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IMPLEMENTING AN INTEGRATED HEALTH, SAFETY, AND ENVIRONMENTAL MANAGEMENT SYSTEM: THE CASE OF A CONSTRUCTION COMPANY

Abstract: *Over the past two decades, there has been an increasing trend of organizations implementing simultaneously two or more management systems. The structural similarities of these systems – despite the diversity of their fields of application, such as occupational health and safety for OHSAS 18001, and environmental management for ISO 14001 – have enabled many organizations to integrate different systems into a single one, rather than implementing them separately from one another. The purpose of this paper is to examine in depth a case of integration of the ISO 14001 and OHSAS 18001 systems, using a construction company as a research setting, in order to draw conclusions about the level of integration achieved, as well as the benefits, the problems, and the critical success factors of this endeavour. The findings of this study show that both the company's devotion to the fulfillment of the critical success factors and the identical structure of the two systems under consideration have facilitated the successful outcome of integration. However, this does not automatically imply that the company adopted the idea of full integration. Instead, the maximization of integration benefits and the elimination of related problems was achieved through the company's conscious choice to proceed with partial integration, keeping separate manuals, policies, and risk management procedures for each system. This study will be useful in order to understand that partial integration is a perfectly acceptable and realistic solution that, under certain circumstances, may even have a better cost-benefit ratio than full integration.*

Keywords: *Integrated Management Systems; partial integration; ISO 14001; OHSAS 18001; construction industry*

1. Introduction

In a global, competitive, and fast-growing

business environment, organizations operate under conditions of extreme tension, in order to meet the demands of their customers. However, the sustainability of an organization in such an environment does not only require meeting customers'

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expectations but now extends to include all internal and external stakeholders who place direct or indirect demands on that organization (Rebelo et al., 2014a). Thus, in addition to financial performance, organizations have to focus their attention on other important issues, such as quality management, environmental management, occupational health and safety, and corporate social responsibility (Karapetrovic and Jonker, 2003; Salomone, 2008). In order for an organization to remain competitive, it should constantly monitor the aforementioned issues by developing adequate internal structures (Scipioni et al., 2001; Seghezzi, 2001). Consequently, the implementation of an appropriate management system plays a catalytic role, from an operational point of view, in meeting both stakeholders' demands and the organization's own requirements (Scipioni et al., 2001; Karapetrovic, 2002a).

The International Organization for Standardization and other organizations have developed – and continue to develop – several management systems, each focusing on a distinct area, such as quality (ISO 9001), environment (ISO 14001), health and safety (OHSAS 18001), and others (Karapetrovic and Jonker, 2003; Simon et al., 2012). The effectiveness of these valuable management tools is widely accepted and recognized, as their global diffusion indicate; approximately 1 million ISO 9001 and 320.000 ISO 14001 certificates have been awarded in more than 200 countries to date (IOS, 2016). At the same time, many other management systems with different fields of application have been globally adopted by organizations in order to satisfy their various stakeholders (Rebelo et al., 2014a).

Implementing different management systems independently has been linked to a number of problems such as bureaucracy, effort duplication, conflicting objectives, lack of coordination and control, etc. (Karapetrovic, 2002b; Zeng et al., 2007; Asif et al., 2010). Thus, organizations that implement multiple

management systems are urged to integrate them into a single management system in order to better exploit the compatibilities they present (Matias and Coelho, 2002; Simon et al., 2012). These include:

- The common design philosophy around the PDCA logic (Matias and Coelho, 2002; Beckmerhagen et al., 2003b; Asif and Searcy, 2014).
- Process management as a central mechanism for the systems' implementation (Jørgensen et al., 2006).
- Risk management for each field of application (Griffith, 2000; Labodová, 2004).
- Several other common areas, such as policy, training, internal audits, corrective and preventive actions, etc. (Zeng et al., 2005; Jørgensen et al., 2006).

However, due to their different fields of application, the integration of individual systems into a single management system – while presenting a number of significant benefits – is still a fairly challenging process (Jørgensen et al., 2006). Indeed, several obstacles and problems arise regarding the implementation of such an integrated system, which, in some cases, may even be of equal importance with the integration benefits (Asif et al., 2009). Thus, organizations are faced with the dilemma between the independent implementation of management systems or their integration into one single system, weighing the benefits and costs of each option (Karapetrovic, 2003). Even if they proceed towards the integration of their systems, they may also have to decide whether or not to preserve the independence of certain areas of these systems, given their importance (Sampaio et al., 2012). Domingues et al. (2015) recently raised this issue (i.e. whether it is mandatory to integrate all the systems' areas or not) for further future exploration.

The purpose of the present study, in line with Domingues et al. (2015) suggestion for

further research, is to highlight the benefits and problems arising when integrating management systems – also taking into account the critical success factors of such an endeavour – so as to explain the decision of an organization to integrate only certain, but not all, the areas of these systems. The potential structural dissimilarity of the systems may also play a part in this decision since it usually makes it difficult for organizations to fully integrate their systems (Seghezzi, 2001; Karapetrovic, 2002b). To control this last possibility – and in order to focus exclusively on the organizational and operational factors that affect this decision – we examined a case study of integrating two management systems that have identical structure (i.e. ISO 14001 and OHSAS 18001). A construction company was chosen as a research setting since its actual operation requires particular attention to be paid to the objectives of both systems (i.e. environmental management, and occupational health and safety, respectively).

The present study is structured as follows: Section 2 presents a literature review, which provides the necessary theoretical background for the analysis of the case study. Section 3 presents the methodological approach of the research. In Section 4, the results of the case study are presented, focusing on the process followed by the company to partially integrate the ISO 14001 and OHSAS 18001 systems, as well as the benefits, the problems and the critical success factors of this endeavour. Finally, Section 5 discusses concluding remarks that emerged from the analysis of the case study.

2. Related literature

In this section, we present the literature, which provides the necessary background for the analysis of the case study. The potential benefits and problems that accompany the integration of management systems, as well as the critical success factors of this endeavour, are presented. In addition, the individual areas of the ISO 14001 and

OHSAS 18001 systems that can potentially be integrated are identified.

2.1. Benefits of integration

Integration of management systems can bring significant benefits, which are primarily related to the reduction of the organizations' operating costs and administrative complexity (Zeng et al., 2007; Bernardo et al., 2015; Rebelo et al., 2016). This is mainly achieved by streamlining the organizations' procedures (Douglas and Glen, 2000; Ofori et al., 2002; Bernardo et al., 2015). Resources (human and other), are also rationalized within the organization, saving not only money but also valuable time (Pheng and Yeo, 1998; Fresner and Engelhardt, 2004; Simon et al., 2012; Almeida et al., 2014; Bernardo et al., 2015). Other benefits include keeping fewer documents and records, which contributes to the reduction of bureaucracy (Kraus and Grosskopf, 2008; Bernardo et al., 2012; Almeida et al., 2014), consolidating and simplifying internal and external audits, as they become more targeted (Wilkinson and Dale, 1999), and simultaneously addressing all employees' training needs (Salomone, 2008; Tari et al., 2009). The confusion of the employees is further reduced, as the latter handle more simplified documents and work in a lighter and more ergonomic environment (Lopez-Fresno, 2010; Zeng et al., 2010), which increases organizations' structural flexibility (Zutshi and Sohal, 2005; Zeng et al., 2007; Asif et al., 2009; Simon and Douglas, 2013). In addition, through integration, organizations can achieve other benefits, which pertain to the creation of added value for the customers and stakeholders (Bernardo et al., 2015; Rebelo et al., 2016), and the attainment of a competitive advantage with the objective to increase market share (Renzi and Cappelli, 2000; Zeng et al., 2010, Casadesus et al., 2011). Holistic continuous improvement is also facilitated by exploiting synergies, since the management systems share the same

philosophy based on the Deming's PDCA cycle (Douglas and Glen, 2000; Jørgensen et al., 2006; Asif et al., 2010; Simon et al., 2011; Bernardo et al., 2012). When integrating management systems, better conditions are also created for adopting and integrating new systems at a future time (Simon et al., 2012; Rebelo et al., 2014a).

2.2. Problems of integration

Although the benefits of adopting an integrated management system are many and important, integration is also linked to a number of problems that need to be taken into account and addressed (Karapetrovic and Willborn, 1998). If organizations consider these problems to be significant in their case, then they may decide not to proceed with the integration endeavour at all, or to keep certain individual areas of their systems independent, thus choosing a partial integration approach.

A first potential problem for organizations' employees is the sense of loss of power or even loss of jobs. Integration of management systems requires serious structural and functional changes at various levels within the organization. The result of integration can create a sense of loss of power for some executives or a sense of loss of ownership of their workplace, due to merging of individual management systems (Matias and Coelho, 2002; Beckmerhagen et al., 2003a; Asif et al., 2009; Bernardo et al., 2009). To make matters worse, integration could also lead to a loss of positions, which would be made redundant after the systems were integrated (Karapetrovic and Willborn, 1998; Beckmerhagen et al., 2003a; Jørgensen et al., 2006). It is therefore understandable, and to a certain extent expected, that integration can trouble and worry employees.

As reported by McDonald et al. (2003) and Bernardo et al. (2012), the fear of increasing the complexity of the integrated management system is another problem. This is due to the fact that organizations tend to develop many bureaucratic procedures and documents that

they rarely use; this results in employees treating them with mistrust and negativity because of the difficulty associated with implementing them on a daily basis. Therefore, the design of the integrated management system should be based on the organizations' basic needs, requirements, and business operations, so as to avoid creating complicated and lengthy procedures (Matias and Coelho, 2002; Holdsworth, 2003; Karapetrovic and Jonker, 2003; McDonald et al., 2003; Fresner and Engelhardt, 2004; Zeng et al., 2007; Griffith and Bhutto, 2008).

Another problem is the risk of not assigning the required degree of importance in the individual systems' requirements, given that there are major differences in their scope. For example, OHSAS 18001 focuses on the occupational health and safety, while ISO 14001 deals with environmental management and monitoring. It is therefore perceived that the risk of not assigning the required degree of importance to each requirement that has to do with health and safety and the environment – due to the integration of the respective systems – constitutes an important issue and sometimes acts as a deterrent to the realization of integration (Salomone, 2008). Following the above considerations, a further matter of concern for the organizations is whether the integration of the systems will satisfactorily cover the requirements of the certification bodies (Wilkinson and Dale, 1998).

Finally, the conviction that internal and external audits can continue to be conducted separately for each system is another serious problem in achieving full integration (Beckmerhagen et al., 2003b). Performing comprehensive internal and external audits is a point warranting particular attention and requires knowledge, experience and a holistic approach (Karapetrovic, 2002a; Zutshi and Sohal, 2005). The lack of sufficient knowledge and experience by the auditors, both hinders the expected results and confuses the employees involved (Salomone, 2008), while at the same time it

leads to a considerable waste of time and resources (Zutshi and Sohal, 2005).

2.3. Critical success factors for integration

Experience so far from the integration of management systems has highlighted certain factors that generally facilitate its success. These critical success factors are directly related to the main obstacles faced by organizations during integration, and are, to some extent, good practices to overcome these obstacles.

The commitment and active involvement of top management in the implementation of an integrated system is a critical success factor very often mentioned in the literature (Beechner and Koch, 1997; Scipioni et al., 2001; Fresner and Engelhardt, 2004; Rocha et al., 2007; Zeng et al., 2007; Asif et al., 2009; Tari and Molina-Azorin, 2010; Rebelo et al., 2014b). Its role in the success of integration is catalytic, as it sends a strong message of support in all directions, not only for the implementation of the integrated system, but also for the achievement of the objectives that have been set (Wilkinson and Dale, 1998; Pheng and Kwang, 2005; Asif et al., 2009; Ivanova et al., 2014). The actual commitment of the top management is expressed primarily by the provision of the necessary human or financial resources to support integration implementation (Zeng et al., 2007; Asif et al., 2009; Simon et al., 2012; Bernardo et al., 2012). Other important challenges for top management are the creation of a competent team to manage the integration endeavour (Mackau, 2003; Fresner and Engelhardt, 2004) and the definition of a clear integration strategy that needs to be promoted and communicated in an explicit way to all employees (Asif et al., 2009; Tari and Molina-Azorin, 2010; Rebelo et al., 2014b).

Effective management of employees' resistance to change is another important key to the success of integration. Employees usually do not like changing the way they have become accustomed to operating,

which results in their being negative towards processes that bring about such changes (Zeng et al., 2007). Traditionally, organizations have separate staffing for each management system, which may cause disagreements between respective executives during the implementation phase of integration, jeopardizing the success of the entire endeavour (Zutshi and Sohal, 2005; Zeng et al., 2007). Therefore, organizations should instead seek to support and involve their employees in the integration efforts (Holdsworth, 2003; McDonald et al., 2003; Zutshi and Sohal, 2005; Pojasek, 2006; Asif et al., 2009). This can be achieved by developing an appropriate culture for managing change (Wilkinson and Dale, 2002; McDonald et al., 2003; Jørgensen et al., 2006; Zeng et al., 2007; Asif et al., 2009), ensuring effective communication (Bamber et al., 2000; Fresner and Engelhardt, 2004; Zutshi and Sohal, 2005), and providing targeted employee training (Mackau, 2003; Zutshi and Sohal, 2005; Pojasek, 2006; Asif et al., 2009).

Choosing an appropriate method of integrating management systems also plays an important role in the success of integration (Seghezzi, 2001; Karapetrovic and Jonker, 2003; Pheng and Kwang, 2005). In this context, the method chosen should be compatible: (i) with the activities and processes of the organization (Griffith, 2000; Pun and Hui, 2002; Holdsworth, 2003; Mackau, 2003; Griffith and Bhutto, 2008; Asif et al., 2009), (ii) with the particular organization needs (Matias and Coelho, 2002; Holdsworth, 2003; Karapetrovic and Jonker, 2003; McDonald et al., 2003; Fresner and Engelhardt, 2004), and (iii) with the existing systems that are to be integrated (Bamber et al., 2000).

2.4. Individual areas for integration between ISO 14001 and OHSAS 18001

The results of Salomone's (2008) empirical research show that the common structure of the ISO 14001 and OHSAS 18001 systems

significantly helps organizations move towards integration. By decoding their structure, we can identify 15 distinct areas, which could potentially be integrated (Griffith, 2000; Scipioni et al., 2001; Karapetrovic, 2002b; Zeng et al., 2005; Jørgensen et al., 2006; Rebelo et al., 2016): policy; risk management; legal and other requirements; objectives, targets and programs; resources, role, responsibilities and authority; competence, training, and awareness; communication; documentation; control of documents and records; emergency, preparedness and response; monitoring and measurement; evaluation of compliance; nonconformance, corrective and preventive action; internal audits; and management review.

3. Research method

The purpose of this study is to examine in depth a case of integration of the ISO 14001 and OHSAS 18001 systems into a single system of health, safety, and environment (referred hereafter as HSE). Particular emphasis is given to examining the factors that can lead an organization to consciously choose not to integrate all areas of the ISO 14001 and OHSAS 18001 systems, despite their structure being identical. To achieve this goal, it is necessary to analyze in depth the potential benefits and problems associated with this decision. This need, led to the choice of a case study analysis, as the basis for the development of the research design (Yin, 2014). Next, we present the research method followed for the selection of the company under review, as well as for the collection, coding, and analysis of the data.

3.1. Case selection

For the needs of the case study analysis, a Greek company was purposefully chosen from the construction industry. The rationale for choosing this particular company lies in that it has partially integrated the two

individual systems in question (i.e. ISO 14001 and OHSAS 18001) into a single HSE system, and that its actual operation requires particular attention to be paid to the objectives of both systems.

This company was founded in the early 70's and specializes in the construction of high budget public and private projects of a particular type, such as roads and railway networks, ports, buildings, hospital units, industrial, hydroelectric etc. It is active in countries of Southeastern Europe, the Middle East, and Northern America. In Greece, it is a leading company, employing more than 5.000 employees; at a European level, it is considered to be a medium-sized construction company. The accumulated experience in the construction industry and the maturity that this company has acquired over many decades has been a major stimulus for studying how it manages its systems. The integrated HSE system is already being implemented in the company for approximately 10 years; therefore documenting this experience is of particular value.

As for the implementation of the HSE system, the company organizationally consists of:

- Two Vice-Presidents, who are responsible for the development and implementation of the HSE system; they participate in the management reviews of this system, set the framework for HSE policies, and delineate the relevant corporate objectives and targets.
- A Chief Executive Officer (CEO), who approves HSE policies and the costs required to achieve the HSE objectives.
- A health, safety, and environmental Director, who is responsible for the implementation of the HSE system, in order to ensure effective protection of the employees, the environment and ecosystems, and

the company's equipment in all of its facilities and branches.

3.2. Data collection procedures

Three different sources were used to collect the data, in order to ensure the required validity of the research: interviews with the relevant executives, document and record review, and field observation. The interviews constituted the initial source of data collection. Specifically, four 45 minutes open-ended, face-to-face interviews were conducted, with specific company executives (i.e. First Vice-President, Chief Executive Officer, HSE Director, and Human Resources Director). All the interviews were recorded. During these interviews, the interviewees were asked to respond to a series of questions revolving around the reasons that led the company to partially integrate the ISO 14001 and OSHAS 18001 systems, focusing on the analysis of the integration process followed, the advantages and disadvantages this approach had, as well as the critical factors that underpinned its success. The outputs of the literature review (see Section 2) formed the basis for posing the relevant questions in a structured way.

Subsequently, the manuals, as well as the procedures that make up the documentation of the company's management system, were analyzed. At the same time, sampling checks were carried out on the training, audits, management review, and non-compliance records. Data collection was concluded with on-site observation at one of the company's worksites where work is being carried out for the construction of the main motorway in Western Greece. Observation focused on reviewing how HSE internal on-site audits are performed, as well as how employees are trained by attending a tool-box training on areas such as hazardous waste management, safety when working at height, and laboratory quality control and testing.

3.3. Data coding and analysis

Each interview was indexed and analyzed using specialized software. Iterative analyses were conducted by two independent researchers to identify the highlights of the interviews and to further categorize and codify the results of the analyses in order to meet the requirements of the survey. At the same time, additional elements to which the interviewees referred to many times – and thus were interpreted as catalysts for the implementation of the management systems – were also identified.

In addition, a qualitative comparison was made between what was said in the interviews – especially relating to their highlights – and the written descriptions of the procedures, so as to confirm that the content of the interviews is valid and reliable. The validation of the previous data – as resulted from interviews and documents – was completed by further cross-referencing them through the data gathered by observation at the worksites.

4. Results

This section presents the data gathered as part of the case study analysis, focusing in turn on the process followed by the company to partially integrate the ISO 14001 and OHSAS 18001 systems, the benefits, the problems, and the critical success factors of this endeavour.

4.1. ISO 14001 and OHSAS 18001 integration process

The process followed by the company to integrate its systems was implemented in 4 phases: (i) strategic level; (ii) operational level; (iii) control level; and (iv) review level.

4.1.1. Phase 1: Strategic level

During the first phase, the company chose to pursue different policies for health and

safety, and environmental management. With these policies, the company is firstly committed to the prevention and reduction of accidents, as well as the elimination of errors and omissions and their impact on the health and safety of employees, and secondly committed to the continuous improvement of environmental performance, and the reduction of the impact of its operation on the environment. In designing policies, top management took into account the internal and external environment and also identified stakeholders' demands, such as the shareholders, investors, customers, employees, and various legislative bodies that affect the company's operation. Additionally, at this stage, the company proceeded to develop a process for risk identification and assessment in its occupational health and safety-related activities. It accordingly drafted a different process for identifying and defining the aspects of its activities that have – or can have – a significant impact on the environment. In addition, in order to meet the legal and other requirements, the company went with drafting a common procedure, which ensures the continuous monitoring of all the relevant requirements. The first phase ends with drafting a common procedure whereby the company establishes, implements and maintains documentation of HSE objectives in various functions and levels. The objectives are measurable and consistent with HSE policies, including commitments to prevent pollution, accidents and adverse situations, compliance with legal and other requirements, and continuous improvement. When establishing and reviewing objectives and targets, the company takes into account its significant environmental aspects, the risk of its activities, the technological choices, the economic, operational and administrative requirements, as well as the views of its stakeholders.

4.1.2. Phase 2: Operational level

During the second phase, the company proceeded to prepare two different manuals on health and safety, and environmental management, describing in detail the roles, responsibilities, and competencies of individuals for the effective implementation of the HSE system. Those directly involved are the two Vice-Presidents, the CEO, the HSE Director, the Human Resources Director and all Project Directors. Then, at this stage, the company set out, through a common procedure, the way in which it would recognize the needs for training related to workplace and environmental hazards, as well as assessing the effectiveness of this training. The second phase is completed by meeting the requirements for internal and external communication with stakeholders, documenting the HSE system as a whole, documents and records control, and defining the actions the company can take in the event of an emergency concerning health, safety, and the environment. For each of these areas, a common procedure was developed within the HSE system.

4.1.3. Phase 3: Control level

During the third phase, the company recognizes and designs those functions and activities related to the identified HSE risks, in accordance with the relevant policies and objectives that have been set. For these functions and activities, the company determines:

- The operational controls, as they are applied to the company's activities, including their integration into the overall HSE system.
- The controls for the procurement of goods, equipment, and services.
- The controls related to subcontractors and visitors at the workplace.
- Procedures and criteria, the absence of which could lead to deviations

from HSE policy and objectives that have been set.

- The process for controlling the environmental aspects of both the company's operations and its contractors at the company's premises, as well as the services provided that significantly affect the company's environmental performance.

The company established a common procedure to monitor and measure on a regular basis the main features of its operations, which can have a significant impact on HSE. The procedure includes documenting information to monitor performance, applicable functional controls, and compliance with the company's HSE objectives and targets. The company also maintains a common procedure for the periodic assessment of compliance with the applicable legal and other requirements set out in the first phase of the integration process. The third phase ends with the elaboration of two additional common procedures. In the first procedure, the company meets the requirements for investigating and addressing non-compliance, as well as defining their causes and taking actions to avoid their reoccurrence. In the second procedure, the company ensures that internal audits are carried out at regular intervals, in order to determine whether the HSE system complies with the planned arrangements for managing relevant issues.

4.1.4. Phase 4: Review level

Finally, during the fourth phase, the company designed a common management review procedure, in order to ensure the continuous adaptation and effectiveness of the HSE system. Inputs to the management review may include: outcomes of internal audits, and assessments of compliance with legal and other requirements applicable to the company; communications of external stakeholders, including complaints; the

company's performance on HSE; the degree of achievement of the company's objectives and targets; the degree of implementation of the company's corrective and preventive actions; pending actions from previous management reviews; changing conditions, including changes in legal and other requirements; and suggestions for improvement. The outcomes of the reviews include decisions and actions related to possible changes to HSE policies and the establishment of new objectives and targets.

All the previous phases, with their individual areas and the degree of their integration, are diagrammatically depicted in Figure 1 (see Appendix).

4.2. Benefits of integration

As it emerged from the case study analysis, the company gained substantial benefits from the integration of the ISO 14001 and OHSAS 18001 systems, primarily on a financial level. The CEO characteristically said that the cost reductions resulting from managing the two sub-systems through many common procedures have been significant. Specifically, through integration, monitoring of HSE issues became more effective and holistic, as twelve procedures have been drawn up to form the integrated management system. Some notable examples include:

- A common employees' training procedure; this involves parallel training on health, safety and environmental issues, organized on the same day in the workplace, and the relevant data being recorded on a common training form.
- A common procedure followed during internal and external audits on worksites; this approaches all HSE issues in an integrated manner, with simultaneous involvement of the relevant executives, and use of a common audit form.
- A common management review procedure; this collectively records all HSE issues on a common form,

and also identifies the employees responsible for the execution of the actions decided, including the date of their completion, which allows top management to holistically monitor the various issues that arise.

The above were confirmed by the records kept by the HSE Department, namely the management review reports, the reports of audits carried out on motorway worksites, and the reports of employees' induction training on a thermoelectric station worksite.

The CEO added that the administrative costs have also been kept low. The company set up a unique Department for the monitoring of HSE issues, which was staffed by people who already worked at company's worksites. Moreover, the CEO stated that "in consultation with the First Vice-President, we designated an Executive Director, who would undertake the overall coordination of the HSE Department and the monitoring of the smooth operation of the integrated HSE system". Indeed, according to a statement of the Human Resources Director, no change in their financial remuneration has occurred for these employees so that the implementation of integration does not burden the company. In addition, the HSE Director stated that the appointment of safety technicians - coordinators and environmental supervisors was mandated by appointing employees already working on the worksites, without requiring the contribution of external support.

The company not only succeeded in effectively controlling the costs of maintaining the integrated HSE system involving fewer human resources but also by keeping common documents and records, a considerable reduction of bureaucracy was achieved. In particular, the latter was also confirmed by the HSE Director, who even pointed out that less bureaucracy has also simplified the process of the systems' certification, since the certification body's auditors, act in a more targeted way.

In addition, the integration of the two systems has led to faster resolution of HSE issues, since, through a common internal and external communication procedure, all employees have the responsibility to report to their supervisors HSE incidents, dangerous HSE occurrences, HSE non-conformances, non-compliances with legal and other HSE requirements, or simply their personal views on HSE issues, with a view to reviewing and taking relevant actions. Moreover, as stated by the HSE Director, who was on the same reporting line as the Human Resources Director, the company communicates important safety issues and good environmental practices to all safety technicians - coordinators and environmental supervisors through emails, newsletters, and the company's intranet, so that they can integrate this information into the training program of the employees.

Finally, a more effective and efficient realization of the demands of the company's stakeholders has been achieved, through a common procedure of monitoring non-conformances and applying corrective actions. Thus, deviations from technical work protocols, construction practices, and legal requirements are monitored and addressed simultaneously. At the same time, the HSE Director stated that he monitors all stages of the corrective actions, he examines in cooperation with other executives the adequacy and effectiveness of the measures taken, he completes and signs a relevant form, and communicates it to all involved employees for any further possible actions. This has also been confirmed by the CEO, who has stated that due to the continuous monitoring of the corrective actions by the HSE Director, any construction activity or technical study is performed in the safest and most environmentally sound way. In order to verify the above, we conducted additional on-site observation on the way the working procedures are monitored for the construction of all upper and lower crossings on a motorway worksite.

4.3. Problems of integration

Generally speaking, the company appears to have not particularly encountered major problems as a result of the systems' integration. As the First Vice-President mentioned, no new structural changes have occurred in the company, because the HSE Department was a separate entity that was created from the outset and staffed by the company's own resources, thus eliminating the potential sense of loss of power that such an endeavour might bring about. However, the selection of executives, as stressed by the Human Resources Director, was not a simple matter, but something that initially troubled the top management. The right people had to be found, who should have been involved in the past with HSE issues and could handle the challenges of such an approach in order to meet the requirements for system-wide certification over time. For these reasons, the Human Resources Director stated that he initially set as core selection criteria a ten-year experience on worksites, as well as any additional Project Management certifications. As reported by the CEO, the company then planned the specialized training and certification of the selected executives, as provided by the largest certification body in Greece, so as to ensure that the required knowledge competence of these executives is obtained. At the same time, appropriate external consultants were involved in the process, who provided technical guidance on the whole endeavour. In view of the above, it is concluded that the decision for integration only led to a small initial financial burden on the company, which would have also existed – perhaps even to a greater extent – if the company separately implemented the two systems.

Regarding the lack of organizational flexibility and the fear of increased bureaucracy due to the complexity of the single system, the HSE Director said that this was not a problem because: (i) the lean structure of the system was based exclusively on the company's narrow scope

of work; (ii) the procedures covering all HSE issues addressed the requirements of both sub-systems without redundancies; and (iii) the coordination of all the above is undertaken by a single person, the HSE Director. The objectives set by the top management were also clear and entirely realistic. In particular, as the First Vice-President stated, the main goal regarding health and safety is "zero fatal accidents and no major industrial accidents for every 1 billion working hours", while the main goal for the environment is "the rigorous and strict adherence to the approved environmental conditions so as to avoid any degradation of the flora and fauna of the environment in which the company operates".

The risk of not assigning the required degree of importance in the individual systems' requirements, due to their integration, was initially a serious cause for concern and a point of friction between senior executives. Eventually, as the HSE Director said, effective resolution was achieved by compiling two different manuals and also by adopting different policies for the two sub-systems. In addition, different procedures were developed for risk management, one for health and safety and one for the environment. In this way emphasis was given, as the CEO stated, to the special requirements of each sub-system, since the legal and other requirements in each phase of work are taken into account separately; in addition, all the potential hazards for workers' health and safety and ecosystem pollution are thoroughly analysed.

Finally, regarding the potential problem of conducting integrated internal or external audits, the HSE Director said that the company has resolved this issue by acting on three levels. The first, he said, had to do with the knowledge competence and certification of the executives who make up the HSE Department. Secondly, the ten-year construction experience of these executives has ensured that they have the right on-site background and the acceptance of those who

are being audited. And thirdly, as the HSE Director concluded, the company decided to enter into a partnership with the largest certification body in Greece, on the understanding that they have the experience and appropriate logistical and human infrastructure to reliably audit an integrated system.

4.4. Critical success factors for integration

The critical factors that played a key role in achieving the successful integration of the

two systems are presented below. First of all, it seems that the company followed a structured process to implement integration, which allowed effective control of the whole endeavour. Judging this process in retrospect, we notice that it combines the rational model of strategic management of Wheelen and Hunger (2006) and the integration methodology based on continuous improvement through the PDCA cycle proposed by Rebelo et al. (2014a). This combinational approach is illustrated in Table 1.

Table 1. A combinational methodology for the implementation of management systems' integration

Phases	Wheelen and Hunger (2006)	Rebelo et al. (2014a)
1 st Phase	Stages 1 and 2: Analysis of the external (e.g. legal) and internal (e.g. resources, culture) environment of the organization. Development of strategy, policy, objectives, and targets.	Plan: Planning the management systems' integration.
2 nd Phase	Stage 3: Implementation of the strategy through the development of specific programs, budgets and procedures.	Do: Implementation of the plan.
3 rd Phase	Stage 4: Assess the implementation of the organization's strategy on the basis of the established objectives.	Check: Functional control of the integrated system outflows.
4 th Phase		Act: Management review and action taking, if required.

In addition, the commitment and active involvement of top management in the whole endeavour were thoroughgoing. From the very onset, they invested in the establishment of a separate HSE Department, with experienced Director and executives, dedicated to the achievement of integration. In fact, top management's support was not limited only to the establishment of the new Department but also made available adequate financial resources for the purpose of training and certification of all the executives, so that the latter are in a position to respond in the best possible way to their new duties. It is noteworthy that top management allocated additional financial resources for the

technical support of integration through the use of external consultants. In addition, from the interview with the HSE Director, it is concluded that top management have strengthened their commitment to integration with the mandate to immediately appoint safety technicians - coordinators and environmental supervisors from a pool of executives on all worksites, so that there is no question of the availability of human resources in a way that would prevent the implementation of integration.

The success of the integration of the HSE management system was also facilitated by the effective management of any disagreement that the company's employees

may have displayed. The latter were constantly being informed on important safety issues and good environmental practices, something that discouraged any internal negative reactions that would impede the effective implementation of the integrated HSE system. In addition, through a joint procedure of internal and external communication on HSE issues, top management provided the opportunity to all its employees to report, at any time, any unsafe situation that relates to HSE issues, by directly involving them in the whole process. Thus, the message of the added value of integration was passed on at all levels of the company.

5. Discussion and conclusion

This study explored the integration process of ISO 14001 and OHSAS 18001 systems in a Greek construction company, highlighting the benefits, the problems and the critical success factors of this endeavour. The documentation of this case study enables us to make some concluding remarks. First of all, it is clear that the company examined in this case study, successfully integrated the ISO 14001 and OHSAS 18001 systems. The success lies in the multiple benefits brought about by the integration process, such as: keeping management and operational costs low, holistic monitoring and faster resolution of HSE issues, a significant reduction in bureaucracy, and a more effective and efficient realization of the demands of the company's stakeholders.

Of course, it is worth noting that the above benefits were achieved since many conditions for implementing integration were ideal. On the one hand, it was the common structure of the two systems; although this did not play a role in the company's decision to integrate the systems, it certainly helped make integration easier. On the other hand, the company's devotion to the satisfaction of the critical success factors of this endeavour was also a contributor. The most important of these

factors were: the use of a structured process for the implementation of integration, the commitment and active involvement of top management in the process, the effective management of employees' resistance, the appropriate training and involvement of employees in the whole endeavour, and the creation of a simple and lean system. Consequently, the company did not face major problems as a result of integration; it avoided creating a chaotic integrated HSE system, effectively controlled possible employees' reactions, and made integrated audits feasible without adding much complexity.

However, despite the ideal conditions of integration that the company created, it did not manage to avoid all problems. In particular, the risk of not assigning the required degree of importance in the individual systems' requirements was not fully controlled. There were, therefore, fears that the integration of the two systems might have led to the downgrading of one of them. This problem was initially considered by the top management to be particularly serious and possibly endanger the entire integration endeavour; this confirms the relevant previous findings of Salomone (2008).

Eventually, the solution chosen was the partial integration of the two systems. The company did not integrate three distinct areas, choosing to keep separate manuals, design separate policies, and issue separate risk assessment procedures for health and safety on the one hand and for the environment on the other. For the company, it was judged that these areas were crucial, and they had to remain intact so that their importance is granted in each field separately. This decision was also prompted by both the code of health and safety at work legislation and by the environmental legislation, which are extremely demanding and require particular attention and monitoring in the construction sector. It follows from the above that the company wanted to pay special attention to the value of human life by analyzing working

methodologies, by designing technical and collective protection measures for employees, and by specifying personal protection measures to be taken by the latter during their work. In addition, it wanted to ensure that the activities of the company adjacent to areas of supreme natural beauty, networks of protected nature zones, and sites of significant cultural heritage, would be carried out with due care by adopting environmentally friendly methods and technologies.

Discussing the company's decision, we could argue that maintaining a separate manual and policies is a reasonable approach, and could also work well in the future. At this strategic level differentiation makes sense, as it will continue to mark the special emphasis that the company wants to apply to both fields: health and safety, and the environment. Moving away, however, from the strategic to the more functional level, the use of separate procedures can become problematic. Just as the company managed to integrate important areas at the operational level, such as internal audits and training, it could take things one step further and integrate the risk management area for both systems. Of course, this is not at all easy, and the company will definitely need further technical guidance to address this issue. However, research is moving in this direction (for the construction industry see Ganglells et al., 2012), and is expected to expand in the coming years; this is largely due to the particular importance that ISO now attributes to risk management, through the High-Level Structure that it promotes in all newly issued or revised systems. Future research should, therefore, propose appropriate tools that could help organizations – including the company in this case study – to more effectively integrate the different risk management approaches that they use in their separate management systems.

From the above it can be concluded that the success of an integrated management system does not always require the integration of all the areas of the respective systems; instead, the integration of only some areas may work well, leaving some others as separate entities for the purpose of preserving their significance and their dynamic value in the operation of the organizations. This is exactly how the company of this case study has maximized the benefits and minimized the problems of integration. Although the structure of the two systems examined is changing at this time – some organizations have already begun to be certified under the recently revised ISO 14001, while OSHAS 18001 is expected to be replaced by ISO 45001 in near future – these findings will remain unscathed, as the areas and the procedures for integration are not expected to be particularly affected (especially for systems that already have the same structure). In any case, further research will be needed to document the relevant experience of other organizations, so that more robust conclusions can be drawn on this issue, ideally examining it within the framework of the new ISO's High-Level Structure.

In conclusion, the integration of different systems is, by definition, a painful endeavour and for this reason, it should be done with rationality and special attention. The literature abounds in methods and approaches on how to integrate these systems. The basic conclusion, however, is that there are no lawful practices for the full or partial integration of different systems under a common umbrella. The focus should be put on the proper initial design of the integration process, respecting the particular conditions prevailing in each organization, which affect the critical balance of the time, cost, and quality triangle in relation to the requirements of the integrated management systems.

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Appendix:

ISO 14001		OHSAS 18001		ISO 14001		OHSAS 18001		ISO 14001		OHSAS 18001	
1st PHASE											
1 - CORPORATE POLICIES		2 - PLAN		3 - IMPLEMENTATION & OPERATION		4 - CONTROL & CORRECTIVE ACTIONS		5 - ACTION TAKING			
Policy	Environmental Policy	Health & Safety Policy	Resources, role, responsibilities and authority	Environmental Mammal	Health & Safety Mammal	Monitoring and measurement	Management review	Common procedure (HSE_P-09)	Common procedure (HSE_P-12)		
			Competence, training, and awareness	Common procedure (HSE_P-05)	Common procedure (HSE_P-06)	Evaluation of compliance		Common procedure (HSE_P-03)			
Risk management	Common operational control procedure (HSE_P-07)	Health & Safety risk management procedure (ENV_P-02)	Communication	Common procedure (HSE_P-01)	Common procedure (HSE_P-01)	Nonconformance, corrective and preventive action		Common procedure (HSE_P-10)			
Legal and other requirements	Common procedure (HSE_P-03)	Common procedure (HSE_P-04)	Control of documents and records	Common procedure (HSE_P-08)	Common procedure (HSE_P-08)	Internal audits		Common procedure (HSE_P-11)			
Objectives, targets and programs			Emergency, preparedness and response								
2nd PHASE											
3rd PHASE											
4th PHASE											

Figure 1. Integration areas of ISO 14001 and OHSAS 18001 systems

