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Integration of standardized management systems: does the implementation order matter?

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Standardized
management
systems

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Abstract

Purpose – The purpose of this paper is to analyze whether the order or the strategy of management system standards (MSSs) implementation in an organization determines the level of integration of its standardized MSSs.

Design/methodology/approach – Groups of organizations that follow different implementation sequences have been obtained descriptively using a sample of 435 Spanish organizations, registered to two MSSs (ISO 9001 and ISO 14001) at the minimum. Differences with respect to the size of the organizations are also studied.

Findings – The results obtained show six different groups of organizations that follow different sequences of implementation and that have different levels of integration of their MSSs. Among the more interesting findings, organizations that had implemented quality and environmental MSSs simultaneously and have 50 employees or less achieve higher levels of integration compared to other organizations in the sample.

Originality/value – The paper analyses those sequences of management systems implementation that allow organizations to achieve higher levels of integration and presents a possible pattern for the companies initiating the integration process.

Keywords Spain, Quality standards, Management techniques, Standardization, Implementation strategy, Management system, Integration, ISO 9001, ISO 14001, Standards

Paper type Research paper



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Introduction

Organizations are increasingly implementing multiple management system standards (MSSs) to improve effectiveness, efficiency, and stakeholder assurance. This is evidenced, for example, by a sustained rise in registrations to not only the most widely-used MSSs, such as ISO 9001 (ISO, 2008a) for quality management systems (QMSs), and ISO 14001 (ISO, 2004c) for environmental Management Systems (EMSs), but also to the more recently published such standards, like ISO 27001 (ISO, 2005b) for information security MSs. At the end of 2008, according to the latest “ISO Survey of Certifications” (ISO, 2009b), there were 982,832 and 188,815 registrations to ISO 9001 and ISO 14001, respectively, representing a growth of 3 percent for ISO 9001 and 22 percent for ISO 14001 over the previous year. ISO 27001 certifications increased to 9,246, which is 20 percent more than in 2007 (ISO, 2009b). Other standardized MSs have also been applied, such as the ones for occupational health and safety (OHS), e.g. OHSAS 18001 (BSI, 2007), for corporate social responsibility, e.g. SA 8000 (SAI, 2008), and for customer satisfaction, e.g. the ISO 10000 series (ISO, 2004b, 2007a, b, 2010).

Another demonstration of the importance of standardized MSs is the evolution characterizing their implementation. Studies by Franceschini *et al.* (2004), Marimon *et al.* (2006, 2009), and Casadesús *et al.* (2008) discuss this evolution and agree that countries with more tradition in the application of MSSs (e.g. within the European Union), will reach saturation in a short time, while in countries where the implementation had been initiated more recently (e.g. China), the diffusion of MSS certificates is still in the initial phases or is currently being consolidated.

This situation leads the organizations which have multiple MSs in place to consider the integration of these systems as a way to better manage them and in turn exploit the related synergies (Karapetrovic and Willborn, 1998a; Wilkinson and Dale, 1999; Douglas and Glen, 2000; Karapetrovic and Jonker, 2003; Zutshi and Sohal, 2005a; Karapetrovic and Casadesús, 2009). However, the process of integration of MSs is not itself “standardized”, for instance, by an international standard that addresses the best way to carry it out. There are, nevertheless, national guidelines (SAI Global, 1999; Dansk Standard, 2005; AENOR, 2005; BSI, 2006) and an international handbook (ISO, 2008b) focused on organizations attempting to integrate standardized MSs.

Besides, the fact that the integration process is not the same in all organizations, there are many possible constraints or determinants of the process and its outcome that are conditioning the level of integration of MSs. Among others, these determinants can be the model used in the process (Karapetrovic and Willborn, 1998b; Karapetrovic, 2005), the motivation of the company’s human resources (Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Zeng *et al.*, 2007; Asif *et al.*, 2009), or the order in which standardized MSs have been implemented (Karapetrovic and Willborn, 1998a; Aboulnaga, 1998; Karapetrovic, 2002; Labodová, 2004; Griffith and Bhutto, 2008).

This last determinant is the focus of study in this article, since the objective is to find out if the level of integration achieved in the integrated management system (IMS) is determined by the order of implementation of the constituent MSs. The article continues with a review of the literature on the sequence of implementation of MSs, followed by a description of the methodology, findings, and conclusions of the field study conducted in Spain to support the attainment of the set objective.

Literature review

The strategy used for the process of integration is based on the particular MSs implemented in the organization. The implemented MSs may then condition the type of the IMS achieved at the end of the process. Specifically, the sequence or order of implementation of MSs that are integrated into a single IMS is what determines the integration strategy.

Before analyzing the existing strategies, a note about the difference between management systems (MSs) and MSSs is given. According to ISO 9000 (ISO, 2005a), a MS is a “system to establish policy and objectives and to achieve those objectives”. ISO 9000: 2005 also clarifies that a “management system of an organization can include different management systems, such as a quality management system, a financial management system or an environmental management system” (ISO, 2005a). On the other hand, a standard is a:

[...] document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context (ISO, 2004a).

Consequently, MSSs are documents that specify requirements or guidelines to follow in setting up and operating an MS (ISO, 2008b). Since different MSSs, e.g. ISO 9001, ISO/TS 16949 (ISO, 2009a) and ISO 13485 (ISO, 2003), can cover the same MS, e.g. the QMS, and different standardized MSs, and not MSSs, are integrated (ISO, 2008b), in this paper, the term “implementation” could refer to either a specific MSS, e.g. ISO 14001, or the related standardized MS, e.g. an EMS, while “integration” refers to MSs only, e.g. of a QMS and an EMS.

There are different strategies for the integration of standardized MSs, although the most cited one in the literature is by Karapetrovic and Willborn (1998a), who proposed three possible sequences based on the integration of QMSs and EMSs. The options are to establish:

- the QMS first and the EMS second;
- the EMS first and the QMS second; and
- the QMS and EMS simultaneously.

Karapetrovic and Jonker (2003) argue that for organizations that have established a QMS before an EMS, a possible strategy to integrate other MSs can be:

- Integrate QMS and other MSs based on the “process approach” of ISO 9001.
- Integrate EMS and other MSs based on the “PDCA model” of ISO 14001.
- Subsequently, join, align, and integrate these specific MSs.

An alternative proposal is presented by Aboulnaga (1998), who defines a strategy for implementing ISO 9001 and ISO 14001 concurrently, with the following three elements:

- (1) methodology;
- (2) competitiveness during implementation; and
- (3) change effect on personnel.

Karapetrovic (2002) proposes an extension of the strategy outlined in Karapetrovic and Willborn (1998a), with four possible sequences as a function of the MSs that have already been applied in an organization and those that are required to be implemented:

- (1) QMS first, followed by the others.
- (2) EMS first, then the others.
- (3) QMS and EMS simultaneously first, subsequently the others.
- (4) Fundamental elements of the IMS first, any function-specific subsystems after.

A different strategy is proposed by Labodová (2004), who discusses two ways to integrate MSs based on risk analysis:

- (1) *Step-by-step*. A sequential implementation of individual QMS, EMS, and OHSMS, and combining them into an IMS.
- (2) *Implementation of an IMS*. Covering these three areas (QMS-EMS-OHSMS) directly, a strategy applicable to organizations with no implemented MSs.

Finally, Griffith and Bhutto (2008) suggest three types of IMSs consisting of QMSs, EMSs, and OHSMSs, namely:

- (1) *Merged*. In which EMS is combined with the existing QMS.
- (2) *Conversion*. Based on an established QMS with added EMS elements.
- (3) *Engineered*. In which QMS are integrated with EMS and OHSMS, taking advantage of the related synergies.

With respect to the empirical research related to the above described or even general strategies, a total of seven studies have been found. Douglas and Glen (2000) analyzed IMSs in small and medium enterprises and found that all 28 organizations in their sample had implemented a QMS first and then an EMS. Labodová (2004) discussed two different companies, one with an EMS already in place and wanting to also implement an OHSMS, and another without a standardized MS prior to the implementation of an IMS directly. The study by Salomone (2008) showed that the majority (52 percent) of the companies surveyed had also introduced the QMS first and then the EMS after. Similar results were obtained by Karapetrovic *et al.* (2006) where 86 percent of organizations had followed the QMS-EMS order. In Zeng *et al.* (2007), the 104 organizations of the sample have also implemented the QMS first and the EMS second. In Griffith and Bhutto (2008), of the 90 companies participating in the study, the majority adopted the “merged” system, i.e. organizations implemented first the QMS and then the EMS. Finally, Karapetrovic and Casadesús (2009) present four case studies where the integration strategies have been different: the first organization’s IMS contained the QMS, which was implemented first, and the EMS, but not the also-applied OHSMS; in the second, the OHSMS had been integrated with the other two MSs (QMS and EMS); in the third, the existing IMS contained the QMS, EMS, and OHSMS, while the corporate social responsibility MS (CSRMS) was being integrated; and in the fourth, the IMS was based on the initially-implemented EMS.

Therefore, the strategy followed in the implementation process seems to condition the resulting IMS. As can be observed from the empirical studies, the most common IMS is the one that builds upon the QMS, which is subsequently integrated with the EMS. ISO 9001 for a QMS and ISO 14001 for an EMS are the most widely implemented

MSSs (ISO, 2009b). Another frequent structure is the IMS consisting of the three most commonly applied standardized MSs, namely QMS-EMS-OHSMS. Naturally, these three are not the only MSs that can be integrated (Wilkinson and Dale, 2000), as any or all MSs implemented can be integrated in an IMS, but the number and type of such systems will depend on the organization's specific need (Franceschini *et al.*, 2004) and its capacity to integrate the different frameworks of those MSs. The field study that follows is trying to test this notion in the organizations with multiple MSS certificates.

Methodology

The methodology used to collect the data was a survey mailed in 2006 and 2007 to a sample of Spanish organizations registered to, at least, ISO 9001: 2000 and ISO 14001: 2004, as described in Bernardo *et al.* (2009). The main reason for conducting the study in Spain is because it is one of the countries with the most registrations to these two standards, ranking third in the world in terms of the number of ISO 9001 and ISO 14001 certificates (ISO, 2009b). Specifically, the survey was sent to 1,615 organizations located in the regions of Catalonia, the Basque Country, and Madrid, the three regions with the largest "certification intensity" in the country (Heras and Casadesús, 2006).

Finally, 435 valid questionnaires were obtained, representing a 27 percent response rate and a 96 percent confidence level. Some of the participating organizations had also implemented other standardized MSs, such as OHSMSs and CSRMSs. A descriptive study of Catalan organizations, with more related details, can be found in Karapetrovic *et al.* (2006).

With respect to the size of these organizations, 31.12 percent are small, having 50 employees or less. About 38.72 percent are medium sized, with the number of employees between 51 and 250, while 30.17 percent are large, having more than 250 employees, according to European Commission's (2003) classification. The size distribution for the regions shows that Catalonia and Basque County have a higher percentage of small- and medium-size organizations in the survey (35 and 40 percent approximately each), while Madrid has a higher percentage of medium and large companies (33 and 43 percent, respectively).

Concerning the survey design, questions that companies responded to were related to the specific MSs, as well as to the integration process, which were applied in these organizations. Two of these questions, specifically one on the implementation orders and another on the integration levels, are the focus herein. In the former, the organizations were asked to list the MSSs implemented, specifying the order of implementation of these MSSs, with several examples of such standards given in the question, and those cases in which the implementation of different MSSs had been simultaneous. In the present study, the results obtained from this question are related to the level of integration of MSs, denoted by the degree of integration of the system goals, resources, and processes. In the survey, while responding to the latter question, the organizations indicated whether certain aspects of these three elements of the IMS (as defined in, e.g. Karapetrovic and Willborn, 1998b), were not integrated, were partially integrated or were fully integrated (Seghezzi, 1997; Kirkby, 2002; Karapetrovic, 2002, 2003; Pojasek, 2006; Bernardo *et al.*, 2009). For example, in terms of the human resources, the respondents indicated if MS representatives were different or the same persons. In the subsequent analysis, the "different persons" response was noted as "no integration" and the "same persons" as "full integration". The same type of indication of the level

of integration was given for MS managers and inspectors. In terms of the other IMS elements, namely goals (e.g. MS policy and objectives), documentation resources (e.g. MS manuals and records), and processes (e.g. procedures for MS planning and internal auditing), the survey participants indicated if these particular aspects were “not integrated”, or were “partially” or “totally” integrated, with the meaning of the last two options further explained in notes. This particular variable (“integration levels”) is further explained and analyzed in Bernardo *et al.* (2009).

The results of the study are presented in the next section. Data processing was largely descriptive in nature, as different groups have been created based on the sequences used by the participating organizations. This descriptive analysis, which is presented first, enables an illustration of both the number of MSs implemented and the sequence of their implementation. Subsequently, the levels of integration of MSs were examined with reference to the implementation order, and the groups of organizations obtained from this examination are described.

Results

Analysis of the implementation order

Organizations were initially classified according to the order of implementation of their standardized MSs. This classification is presented in Table I. All participating organizations that provided the information on the sequence of implementation, namely 422 of them, were taken into account for the grouping. It is important to note that, if an organization indicated an update of an existing MS with a new version

Number of MSs	Sequence	Full integ.		Partial integ.		No integ.		Total
		No. org.	%	No. org.	%	No. org.	%	
Two MSs	<i>Q1 + E2</i>	217	65.56	0	0	47	77.05	264
	<i>E1 + Q2</i>	13	3.93	0	0	3	4.92	16
	<i>QE</i>	30	9.06	0	0	3	4.92	33
Three MSs	<i>R1 + E2</i>	0	0	0	0	1	1.64	1
	<i>Q1 + E2 + S3</i>	37	11.18	19	63.33	3	4.92	59
	<i>QES</i>	2	0.60	0	0	0	0	2
	<i>QE1 + S2</i>	1	0.30	0	0	0	0	1
	<i>Q1 + ES2</i>	5	1.51	0	0	0	0	5
	<i>Q1 + E2 + R3</i>	11	3.32	3	10.00	1	1.64	15
	<i>Q1 + R2 + E3</i>	7	2.11	5	16.67	1	1.64	13
	<i>E1 + Q2 + R3</i>	0	0	1	3.33	0	0	1
	<i>R1 + E2 + Q3</i>	0	0	1	3.33	0	0	1
Four MSs	<i>Q1 + RE2</i>	1	0.30	0	0	0	0	1
	<i>R1 + QE2</i>	1	0.30	0	0	0	0	1
	<i>QE1 + S2 + R3</i>	2	0,60	0	0	0	0	2
	<i>Q1 + E2 + S3 + R4</i>	1	0,30	0	0	1	1,64	2
	<i>E1 + S2 + R3 + Q4</i>	0	0	0	0	1	1,64	1
	<i>Q1 + R2 + E3 + S4</i>	0	0	1	3.33	0	0	1
	<i>Q1 + E2 + R3 + S4</i>	1	0.30	0	0	0	0	1
	<i>Q1 + ES2 + R3</i>	1	0.30	0	0	0	0	1
	<i>Q1 + R2 + ES3</i>	1	0.30	0	0	0	0	1
TOTAL	331	100	30	100	61	100	422	

Table I.
Sequences of
implementation of MSs

Source: Own elaboration

of the same standard used previously, e.g. updating ISO 14001: 1996 to ISO 14001: 2004, or an introduction of a new standard within an existing MS, e.g. ISO/TS 16949 in an ISO 9001-based QMS, these updates or introductions were not considered as an implementation of a new MS. In other words, a company that responded to have first implemented a QMS based on ISO 9001: 1994, second a QMS based on ISO 9001: 2000, and third an EMS, was considered to have only two standardized MSs in place, namely QMS first and EMS second.

In Table I, each MS is denoted with a single initial, where “Q” stands for the QMS, “E” for the EMS, “S” for the OHSMS, and “R” for the CSRMS. When companies have implemented two or more systems simultaneously, the initials are given together (e.g. “QE” stands for the QMS and EMS applied at the same time), while the order of implantation is also specified (e.g. “QE1 + S2” means that the QMS and EMS were implemented simultaneously first, followed by the OHSMS).

In addition, the most common sequences of implementation are highlighted. The criterion for inclusion was that a particular sequence had been applied by more than ten organizations. As can be seen from Table I, there are six such sequences out of 21 that were reported at least once. A total of 400 organizations from the sample followed one of these six implementation orders.

Evident in Table I is that the most frequently-followed sequence is to implement the QMS first and the EMS second. About 65.56 percent of organizations with an IMS (51.42 percent from the total sample) and 77.05 percent of organizations that have not integrated their MSs (11.14 percent of the entire sample) follow this order of implementation. This result was expected, taking into account the theoretical and empirical studies presented in the literature review section of the paper and the fact that ISO 9001 was published before ISO 14001. But it also highlights that the majority of organizations, at least for now, only have these two standardized MSs in place.

With respect to the organizations that have fully integrated their MSs, for those that only have two MSs implemented, the second most common sequence (9.06 percent) is to introduce the two systems simultaneously (7.11 percent of the total). The least common order is to implement the EMS first and the QMS after, which was done in the total of 13 organizations.

When the companies have three MSs implemented, the order with the highest occurrence in the sample is to first implement the QMS, then the EMS, and finally the OHSMS (11.18 percent of organizations with a full IMS or 8.77 percent of the total). Less common, but also a significant order is to establish the QMS first, the EMS second, and the CSRMS third (3.32 percent). The sequence followed by 2.11 percent of these organizations (2.61 percent of the entire sample) is to establish first the QMS, followed by the CSRMS and then the EMS last.

Organizations that have integrated some, but not all, of their MSs have implemented three different MSs, while one organization has applied four standardized MSs. The most common sequence, as in the previous case, is to implement the QMS first, the EMS second, and the OHSMS third, present in 63.33 percent of these organizations (4.5 percent of all organizations). In 16.67 percent of companies with three or more MSs, the sequence varies as the QMS is implemented first, followed by the CSRMS as the second and the EMS as the last system applied (1.18 percent of the entire sample).

Finally, for firms that have not integrated their MSs, the majority have implemented two systems in total. As already noted, 77.05 percent of organizations have followed

the most common order (11.14 percent of the whole sample), namely first the QMS and then the EMS. The other possible sequences with two MSs implemented have been followed by three organizations for each sequence. One organization has implemented the CSRMS first and the EMS second. Regarding the organizations with three MSs in place, 4.92 percent of them implemented the QMS first, the EMS second, and the OHSMS last (0.71 percent of the total sample).

These results are consistent with the empirical studies discussed previously, i.e. Douglas and Glen (2000), Karapetrovic *et al.* (2006), Zeng *et al.* (2007), Salomone (2008), Griffith and Bhutto (2008), and Karapetrovic and Casadesús (2009).

Analysis of the integration level as a function of the implementation order

Due to the large number of sequences, namely 21, that the surveyed organizations have followed, the study was limited to the 400 organizations using one of the six most frequent sequences of MS implementation (see Table I, in italic). All organizations using a particular sequence were then classified into a specific group, thus resulting in six distinct groups of organizations with respect to the order of implementation. Out of the 21 different sequences reported by the surveyed organizations, 19 sequences had full and/or partial integration indicated, since the companies indicating two specific sequences (“R1 + E2” and “E1 + S2 + R3 + Q4”) had not integrated their MSs.

However, investigating the level of MS integration required that only those organizations stating that they have actually integrated their MSs, and also responded to the question on the implementation order, be included in the analysis. For example, out of 264 companies from the first group that have two MSs only (QMS and EMS) and have all implemented the QMS first and the EMS second (Table I), 217 have responded that they integrated their QMS and EMS, and thus create “Group 1” illustrated below. The analysis presented herein was, therefore, applied to a total of 342 organizations, namely those that have integrated their MSs at some level (indicated in the “Full integ.” and “Partial integ.” columns of Table I). Such organizations were categorized into six groups labelled “1” to “6”.

In order to determine the level of integration of MSs in these six groups, the methodology presented in Bernardo *et al.* (2009) was used. According to this methodology, the integration of three different elements of a MS, namely system goals, resources, and processes, was analyzed. Policy and objectives were included in the first element, while the system manual, procedures and records comprised the second. Since human resources were not found to be significant in Bernardo *et al.* (2009), they were not included in the resources studied. The third element included procedures such as planning, internal audits, and preventive and corrective actions. The level of integration is an ordinal variable with three categories: “no integration”, “partial integration”, and “full integration”. Taking this into account, in order to describe and discriminate the level of integration of the six groups, a recoding was applied. Organizations that had not integrated a particular aspect of their MSs (e.g. policy) were assigned the value of 0 percent for the integration level of that aspect. Partially-integrated aspects were coded with a 50 percent level, while fully-integrated aspects were given a 100 percent level. This recoding allows for the approximation of the level of integration, but mainly for those organizations that partially integrated the MS elements, as the exact level of integration was not possible to obtain from the participants’ answers. Furthermore, the recoding enabled the calculation and a description of the average levels of integration

and also a graphical representation of the resulting groups. A detailed description of the codification used in the analysis can be found in Bernardo *et al.* (2009). Three additional types of analyses were also conducted, namely the median, the mode and Jonckheere-Terpstra's test. The results of these analyses did not allow for a clear differentiation of the groups of organizations, which is the main objective of this study. For this reason, we conclude that the application of the average, despite its already-mentioned limitation, permits us to illustrate this differentiation with more clarity.

Figure 1 shows the levels of integration of MSs with respect to the order of implementation of these MSs. Integration levels are represented through two significant axes, namely the integration of system goals and documentation, on one axis, and the integration of system procedures, on the other (Bernardo *et al.*, 2009). The groups obtained from the analysis are represented as circles, where the size of each group or circle represents the number of companies that comprise it.

The levels of integration of standardized MSs achieved by the six groups of organizations are described below for each group.

Group 1. It is the largest group with 217 organizations, representing 63.45 percent of the sample. All members of this group have implemented two MSs, the first being the QMS and the second being the EMS. On average, these companies integrate system goals and documentation at 80.54 percent, and procedures at 91.05 percent (Figure 1).

The most integrated documentation resource (Table II) is the system manual, with a level of 87.75 percent, followed by policy at 84.31 percent, while the least integrated is records at 72.44 percent. The most integrated procedure is the internal audit, at 96.34 percent, followed by the procedures related to control of documentation resources, with an integration level of 95.85 percent for record control and 95.61 percent for document control. The least integrated is product realization at 76.24 percent.

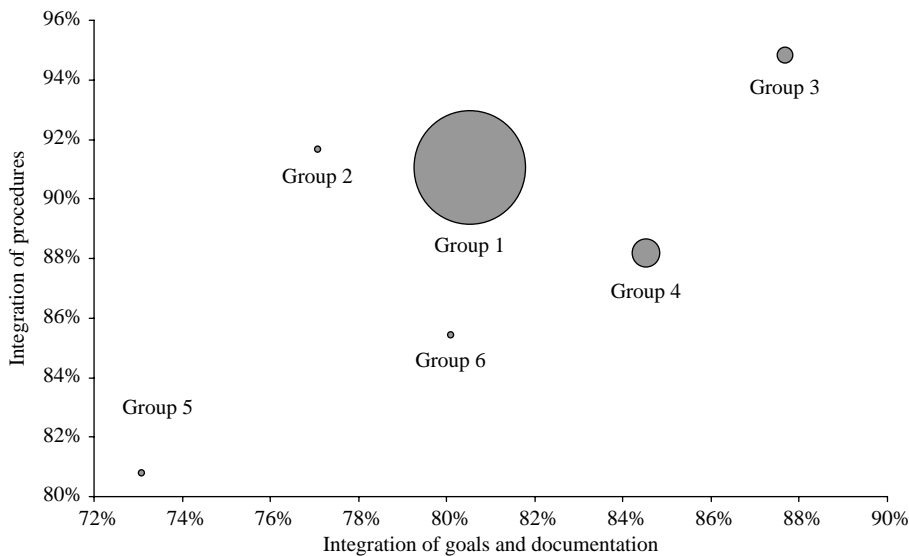


Figure 1. Levels of integration of MSs by order of implementation

Source: Own elaboration

MS elements	Aspects	Integration level percentages					
		No. 1 (%)	No. 2 (%)	No. 3 (%)	No. 4 (%)	No. 5 (%)	No. 6 (%)
Objectives and documentation resources	Policy	84.31	79.17	96.55	84.55	65.83	95.83
	Objectives	81.77	91.67	89.66	84.55	76.92	87.50
	Manual	87.75	87.50	94.83	88.18	88.46	95.45
	Work procedures	79.31	75.00	85.71	88.18	84.62	72.73
	Work instructions	76.13	70.83	75.93	75.00	69.23	68.18
Processes	Records	72.44	66.67	83.33	76.42	61.54	62.50
	Planning	78.92	87.50	83.93	84.55	50.00	68.18
	Internal audit	96.34	91.67	94.83	89.09	80.77	79.17
	Review	93.90	91.67	96.55	90.00	80.77	91.67
	Non-conformities	90.20	87.50	94.83	87.27	92.31	83.33
	Preventive and corrective actions	91.91	95.83	94.83	87.27	88.46	87.50
	Product realization	76.24	87.50	77.78	80.91	59.09	66.67
	Resources management	86.83	87.50	96.55	83.64	61.54	75.00
	Requirements	83.66	87.50	82.14	80.91	69.23	83.33
	Improvement	89.71	91.67	94.83	90.91	69.23	87.50
Resources	Document control	95.61	95.83	98.28	92.73	92.31	87.50
	Record control	95.85	95.83	98.28	89.09	92.31	87.50
	Internal communication	93.87	95.83	100.0	93.64	80.77	87.50

Table II.
MSs integration levels by groups

Source: Own elaboration

Regarding the size, 33.01 percent of these companies are small, 42.58 percent are medium, and 24.40 percent are large. This group is mainly composed of small- and medium-sized organizations (Figure 2).

Group 2. This group consists of 13 companies that first introduced the EMS, followed by the QMS, and thus is represented by 3.80 percent of the sample. As shown in Figure 1, these organizations have integrated, on average, the goals and documentation

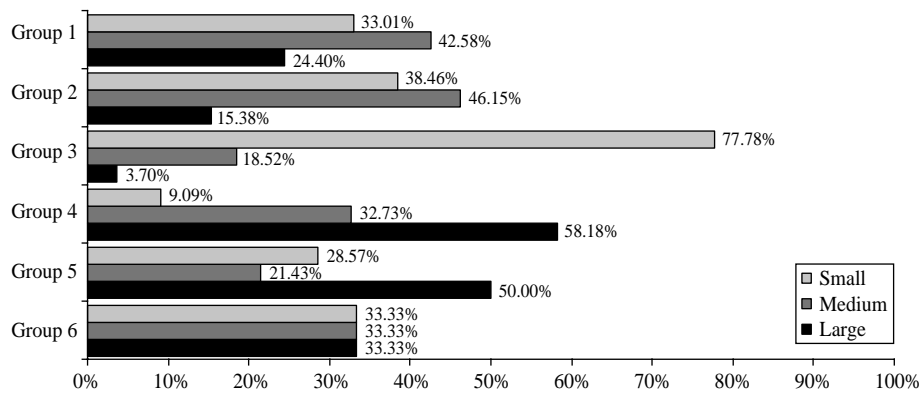


Figure 2.
Breakdown of the sizes of organizations for each group

Source: Own elaboration

at 77.08 percent, a level slightly below the one achieved by Group 1. Procedures, on average, are integrated at 91.67 percent, a level similar to the previous group (Table II).

System objectives are the most integrated MS aspect (91.67 percent), followed by the system manual (87.50 percent). As in the previous group, records are the least integrated documentation resource, with a level of 66.67 percent.

The most integrated procedures are document control, record control, internal communication, and preventive and corrective actions, all integrated at 95.83 percent. In contrast, planning, resource management, determination of requirements, non-conformities, and product realization are the least integrated at 87.50 percent. It can be seen that the common procedures in MSSs are the most integrated, as opposed to those more specific to each standard.

38.46 percent of organizations in this group are small, 46.15 percent are medium, and the other 15.38 percent are large companies (Figure 2). As in Group 1, the organizations are mainly small and medium sized.

Group 3. This group is formed by 30 organizations that have implemented QMS and EMS simultaneously (8.77 percent of the sample). In addition, these companies have the highest level of MS integration, on average, since the goals and documentation are integrated at 87.68 percent, and procedures at 94.83 percent (Figure 1).

Policy, integrated at 96.55 percent, and the manual, integrated at 94.83 percent, are the most integrated goal and documentation resources, respectively, while the work instructions that have the lowest level of integration for the documentation resource (75.93 percent).

The most integrated procedure (Table II) is internal communication, which achieves total integration (100 percent), followed by the document and record control integrated at 98.28 percent. Internal audit and resource management are integrated at 96.55 percent. The least integrated is product realization at 77.78 percent. As in the preceding group, procedures related to the common requirements of MSSs (e.g. document control) are the most integrated. Conversely, procedures that are specific to each MSS (e.g. product realization, which is particular to ISO 9001) achieve lower levels of integration.

This group has the highest percentage of small-sized organizations, namely 77.78 percent. Medium-sized companies represent 18.52 percent, while only one organization from this group is large (Figure 2).

Group 4. It is the second largest group, accounting for 16.37 percent of the sample. These are the 56 companies that have implemented the three most common MSs, with the QMS applied first, followed by the EMS, and then the OHSMS. On average, these organizations have integrated goals and documentation at 84.55 percent and procedures at 88.18 percent (Figure 1).

In this group, the most integrated documentation resources are the manual and procedures (Table II), both at 88.18 percent, while work instructions are the least integrated, at 75 percent. Therefore, organizations of this group integrate documentation at a higher level than the goals, coinciding with the findings of Seghezzi (1997) and Douglas and Glen (2000).

Regarding procedures, integrated on average at 88.18 percent, the most integrated are internal communication, documentation control, and system improvement (93.64, 92.73, and 90.91 percent, respectively). The least integrated in this group is planning at 84.55 percent.

In this group, the tendency of organizations' size changes, because there are 9.09 percent of small organizations and 32.73 percent are medium sized (Figure 2). The percentage of large organizations is higher than for the other five groups analyzed (58.18 percent). It, therefore, seems that large companies implement more MSs.

Group 5. On average, organizations in this group are those with the lowest levels of integration of the six groups studied for both the goals and documentation (73.08 percent) and procedures (80.77 percent). They are 14 organizations that have implemented three MS and in the following order: QMS first, EMS second, and CSRMS third (Figure 1).

As in the previous group with three standardized MSs, the most integrated documentation resources are manual at 88.46 percent and procedures at 84.62 percent (Table II). Records are the least integrated at 61.54 percent. Documentation and record control are the most integrated procedures at 92.31 percent. Planning, as in Group 4, is the least integrated procedure, since it has a level of 50 percent.

Regarding the size of organizations in this group (Figure 2), 28.57 percent of organizations are small, 21.43 percent medium, and 50 percent are large. Therefore, as in the preceding group, large companies are more prominent than in Groups 1-3, which have implemented two MSs only.

Group 6. This group consists of 12 organizations that have three MSs implemented in the following order: QMS first, CSR second, and EMS last. As shown in Figure 1, firms in this group have goals and documentation integrated, on average, at 80.11 percent, and procedures at 85.42 percent (Table II).

Regarding the aspects belonging to goals and documentation, policy (95.83 percent), and manual (95.45 percent) are the most integrated, while records exhibit the lowest level of integration at 62.50 percent. System review, integrated at 91.67 percent is the most integrated procedure, followed by internal communication, record and document control, system improvement, and preventive and corrective actions, at 87.50 percent, while product realization is the least integrated procedure at 66.67 percent.

Regarding the size, it is the most balanced group, as all three categories are represented by exactly 33.33 percent of organizations in the group (Figure 2).

Summary of the results

The analysis of the six groups of organizations presented above shows that the levels of MS integration obtained by the companies with two implemented MSs is higher than those obtained by the organizations with three MSs. Another interesting finding is that large organizations seem to implement more standardized MSs than small- and medium-sized companies, the majority of which have implemented only two MSs.

With respect to the overall results when different groups are contrasted, it appears that the order of implementation does not condition the level of integration for Groups 1 and 2. This is because the corresponding integration levels, especially for procedures, are very similar between these two groups, although they represent the opposite strategies of implementation. Namely, Group 1 organizations implemented the QMS before the EMS, while Group 2 companies applied the EMS before the QMS. Both groups had those two MSs only. They are also similar with respect to the company size, as the majority of organizations in these two groups are small and medium.

For Group 3, the other group with only two MSs, the order of implementation conditions the integration level because, as the standards are implemented simultaneously,

the integration level increases. The company size in this group is also noteworthy, since 78 percent of these organizations are small.

However, the order of implementation seems to condition the level of integration for Groups 5 and 6 that also implemented exactly the same MSs, but in a different order. Specifically, the organizations from these two groups implemented the QMS, EMS, and CSRMS, but while the order was QMS-EMS-CSRMS in Group 5, it was QMS-CSRMS-EMS in Group 6. The level of integration of MSs, especially for objectives and documentation, was different between the groups, with Group 6 exhibiting a higher level.

Comparing Groups 4 and 5, the former had the highest percentage of large organizations (58.18 percent), followed by Group 5 with 50 percent. They both implemented three MSs, the QMS first and the EMS second. However, the third standardized MS was different between these groups. Group 4 has the OHSMS and Group 5 the CSRMS, while the OHSMS had a higher level of integration.

In addition, large organizations tend to have implemented the CSRMS in more instances than small- and medium-sized companies, possibly due to operating in larger markets and having customers or other stakeholders focusing on social responsibility.

Conclusions

An empirical analysis was done to examine whether the order of implementation of standardized MSs in an organization determines the level of integration of these systems. Six groups of organizations that have followed different sequences and have different levels of integration were studied. After analyzing these groups in detail, four conclusions can be drawn.

The first conclusion is that the levels of integration of MSs achieved by the companies belonging to the six analyzed groups are very high, as was also confirmed in the previous studies by Bernardo *et al.* (2009, 2010).

The second conclusion is related to companies' size. Analyzing the six groups (with 342 organizations), the majority of the sample is small- and medium-sized organizations (69.84 percent having 250 employees or less). The results also show that companies with only two MSs implemented (Groups 1-3), in this case QMS and EMS, tend to be small (33 percent in Group 1, 38.46 percent in Group 2, and 77.78 percent in Group 3). As more MSs are implemented, the companies also become larger (Groups 4-6). In other words, it seems that large companies have more than two MSs implemented (58.18 percent in Group 4, 50 percent in Group 5, and 33.33 percent in Group 6).

Third, organizations that had decided to implement standardized MSs simultaneously (Group 3) are those that have integrated their MSs at the highest level, compared to all other groups. This is possibly because MSs were implemented together, and therefore, the organizations have found it easier to exploit synergies between the different MSs (Karapetrovic and Willborn, 1998a; Wilkinson and Dale, 1999; Douglas and Glen, 2000; Karapetrovic and Jonker, 2003; Zutshi and Sohal, 2005a; Karapetrovic and Casadesús, 2009). Also, the great majority of these companies are small (77.78 percent), explaining again the importance for these companies to reduce costs of MS implementation.

The fourth conclusion relates to Group 5, i.e. participating organizations that have three MSs in place, implemented in the QMS-EMS-CSRMS order. These organizations are showing the lowest levels of MS integration among the six groups. Such a phenomenon could be due to different reasons, for instance less experience in managing the CSRMS compared to the other two MSs, later publication of the related MSSs, and the different

extent of the CSRMS compared to the QMS and EMS. The number of organizations registered to a CSR MSS is much lower than the number with QMS and EMS certificates, and thus more time is needed to realise if this lower level of integration is a matter of time and training or is due to other reasons.

One of the limitations of this study is related to the recoding of the ordinal scale to calculate averages, which could be considered as rather arbitrary, since averages may not represent an accurate measurement of the integration level. However, the use of this methodology is only to find descriptive differences among groups, analyzing how they behave in terms of the integration of MSs. This methodology provides for the identification of specific differences, taking into account that all these groups have a very high level of integration, which would be difficult to do through the median.

Finally, taking these arguments into account, we cannot affirm categorically that the level of integration of standardized MSs is related to, or determined by, the order of introducing these systems in the organization. However, it appears that the simultaneous integration of MSs provides greater levels of their integration.

Further research will be focused on studying the impact of other determinants of the MS integration level, such as the MS model applied in the process. The influence of the difficulties encountered during the integration process is also an interesting aspect for further investigations.

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