help prepare the plan of action regarding possible energy saving. The interviewee from this firm comments that the monitoring of energy consumption is of paramount importance in their case – assembly lines are being monitored at present and the aim is now to extend this to other sections (the production section will be the next). This monitoring enables them to improve efficiency of compressed air consumption, electricity and gas consumption, although in the case of gas, which accounts for 4.5% of electricity consumption, they are not focusing on it so much because the savings are not significant at the end of the day. Furthermore, they have demanded that new machinery be bought that complies with minimum requirements for energy efficiency, and they are now able to corroborate this with the monitoring being carried out.

4.1.6.3. Implementation

They boast two completely integrated management systems with a single person in charge, although each system is administered by a different person: ISO 50001 is administered by the maintenance department and ISO 14001 by the environmental department. However, they share a common documentary database and the paperwork load has not increased with integration of the EnMS into the EMS.

4.1.6.4. Outcomes

The interviewee understands that EnMS clearly entails added value over EMS, above all owing to the reduction in the firm's environmental impact through a reduction in electricity consumption. They also understand that the EnMS approach that is most applied makes it easier to involve all agents so as to ensure they interact in the firm, thus compelling the latter to make continual improvements in consumption. Those interviewed point out that when they only had the EMS, they took general consumption of electricity into account with other consumption such as water, and the monitoring carried out failed to focus so much on this. Now, however, they are increasingly searching for where they can improve efficiency and where energy is being wasted. They understand that, in addition to helping reduce environmental impact, ISO 50001 is something altogether more appealing, since “as well as contributing to the common good, it is also for the good of the firm, and this makes investment more profitable”.

4.1.7. Firm 7

4.1.7.1. Overview of the organization

This is a paper manufacturer with 67 direct employees. They were first certified with ISO 9001 and later in 2012 with ISO 14001, and are also certified in other systems related to the sector, the Forest Stewardship Council (FSC) certificate. ISO 50001 was implemented at the beginning of 2014.

4.1.7.2. Motivations

The main reason for implementation and subsequent certification was to reduce energy consumption so as to save on costs and “consequently influence the firm’s environmental performance”, despite the fact that this certification has not been demanded thus far. The firm has been certified, because they think it will be of great importance in the future and “holding this certificate is going to make them stand out over the competition”.

4.1.7.3. Implementation

They have integrated ISO 50001 into the other ISO management systems because the core elements of the standard are the same, although the interviewee states that other firms from the sector with whom they have jointly implemented ISO 50001 – with the support of public administration – have done so separately.

One of the most significant differences between adoption of the EMS and the EnMS is that in the case of the former the investment made was not great, given that the main investment set aside for reducing environmental impact had already been made with a view to complying with regulations in force in the sector. In contrast, investment was made in 2011 based on data obtained from the energy audit conducted in 2009: another economizer and vaporizer were fitted in one of the gas turbines, and in 2012 the old gas turbine was reformed and shifters in the vacuum pumps fitted. They do not plan any large-scale investment in the short term owing to current financial difficulties.

Both management systems have been integrated into their organization together with ISO 9001 and FSC, meaning the procedures for all these systems have been modified to ensure such integration. Those interviewed think the paperwork load is greater in the case of ISO 14001 than ISO 50001. Indeed, they point out that a major part of the documentation required by ISO 50001 in their approach to integration has been added to that for the EMS. There is a single person in charge of all management systems at Firm 7. They are of the opinion that integration simplifies proper management of the systems, meaning they are not thinking of making any change.

As regards audits, they point out that as ISO 14001 has been in force for longer, auditors are experts in all types of sector. In the case of ISO 50001, the fact that it is a new standard means that auditors will increasingly gain expertise, although in their specific

case the auditor was highly specialized in energy-related matters.

4.1.7.4. Outcomes

Although they consider that EnMS and EMS complement each other, they are also clear that the EnMS is far more profitable in operative terms. Even though energy aspects with ISO 14001 remained to a certain extent controlled and an attempt was made to improve energy consumption, “all these activities were carried out simply”. In contrast, given the ISO 50001 approach that focuses more on efficiency, the improvements made in energy performance are far greater. Likewise, implementation of ISO 50001 has provided them with greater documentary control than was previously available in terms of energy consumption.

As far as the image conveyed to firms is concerned, those interviewed think implementation of ISO 14001 is still regarded more highly than ISO 50001, as it is associated with a reduction in environmental impact. Despite this, as has been stated previously, they can clearly see the added value provided by the EnMS given that it entails an obvious improvement in terms of cost saving. In the words of the interviewee – who is an expert in ISO 14001 implementation – it was considered to be of great importance in many sectors, as it is applicable to most of them. In the medium term, they believe ISO 50001 will take on the same importance as ISO 14001 in sectors where energy plays a major role, such as their own.

4.1.8. Firm 8

4.1.8.1. Overview of the organization

This is a passenger road transport firm with 338 workers. They implemented and certified ISO 14001 in 2007 and ISO 50001 in 2011. The reason for implementing ISO 14001 was based on the need to modernize the firm, given that they saw it was acting on the boundaries of legality in terms of the regulations in force (e.g. regarding management of residues at the workshop such as oils and filters, etc.). Conversely, in the case of ISO 50001 they saw the chance to control and save electric energy and so decided to take the step.

4.1.8.2. Motivations

With the implementation of ISO 14001 only an initial impetus to environmental improvements in the firm was gained, such as environmental awareness-raising and residue management, whereas ISO 50001 has provided them with everything regarding the saving and control of energy consumption. For instance, in terms of electricity consumption, under ISO 14001 they previously only controlled the firm’s general monthly consumption measured in kWh. With the EnMS, they now control and monitor this consumption in far greater detail, to the extent that they are genuinely able to see where it is being wasted, where the main consumption points are and where the

most efficient improvements can be established. Thus, by adopting ISO 50001 they were able to plan the investment they could make. Although some such investment was not able to be established owing to the general crisis being experienced in the country and in the sector, they did manage to make some investment that was set aside for reducing costs. For instance, they established preventive maintenance measures for the fleet of buses, changed all the company lights over to LED lighting, introduced timers in non-frequented areas, invested a great deal of time in raising awareness among people, changed the lift motor, and now carry out frequent inspections of the compressed air facility and thermostats.

4.1.8.3. Implementation

The systems are integrated and administered by the same person, who is also responsible for them. As far as red tape is concerned, they state that the paperwork load attached to ISO 14001 is considerably greater in their case than for ISO 50001.

As regards audits, the interviewee highlights the fact that in their case the consultant involved who helped them to introduce the EnMS lacked certain expertise in ISO 50001, given that the standard had just been launched at the time. This was not the case with the auditor, who they considered sufficiently specialized.

4.1.8.4. Outcomes

The EnMS has provided them with added value over the EMS, because ISO 50001 enables them to monitor energy consumption and corroborate improvements made in action being carried out in detail – which was not possible with ISO 14001. From the interviewees' standpoint, with an EMS based on ISO 14001 “we can verify the environmental impact we have but then we can't see whether what we do helps or not (e.g. with recycling of filters or packaging) and, more importantly, we can't see what effect this action has on the firm”.

In terms of other types of benefit such as image, social legitimacy and differentiation, those interviewed point out that ISO 50001 is not at all widespread in their sector, which is why it has not enjoyed even the minimal amount of dissemination required to ensure a certain appeal or to secure differentiation. Despite this, they believe this could change soon. For instance, they comment that public administration bodies are starting to take ISO 50001 into account in public bids, but that this is not at present a reason to exclude a company from a tender, as can occur if a firm is not certified in accordance with ISO 14001.

4.2. Summarized cross-case analysis

Responding to RQ 1, the exploratory analysis based on in-depth interviews and observations in eight cases from companies that integrated EnMSs and

EMSs illustrate the rather heterogeneous way in which the adoption of ISO 50001 is experienced by the representatives of the certified companies and the rather homogeneous perspective on the value added that the certified EnMS brings to companies with a certified EMS.

Of the firms analyzed, only Firm 5 has a specially developed EMS (certified in accordance with ISO 14001 and EMAS), and had a pre-existing approach to reducing energy consumption, and consequently it failed to obtain any appreciable added value by implementing and certifying an EnMS. Similarly, Firm 7 and Firm 8 maintain a suitable approach to what energy management entails with regard to environmental management.

Regarding the integration of the documentary bases of both management systems, although from the practitioner literature (e.g. Welch 2014) it is clear that ISO 50001 based EnMSs can be easily integrated using existing EMS structures, only 50% of the analyzed cases had achieved that integration. These findings are consistent with previous findings of the empirical literature on IMSs. For example, one of the main benefits found by Zeng et al. (2011) for integrated management was decreased paperwork. In contrast with this, the evidence by Bernardo et al. (2009) showed that the responsibility for the EMSs and the QMSs falls on the same person even if the systems are not integrated. This was not confirmed in the present study, as in four of the eight cases the person in charge is different, and this happens even in the case where some integration is found (Firm 4).

As far as RQ2 is concerned, in this exploratory study the evidence confirms the added value provided by an EnMSs over and above that derived from the EMSs, given that – except for the case of Firm 5 which adopted EnMSs based on two different schemes (one of which is the more demanding EMAS) and were consequently induced to reinforce all matters related to energy consumption – there is evidence of clear added value in integration. In Table 2 the main outcomes of the exploratory study related to RQ1 and RQ2 are summarized.

5. Conclusions

The exploratory study carried out in firms with a certified EMS confirms the fact that inclusion of an EnMS provides them with added value. Firms state that the EnMS based on ISO 50001 offers them clearer guidelines for improvement in their energy efficiency and, hence, for improvement in their environmental performance. The evidences gathered leads to the conclusion that the adoption of ISO 50001 — a more *technical* and specific meta-standard, which has, so far, a lower *brand* value for adopting organizations compared to a well-known and popular standard such as ISO 14001— can focus on gaining specific energy efficiency performance improvements rather than other objectives.

Table 2. Summary of the main findings obtained from the case-studies

	Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7	Firm 8
Sector	Manufacturing	Supermarket	Education	Car manuf.	Maintenance	Manufacturing	Paper mill	Transportation
Number of employees	405	35	73	11.458	260	600	67	338
Year of ISO 50001 (ISO 14001) certification	2012 (2002)	2012 (2010)	2011 (2007)	2012 (2005)	2012 (2004)	2013 (2001)	2014 (2012)	2011 (2007)
Energy cost/Total cost (%)	18-20%	Medium	Low	High	Very low	High	High	High
Adoption of EnMSs								
Main motivation (internal/external)	Energy saving (internal)	To pre-empt regulation (internal)	Image – example (internal)	Company strategy (internal)	To serve as an example (internal)	Corporate decision	Reduce power consumptions	Consumption control and savings
Main difficulty	Lack of knowledge	”Virtual” certification – “from plans”	Little information on the EnMS	Sector's characteristics	Not stated	EnMS' specific terms	EnMS' specific terms	Investments / Coordination
Time for adoption	6-8 months	12-18 months	3-4 months	4-6 months	3-6 months	6-12 months	8-12 months	8 months
Public subsidies	No	Yes	No	Yes	No	Yes	Yes	Yes
Training to employees	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Auditing/consulting service's quality	Good	Improvable	Failed	Good (now)	Good	Lack of knowledge	Very good	Good
Outcomes of the EnMSs								
Saving % (per year)	2.40%	47-62%	Very low	6,20%	Very low	Medium	High	Medium
Pay off (adoption cost of EnMSs)	2 years	Yes, long period	Probably never	4 years	Hardly	Medium term	2 years	Medium term
Integration of EnMSs and EMSs								
Documentation Integration of EnMS and EMS	No	No	Yes	Not totally	Yes	Yes	Yes	Yes
A manager in charge of the two systems	No	No	Yes	No	Yes	Yes	Yes	Yes
EnMS gives added value to EMS	Yes	Yes	Yes	Yes	Not high	Yes	Yes	Yes
Main added value of the EnMS	More focus on performance	Bridging misalignments	More focus on performance	New approach to improve performance	Better control of energy consumption	Performance perspective	Better control and efficiency	Clearer energy improvements

Source: designed by the author

Although the improvement of energy management and energy performance should be considered by companies with a certificated EMS as an important part of their system, especially for those companies belonging to sectors with low environmental pressure, our study shows that only with the adoption of an EnMS were the organizations able to improve their energy management substantially and obtain relevant improvement in their energy and environmental performance.

What is evident in the exploratory analysis does not, therefore, confirm the previous literature (e.g. Amundsen, 2000; Wagner, 2008), in the sense that adoption of EMSs proves to be a significant factor in energy management activities.

In general terms, implementation and certification of an EMS has provided the firms analyzed with a very limited approach in terms of improvement in their energy management, and that has an indirect effect on environmental improvement. As a result, there is still potential for improvement in environmental performance, through the implementation and certification of an EnMS. This finding is generally surprising, but especially so in the case of those firms – such as some of those analyzed in this exploratory study – in which the impact of energy consumption is one of the most important environmental impacts.

Our study confirmed previous suggestions in the literature but for which no empirical evidence has previously been provided, regarding the value added of a certified EnMSs where there is a certified EMSs. It has been shown that the more specifically defined focus of a standard to implement EnMSs (e.g. ISO 50001) helps to overcome the gaps resulting from the adoption of EMSs based on ISO 14001. The latter is increasingly described in the specialized literature as a standard whose implementation and internal and external audits are more prone to heterogeneity, as a much broader set of environmental impacts may be considered. These results are in line with previous evidence obtained by the empirical works aimed at analyzing the outcomes of more narrowly focused standards for EMSs, standards which are more focused on performance.

Generally speaking, the results obtained from our empirical study corroborate some approaches in the practitioner field which state that the ISO 50001 standard for the EnMS offers a new, far more focused perspective on improvement in energy impact and therefore also on environmental impact. For example, it has been shown that ISO 50001 is more strongly focused on performance, with fewer documentation requirements, and with a stronger focus on metrics and measurement. Energy is included as an aspect in the majority of organizations with a certified EMS, but there is usually no particular emphasis on energy management and control as this was overlooked and organizations concentrate on the more obvious environmental aspects such as waste, even though energy management is probably the most important

environmental aspect to control. Moreover, material and energy conservation go hand in hand, which means that if ISO 14001 and ISO 50001 are integrated, they should produce synergies to achieve the best results, as material and energy conservation are inseparable agendas.

As far as the specific question of IMSs is concerned, some of the benefits found in the literature on the subject are confirmed in the exploratory study, as has been pointed out. These include obtaining benefits from reducing red tape for those firms who combine the documentary databases of both systems. However, a novel finding that appears in the present study, and which contrasts with the previous literature that focuses on the integration of EMSs and QMSs, is that coordination of EnMSs and EMSs tends to be carried out by different people who also belong to different areas of management.

The outputs of the article, have several implications for organizations, managers, public decision makers and other stakeholders. The advantages and effectiveness of EnMSs in terms of energy savings and environmental performance should encourage managers and business leaders to analyze the advantages of EnMSs over EMSs. Policy makers and public decision makers should be aware of the real implications for different type of organizations of the adoption of EnMSs and EMSs. Thus, one might speculate about the advisability of a policy to promote standards for EnMSs and EMSs that is better adapted to the features of the target firms, especially in the case of SMEs.

Finally, possible limitations to this pioneering survey and possible avenues for future research should be mentioned. The conclusions of this study are preliminary, due to its exploratory nature and the use of a qualitative methodology. Thus, there are limitations to the generalization of the conclusions. An interesting line of future research would be to develop a quantitative study based on a much larger sample, to examine, once the very initial phase of dissemination of ISO 50001 standard is over, the adoption and integration of EnMSs and EMSs. Similarly, the fact that the survey was carried out within a single country gives rise to a limitation. Although it can be argued that the main characteristics of the process of adoption of meta-standards does not differ much from one region to another, more research is needed to analyze the influence of the geographical variable. Research aimed at analyzing the real role of the specialist consultancy and the auditors would also contribute to both the practitioner and the scholarly literature.

Appendix

Guidelines for the semi-structured interviews

Section 1: Context of the sector and the company

- Main agents/actors and their power of negotiation
- Main changes in the past (forces, objectives, etc.)
- Future trends (reasons, objectives, etc.)

Section 2: Motivation

- External and internal motivation behind adoption

- Training received
- External and internal help with adoption (consultants, auditors, coordinators etc.)
- Main obstacles to and benefits of adoption
- Influence of adoption on operative performance (costs, productivity, etc.)

Section 2: Adoption of the EnMS/ISO 50001

- Implementation
- Integration of MSSs
- Preparation of audits

Section 3: Outcomes of the EnMS/ISO 50001

Summary of aspects consulted and the type of document analysed in situ

Types of document analysed

- Documentation of the EnMS
- System documents on display at the place of work
- Forms on display at the place of work
- Scoreboards

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