

## Management systems integrated audits: an empirical study *Auditorías integradas de los sistemas de gestión: un estudio empírico*

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**Abstract.** The objective of this study is to determine if there are typological differences in organizations with respect to the integration of both the internal and external management system audits. The methodology used has been the survey, sent to Spanish organizations that were registered to at least ISO 9001:2000 and ISO 14001:2004. 435 valid responses were obtained, sample used in the multiple correspondence analysis and the cluster analysis. The variables used in the analyses were referred to audit resources (teams and time) and processes (audit process and audit plan and report). The results are three different groups of organizations that conduct different integrated audits: a group of 89 organizations, which presents the lowest level of integration; a group of 148 companies, with a medium level of integration of audits, and a final group of 186 organizations presenting the highest level of integration. For the three groups, internal audits are integrated at a higher level than the external audits. In addition, the most integrated aspect, internally and for all groups, are the audit teams.

**Key words:** integration, internal audits, external audits, ISO 9001, ISO 14001.

**Resumen.** El objetivo de este estudio es determinar si existen diferentes tipologías de organizaciones respecto a la integración de las auditorías de sistema de gestión, internas y externas. La metodología utilizada ha sido la encuesta, enviada a organizaciones españolas que están certificadas, como mínimo, según las normas ISO 9001:2000 e ISO 14001:2004. Se obtuvieron 435 respuestas válidas, muestra con la cual se ha realizado un análisis de correspondencias múltiples y un análisis cluster. Las variables utilizadas en los análisis se refieren a los recursos de auditorías (equipos y tiempo) y procesos (proceso y plan e informe de auditoría). Los resultados son tres grupos diferentes de organizaciones que realizan las auditorías integradas de forma diferente: un grupo de 89 organizaciones, que presenta los niveles de integración más bajos; un grupo de 148 empresas, con un nivel medio de integración de las auditorías, y un último de 186 organizaciones que presentan el mayor nivel de las auditorías. Para los tres grupos, las auditorías internas están integradas a un nivel superior respecto a las auditorías externas. Además, destaca que el aspecto más integrado, a nivel interno y para todos los grupos, son los equipos de auditores.

**Palabras clave:** integración, auditorías internas, auditorías externas, ISO 9001, ISO 14001.

### 1. Introduction

In recent years, the number of available Management System Standards (MSSs) with an international and universally-applicable character has increased substantially. It is widely known that these standards began with the creation of the ISO 9000 family for quality management in 1987 and continued with the ISO 14000 series for environmental management in 1996. ISO 9001 and ISO 14001, in their various

versions, have since become the most extensively registered MSSs in the world, with an annual growth of 6% and 21% in 2007 for ISO 9001:2000 and ISO 14001:2004, respectively (ISO, 2008A). However, although these two MSSs have the most registrations, they are certainly not the only international and generic such standards being implemented in organizations. Various national, industry sector—specific and system component—focused standards have also appeared.

Interestingly though, several academic studies on the diffusion of ISO 9001 and ISO 14001 have found that the increase in registrations to these two MSSs can eventually arrive at the point of saturation (see i.e., Franceschini *et al.*, 2004; Marimon *et al.*, 2006; Casadesus *et al.*, 2008). Results indicate that in certain countries, for instance in the European Union, this point has already been reached, while in others, such as in the United States, saturation will not occur that soon. For other MSSs, since they are mostly new and yet unknown (see, e.g., Karapetrovic *et al.*, 2006), the current situation is quite different (see, e.g., ISO, 2008A).

This proliferation of MSSs has created the need for the establishment of the respective auditing systems (e.g., see Willborn and Cheng, 1994). The first international quality MS auditing standard was ISO 10011 (ISO, 1991), although national such standards already appeared in the 1980s (i.e., in Canada and the United States). In 1996, ISO published a series of three standards for environmental auditing (ISO 14010, ISO 14011, and ISO 14012). Karapetrovic and Willborn (1998A) compared ISO 10011 and ISO 14010/11/12, and although differences in the content and structure of these function-specific standards were found, the authors also discussed the integration of audits of quality and environmental MSs. In 2002, the guidelines for auditing quality and environmental MSs were «integrated» into a single standard, namely ISO 19011 (ISO, 2002). This standard is currently under revision, with one of the objectives being the provision of more generic guidance, in other words, for auditing of all standardized MSs (ISO, 2008B).

Following the significant proliferation of standardized MSs, many questions on the auditing of these systems emerge, for example: how do organizations realize audits of their standardized MSs? Do they integrate the audits against quality, environmental and other MSSs? The objective of this paper is to determine if there are typological differences in organizations with respect to the integration of both the internal and external MS audits.

## 2. Literature review

The existence of multiple MSSs that organizations can and have already implemented brought about the issue of whether or not the corresponding MSs are unified into a single or «Integrated Management System» (IMS). One of many possible definitions of an IMS is that of a «set of interconnected processes that share a pool of human, information, material, infrastructure, and financial resources in order to achieve a composite of

goals related to the satisfaction of a variety of stakeholders» (Karapetrovic and Willborn, 1998B). Integration of standardized MSs has been a much-studied topic of research and practical studies, particularly when its theoretical aspects are considered. Overall, these aspects included the various integration strategies (e.g., Karapetrovic and Willborn, 1998B; Douglas and Glen, 2000; Karapetrovic and Jonker, 2003), methodologies (e.g., Karapetrovic and Willborn, 1998B; Zeng *et al.*, 2006; ISO, 2008C), and levels (e.g., Seghezzi, 1997; Wilkinson and Dale, 1999; Kirkby, 2002; Karapetrovic, 2003; Bernardo *et al.*, 2009).

However, the literature on the integration of the internal auditing subsystems or external function-specific audits is much sparser, especially for the latter type of audits. Organizations with more than one implemented MS, regardless of whether these systems are integrated or not, can realize the audits against the corresponding MSSs in an integrated manner. In this sense, the ISO 19011:2002 standard can provide some help, although the guideline itself currently refers to quality and environmental MSs only.

It stands to reason that integrated audits bring about a series of benefits to the organizations using them, for instance the optimized use of resources (e.g., Karapetrovic and Willborn, 1998B; Douglas and Glen, 2000; Karapetrovic, 2002; Zeng *et al.*, 2006; Salomone, 2008) and the establishment of auditor competence for different MSSs (Douglas and Glen, 2000; Kraus and Grosskopf, 2008). Consequently, the majority of the available literature on the integration of MS audits is focused on internal auditing (e.g., Karapetrovic and Willborn, 2000), although a paper by Wilkinson and Dale (1998) investigates the perspective of five MS registrars, and thus external auditors, on IMS audits.

Unfortunately, empirical studies on the integration of standardized MSs generally, and therefore on the subtopic of audit integration specifically, are few and far between, namely Douglas and Glen (2000); Fresner and Engelhardt (2004); Zutshi and Sohal (2005A); Karapetrovic *et al.* (2006); Zeng *et al.* (2006), Salomone (2008) and Bernardo *et al.* (2009). From this group of papers, only Douglas and Glen (2000) and Salomone (2008) touch upon the integration of the audits of standardized MSs, while Karapetrovic *et al.* (2006) study this issue in more detail.

As can be seen from the above review, there is a lack of studies into the practice of the integration of audits of standardized MSs. This is perhaps because such audits, regardless of whether they are integrated or not, are not widely researched in general, or because

many MSSs against which they are conducted are new. Therefore, the investigation illustrated here is focused on studying the possible existence of distinctive practices with respect to the integration of internal and external MS audits in organizations with multiple MSS certificates.

### 3. Methodology

With the objective of analyzing the levels of integration of quality, environmental and other MS audits, this study uses the same methodology as presented in Bernardo *et al.* (2009) for determining the levels of integration of standardized MSs.

The data used in the study comes from a survey of organizations that were registered to at least ISO 9001:2000 and ISO 14001:2004. The survey questionnaire was sent to the MS representatives of 1,615 organizations in Spain during 2006 and 2007. The surveyed organizations are located in Catalonia, the Basque Country and Madrid, the three autonomous communities with the highest «certification intensity» in Spain (Heras and Casadesus, 2006).

A total of 435 valid responses were obtained, representing the response rate of 27%. Overall survey characteristics are presented in Table 1. Apart from having registered their quality and environmental MSs to ISO 9001 and ISO 14001, respectively, 75 companies were registered to OHSAS 18001, while 47 implemented a corporate social responsibility MSS.

The actual survey had a broad coverage of the various issues regarding IMSs and asked questions on 16 relevant aspects of the integration of standardized MSs (an initial descriptive analysis of the Catalonian results can be found in Karapetrovic *et al.*, 2006). One of the major aspects studied in the survey referred to the practice of audits. This particular group of questions was aimed at studying the degrees of integration of the function-specific or standard-focused audits, as

well as the manner in which these audits are conducted in organizations with multiple MSSs. Table 2 describes the study variables, categorized into «variables related to the integration», on one side, and the «variables related to the methodology», on the other. For each variable, an explanation or a definition from ISO (2002), ISO (2005), or ISO (2008D) is provided, and the possible answers on each corresponding survey question are included.

As can be observed in Table 2, variables «related to the integration» include the ones that describe the level of integration of MS audits, from basically no integration to full or complete integration. These four variables can be analyzed in order to determine if different practices or behaviours with respect to MS audits exist among the surveyed organizations. In terms of the variables «related to the methodology», they do not provide for such a clear assessment of the integration levels, but can be used in order to describe the practices or behaviours of the groups defined by the first set.

In the following section, a multivariate and cluster analyses of the first set of variables will be applied to identify the distinct groups of organizations as a function of their level of integration of quality, environmental and other standardized MS audits. These analyses, together with detailed descriptions of the identified groups through the second set of variables, are illustrated next.

## 4. Results

### 4.1. Multivariate analysis

With the objective of determining whether distinct groups of organizations exist in terms of the integration of MS audits, we performed a data reduction or Multiple Correspondence Analysis (Bénzecri, 1973; Greenacre, 1993). As a result, we obtained three quantitative axes, which provide a satisfactory explanation of the studied variables, namely 82.59% of the total variance. Table 3 illustrates the variables and the percentages of their contribution to each of the three axes, with the variables exhibiting a major contribution highlighted.

The first axis is clearly characterized by a lack of integration of the four auditing aspects studied, regardless of whether internal or external audits are taken under consideration. The second axis is formed by the variables representing the integration of the audit teams and the simultaneity of the audits, for internal and external audits alike. These two aspects are

Table 1  
Survey characteristics

Characteristic	Value
Location	Spain
Time of the survey	2006-2007
Estimated population	2,530
Sample size	1,615
Number of responses	435
Response rate	27%
Confidence level ( $p=q=0.5$ )	96%

Table 2  
Study variables

Variable	Explanation/definition	Possible survey answers
<i>Variables related to the integration</i>		
Audit team	«One or more auditors conducting an audit supported if needed by technical experts» (ISO, 2002). Audits of different MSs can be conducted by a single or multiple auditors or teams (ISO, 2002).	<ul style="list-style-type: none"> <li>— Same audit team for all standards.</li> <li>— Same audit team for selected standards.</li> <li>— Different audit teams .</li> </ul>
Simultaneity	Audits of different MSs can be conducted at the same time or different times (ISO, 2002).	<ul style="list-style-type: none"> <li>— Same time for all standards.</li> <li>— Same time for selected standards.</li> <li>— Different times.</li> </ul>
Process	The manner in which standardized MSs implemented by the auditee are actually audited.	<ul style="list-style-type: none"> <li>— Audited as independent systems.</li> <li>— Audited as interrelated systems.</li> <li>— Audited as an integrated system.</li> </ul>
Audit plan and Audit report	Audit plans [«description of the activities and arrangements for an audit» (ISO, 2002)] and audit reports [«source of information that is used for review of the MS» (ISO, 2005)] can be integrated into single documents or not.	<ul style="list-style-type: none"> <li>— One audit plan &amp; one audit report.</li> <li>— One audit plan &amp; different audit reports.</li> <li>— Different audit plans &amp; reports.</li> </ul>
<i>Variables related to the methodology</i>		
Audit execution	Audits can be executed based on the process approach (ISO, 2008D, ISO, 2009), thus «process-by-process», or on the audit criteria (i.e. MSS requirements), thus «requirement-by-requirement».	<ul style="list-style-type: none"> <li>— Process by process.</li> <li>— Requirement by requirement.</li> <li>— Do not know.</li> </ul>
Guideline	Auditors may or not may use a guideline such as ISO 19011:2002 to conduct an audit.	<ul style="list-style-type: none"> <li>— ISO 19011.</li> <li>— Another guideline.</li> <li>— No guideline.</li> <li>— Do not know.</li> </ul>
Frequency	Number of times that the audit is conducted. It depends on the audit programme (ISO, 2002).	<ul style="list-style-type: none"> <li>— Less than 6 months.</li> <li>— Between 6 months and less than 1 year.</li> <li>— Between 1 and 3 years.</li> </ul>
Findings	«Results of the evaluation of the collected audit evidence against audit criteria» (ISO, 2002). They «can indicate either conformity or nonconformity with audit criteria or opportunities for improvement.» (ISO, 2002).	<ul style="list-style-type: none"> <li>— Only detect nonconformities.</li> <li>— Show improvement opportunities for the implementation of each standard.</li> <li>— Show improvement opportunities for integration.</li> <li>— Show improvement opportunities for the implementation of each standard and integration.</li> </ul>

related in terms of audit integration (e.g., Karapetrovic and Willborn, 2000), since it can be expected that integrated audits are conducted at a single instance in time and by a single team of auditors, for instance in order to optimize audit resources. The third axis is constituted by the process of auditing MSs as independent, interrelated or integrated, as well as the integration of the audit inputs and outputs, i.e., plans

and reports. Therefore, we can consider that the second and third axes are formed by the variables related to the integration of the audit resources and the audit processes, respectively.

In addition, two interesting points stemming from these results. Firstly, the analysis did not offer a specific axis that would characterize «total integration»,

Table 3  
Definition of the axes with the variables and contribution percentages

	<b>Axis 1: No integration</b>	<b>Axis 2: Integration (teams/simultaneity)</b>	<b>Axis 3: Integration (implementation/ plant and report)</b>
<i>Internal audits</i>			
Teams	4.98%	21.06%	1.63%
Simultaneity	10.46%	17.64%	0.15%
Process	7.38%	0.05%	21.17%
Plan and report	11.65%	1.28%	12.99%
<i>External audits</i>			
Teams	4.55%	17.64%	0.10%
Simultaneity	11.42%	22.87%	0.07%
Process	9.15%	0.05%	21.47%
Plan and report	8.10%	0.25%	13.48%

indicating that a significant number of organizations which conduct fully-integrated audits, as defined by, e.g., Karapetrovic and Willborn (1998B), was not found. Secondly, the analysis did not point out significant differences between the internal and the external audits.

#### 4.2. Cluster analysis

Finally, we performed a cluster analysis using the three axes obtained from the previous analyses as variables. The clusters were created using hierarchical methods (Johnson, 1967), applying the «Ward method» (Ward, 1963), a robust method allowing for the creation of homogenous groups with minimal variance. Additionally, a «Single linkage» method (Sneath, 1957) was applied to detect outliers that can influence the results of the classification (12 organizations which were atypical and thus were not included in the classification).

The results show the existence of three principal groups of organizations. The goodness of fit of the classification is  $\eta^2 = 0.4287$ , which is considered sufficiently high for this type of study. The resulting groups were subsequently linked with the variables «related to the methodology» (Table 2). Only the «Findings» variable was significant at the 95% confidence level ( $p$ -value = 0.000) for both the internal and external audits. Consequently, this is the only variable that is used, together with the ones «related

to the integration», in the interpretation of the detected groups of organizations.

The three groups resulting from the cluster analysis indicate three types of organizations in terms of the integration of audits of standardized MSs. In order to facilitate the interpretation of the results, a graphical representation in which the three groups are described through the level of integration of internal audits, on one side, and external audits, on the other, was used, instead of a description through the axes illustrated in the previous section. Overall, the difference between these two representations is minimal. Specifically, the representation through internal and external audits explains 80.85% of the variance, which is slightly lower than the previous analysis, but still very significant.

With the objective of a better understanding of each of the groups detected in the analysis, an «integration level» was defined for both the internal and external audits conducted in each organization, basically in the same way as such a level was defined in Bernardo *et al.* (2009) for the integration of standardized MSs. Namely, if separate audits are undertaken in an organization, the integration level was considered to be 0%. In the case that integrated audits are conducted for some, but not all, MSs in an organization, this level was denoted at 50%. Finally, integrated audits for all standardized MSs meant a 100% integration level. These considerations allowed for the drafting of

Figura 1  
Cluster classification

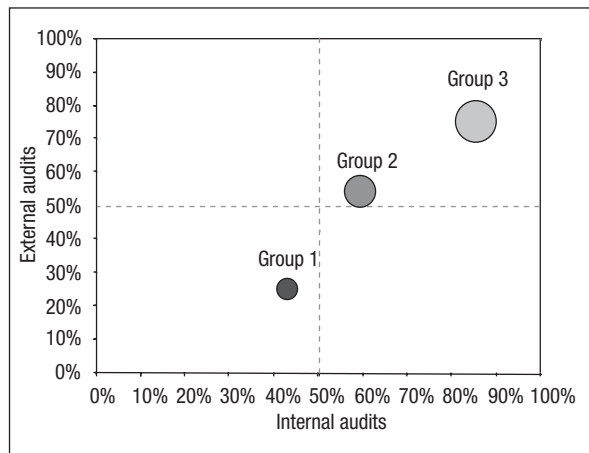


Figure 1, in which each circle represents one group and its size indicates the number of organizations forming the group. Therefore, an initial approximation of the importance of each of the groups was obtained. These groups are briefly described next.

#### 4.2.1. Group 1

This group is formed by 89 organizations representing 21% of the sample. As can be observed in Figure 1, this group is characterized by the lowest degree of integration of the three identified groups. In addition, Group 1 is the smallest in terms of the number of organizations belonging to it.

In terms of the audit teams, the organizations from Group 1 exhibit significant differences between the internal audits, on one side, and external audits, on the other. Internal audit teams are integrated at 63% while external are at 22%. On the other hand, the results related to the simultaneity of audits are much closer, with a little more than a third of organizations from this conducting the various internal MS audits at the same time, while about 8% fewer organizations from this group are externally audited in a simultaneous manner among the MSs. With respect to the audit plans and reports, the level of integration is much higher, with close to 50% for internal and 37% for external audits. Finally, referring to the audit findings, the results are similar for these two types of audits, as internal auditors specify the opportunities for improvement of the implementation of each MSS at the level of 48%, while in 23% of the cases, they also identify such opportunities for the integration of MSs.

In general, this group is characterized by what seems to be a higher level of integration of internal MS audits,

compared to the external such audits, in contrast with the discussions of Karapetrovic and Willborn (1998B), and a relatively low level of integration overall.

#### 4.2.2. Group 2

There are 148 organizations in this group or 35% of the sample. In difference to the previous group, the proportions of organizations that integrate MS audits are much closer between the internal and external ones, basically more than one half in each case and for each aspect studied (Fig. 1). In this sense, the degree of integration is superior to the Group 1, especially in terms of external MS audits.

Internal audit teams seem to be more integrated than the external. Interestingly, the results on the simultaneity aspect show a higher degree of integration for the external MS audits, namely 67% compared to 60% for the internal audits. Taking into account the results of the study related to the type of audit findings, it seems that the external audits of this group of organizations are in line with some theoretical discussions (e.g., Karapetrovic and Willborn, 1998B; Kraus and Grosskopf, 2008).

Specifically in relation to the audit findings, internal auditors detect improvement opportunities for both the implementation of each MSS and the integration of MSs in 50% of the surveyed organizations, while this percentage is 52% for the external audits.

#### 4.2.3. Group 3

This group is the largest and consists of 186 organizations or 44% of the sample. These organizations have the highest level of integration of both internal and external MS audits (Fig. 1).

As is the situation in the other two groups, the organizations from Group 3 seem to exhibit a higher degree of integration of internal compared to the external audits, although the proportions are still quite similar. In two aspects, specifically the integration of MS audit teams and the integration of audit plans and reports, this difference is fairly large, at about 22% and 17%, respectively.

The other results are fairly similar when internal and external audits are compared. Therefore, auditors show opportunities for improvement in the implementation of each individual MSS and in the inte-

gration of MSs in 59% of organizations. When these results are contrasted with Group 2 outcomes, it is clear that the organizations from Group 3 are characterized by a much greater orientation towards integration. Namely, in the case of internal audits, there are about 43% more organizations that benefit from findings containing the opportunities for improvement of MS integration in Group 3, with only 22% more in Group 2.

## 5. Conclusions

The main objective of this paper was to determine if different typologies of organizations registered to multiple MSSs exist with respect to internal and external MS audits. In order to accomplish this objective, one of the first empirical studies on the integration of MS audits was undertaken, with the participation of more than 400 organizations. Three distinct groups of organizations were found in the analysis, including the smallest group (21% of the total) with the lowest level of the integration of MS audits, a larger group (35% of the total) characterized by a medium audit integration level, and the largest group (44% of the total) with the highest such level. Several other conclusions were drawn from the study.

Firstly, we could not identify a group of any significance that did not integrate MSs audits to a certain degree. Therefore, as contemplated in the related literature (e.g., Karapetrovic and Willborn, 1998A; Wilkinson and Dale, 1999; Douglas and Glen, 2000; Karapetrovic and Jonker, 2003; Zutshi and Sohal, 2005B), organizations seem to prefer integration of MS audits to managing and conducting them separately.

Secondly, the results show that there are significant parallels between internal and external audits. However, internal audits have a lead in most of the aspects studied. This finding does not correspond to some theoretical discussions, e.g., Karapetrovic and Willborn (1998B), which contemplated a different, but nevertheless a higher level of integration of external audits.

Thirdly, in all three detected groups, internal audit teams are integrated at a much higher level than the corresponding external audit teams. Undoubtedly, the difficulty in the formation of a single audit team for different MSSs and the related MSs is higher in the case of a registrar needing to obtain the capacity to audit different types of organizations, which is not the situation in internal audits of a single organization

(Wilkinson and Dale, 1998; Douglas and Glen, 2000; Kraus and Grosskopf, 2008).

The major limitation of this empirical study is the focused perspective used in the survey. Namely, the questionnaires were sent to the managers of the registered organizations only, and not to the registrars who undertake external audits of those organizations.

Taking into account the results of this investigation, further study of the integration of both the underlying MSs and their audits is warranted, especially since not all of the surveyed organizations have applied IMSs. Hence, an empirical analysis of the motivation, methods and difficulties encountered in the integration process, among other related aspects, can be a future direction of research.

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