Difficulties and Benefits of Integrated Management Systems

Abstract

Purpose

In recent years, the number of management systems (MSs) has sharply increased. These MSs can be certified with, for example, the ISO 9001 quality standard or the ISO 14001 environmental standard and they can subsequently be integrated into one single, jointly managed system. The main objective of this research is to study the relationships between the level of system integration, on one hand, and the difficulties encountered in the integration process, as well as the related benefits, on the other.

Methodology

Data for this study derives from a survey carried out in 76 organizations registered to, at a minimum, both ISO 14001:2004 and ISO 9001:2008 standards for quality and environmental management systems (MSs). A descriptive and an Exploratory Factor Analysis (EFA) are provided. Additionally, Structural Equation Modelling (SEM) is applied to the responses of these organizations to a mailed survey.

Findings

From the results, we propose a model of the difficulties related to systems integration that have an effect on the level of integration of several specific items of the MSs involved. A model related to the effect of the integration level on the benefits is also provided.

Originlity/value

The study provides an original contribution to the understanding of how difficulties and benefits of MSs integration relate to the level of integration achieved in the participating companies.

Key Words: Integration level, Benefits, Difficulties, Management Systems, ISO 9001, ISO 14001

1. Introduction

In the last few years, many organizations have chosen to implement standardized Management Systems (MSs), such as the ones based on ISO 14001 and ISO 9001 (the most certified and diffused Management System Standards (MSSs), see ISO 2010; Piskar and Dolinsek, 2006; Llach et al., 2011). In particular, ISO 9001 accounts for 1,064,785 registered companies in more than 170 countries, and ISO 14001 for 223,149 in about 150 countries (ISO, 2010). From 2006 to the end of 2009, the number of certifications has increased by 167,856 for ISO 9001 and by 94,938 for ISO 14001.

The proliferation of new MSSs, such as the ones for occupational health and safety (e.g., OHSAS 18001 and CSA Z1000); for corporate social responsibility and accountability, such as SA 8000 or ISO 26000 (Castka and Balzarova, 2008 a,b,c; ISO, 2009); for security of information systems (ISO 27001); for supply chains (ISO 28000) or for energy management (ISO 50001); gives the option that firms integrate the corresponding MSs into a single system

in order to benefit from the existing synergies among them (Labodova, 2004; Zutshi and Sohal, 2005).

During the last few years, both this proliferation and the increasing importance of MSSs have been demonstrated (ISO, 2010; Heras et al. 2011; Prajogo, 2011). Traditionally, organizations have focused on establishing MSs that comply with the requirements of each MSS individually, often in isolation from each other and sometimes even in conflict (e.g. Karapetrovic and Willborn, 1998a; Zeng et al., 2007). However, Integrated Management Systems (IMSs) that address organizations' objectives jointly are becoming more and more popular as they aim to satisfy the needs of several MSs while running a business (e.g. Beckmerhagen et al., 2003, Rocha et al., 2007). Achieving this can be beneficial to the organization's efficiency and effectiveness, as well as reducing the cost of managing each system individually (Tarí et al. 2010; Moneva and Hortas, 2010). However, some challenges may arise during the process of integration (Karapetrovic and Willborn, 1998a; Karapetrovic, 2003).

Many studies exist about the integration of standardized MSs. These studies focus on different topics, such as the integration advantages, methodologies, and degrees (see, for example, Karapetrovic and Willborn, 1998a; Zeng et al., 2007; Bernardo et al., 2009; Khanna et al., 2010; López-Fresno, 2010; Asif et al., 2010; Leopoulos et al., 2010). Moreover, several authors have studied the integration of Quality Management Systems (QMSs) with other MSs, such as the ones for Information Techology (IT), Environmental Management or Corporate Social Responsibility, among others, in order to increase business performance. For example, some authors examine the ways to capitalize on the potential of the integration between IT and quality management to foster a firm's competitive position (Bajgoric et al., 2009; Park et al., 2010; Rodríguez and Martínez-Lorente, 2011).

The purpose of this paper is to analyze whether the level of integration of firms with more than one implemented MS is related to the perceived benefits and difficulties encountered by these firms during the integration process.

First, we review the literature on the topic of MS integration. Then, the methodology used in this study, a discussion of the results and, finally, the conclusions drawn from the analysis, are presented.

2. Literature Review

2.1. Integration of Management Systems

The number of empirical investigations on the integration of standardized MSs is increasing, namely Baldi (1999), Douglas and Glen (2000), Renzi and Cappelli (2000), Fresner and Engelhardt (2004), Zeng et al. (2005, 2007), Zutshi and Sohal (2005), Jørgensen et al. (2006, 2008), Karapetrovic et al. (2006), Salomone (2008), Karapetrovic and Casadesús (2009), Bernardo et al. (2009, 2010), Khanna et al. (2010), López-Fresno (2010), Asif et al. (2010), Leopoulos et al. (2010).

Many studies have been carried out to examine the ways in which organisations have addressed the introduction and integration of quality management systems (QMSs) with environmental management systems (EMSs) and occupational health and safety management systems (OH&SMSs) (Labodova ,2004; Salomone, 2008; Bernardo et al., 2009; Karapetrovic and Casadesús, 2009).

Addressing the question about the convenience of having an IMS, as well as considering the benefits and costs of such integration is of particular importance for the purpose of this study, as all firms with two or more MSs find themselves involved in the need to address such questions (Zeng, 2007; Bernardo, 2009).

2.2. Difficulties and benefits of integration

There have been many studies investigating firms' motivations for certification of MSs, their implementation experiences and the benefits received (Pan, 2003; Masoud et al., 2011). The benefits of integration have also been widely studied. Many benefits and efficiencies are related to the integration of management systems. For instance, Karapetrovic and Willborn (1998b), Wassenaar and Grocott (1999), Wilkinson and Dale (1999), Douglas and Glen (2000), Renzi and Cappelli (2000), Zutshi and Sohal (2005), Rocha et al. (2007), Salomone (2008), Griffith and Bhutto (2009), Asif et al., (2009), Khanna (2010), Asif et al. (2010), Tarí et al. (2010), Simon et al. (2011) and Zeng et al. (2011) present improvements related to having an integrated system such as costs savings, operational benefits, better external image, improved customer satisfaction and enhanced employee motivation.

Despite the numerous benefits cited above, organizations also come across some challenges in the process of integration (Karapetrovic and Willborn, 1998a; Karapetrovic, 2003). The difficulties the most mentioned in Karapetrovic et al. (2006), Zutshi and Sohal (2005) and Asif et al. (2009) are the lack of human resources and the lack of government support. Internal organizational issues like departmentalization of functions, lack of resources and individual concerns of the people involved, are also mentioned by Karapetrovic and Willborn (1998a), Wassenaar and Grocott (1999), Matias and Coelho (2002), Zutshi and Sohal (2005), Zeng et al. (2007) and Asif et al. (2009).

2.3. Integration of MS elements and level of integration

Regarding MS integration, Karapetrovic and Willborn (1998b) define three main elements of a standardized MS which can be integrated at different levels, namely goals, processes, and resources. Karapetrovic et al. (2006) and Bernardo et al. (2009) conducted two empirical studies in order to study the extent of integration of these elements. They found a high level of integration regarding the extent of the integration of the human resources, the company policy, objectives, the MSs manual, and the processes of document control, record control, auditing, and management review. However, they found that aspects such as the use of integrated records, instructions or procedures, found at tactical organizational levels, or the planning, determination of requirements, product realization and other internal business processes, seemed to be integrated at a lesser extent (Karapetrovic et al., 2006 and Bernardo et al., 2009).

These elements can be integrated at a higher or lower level, depending on the choice of each organization. The integration degree an organization wants to reach has been studied and the literature offers different models. However, four levels indicating a similar degree of integration have been identified by Wilkinson and Dale (1999b), Douglas and Glen (2000),

Pojasek (2006) and Bernardo et al. (2009). These levels range from no integration at all (level 0) to complete integration (level 3).

Karapetrovic and Willborn (1998b), Karapetrovic (2003) and Asif et al. (2009) claim that *"integration makes more sense than disintegration"*. Therefore, they propose that organizations will integrate, rather than separate, their MSs. Empirical studies regarding the scope of integration confirm such an idea (Zeng et al. 2007; Salomone, 2008; Karapetrovic and Casadesús, 2009 or Bernardo et al. (2009). For example, Karapetrovic et al. (2006) find that 85% of organisations had integrated their MSs to some degree. When studying the degrees of integration, Douglas and Glen (2000) also found that, out of the 28 companies in their sample, 71% had integrated some aspects of QMS and EMS. Bernardo et al. (2009) found that 86% of companies in their study had either partially or fully integrated MSs.

The studies reviewed in this section provide an overview on some aspects of the integration of MSs and, more specifically, on the benefits and difficulties of having an IMS, as well as on the level of integration an organization can achieve. However, from the above literature review, we find only one empirical study into the relation of the benefits of integration and the integration strategy of the companies, namely Zeng et al. (2011). Therefore, the research hypothesis of this study aims at discovering whether the level of integration of standardized MSs is related to the benefits and difficulties found by organizations registered to multiple MSSs during the integration process. In the following section, the methodology applied in the study will be described.

3. Objectives and methodology

The main objective of this paper is to study whether the difficulties encountered by firms during the integration process are related to the level of integration of their MSs and whether their integration level affects the benefits of having an IMS perceived by organizations.. In particular, we aim to study whether the integration difficulties are related to the integration level of the human and documentation resources, as well as to the procedures that are part of an IMS (Karapetrovic et al. 2006). Moreover, we want to determine the relationship of these elements with the integration benefits.

To test the proposed hypothesis of the study, we obtained data from a survey carried out from February to July 2010 in Catalonia (Spain), using a questionnaire addressed to the 176 firms that had answered the same survey, sent to 535 companies, in 2006 (Karapetrovic and Casadesús, 2009). Catalonia is one of the regions of Spain with the highest rate of ISO 9001 registrations in the country and experiencing a growth in the number of certificates which is very similar to the average rate of growth in Spain (Heras and Casadesús, 2006).

The questionnaire comprised a combination of semi-open and Likert-type questions with a 1 to 5 scale. The survey instrument was refined using a pre-test process.

The empirical study was conducted by means of a mail survey addressed to the person responsible for the QMS and/or EMS of the organization, and was subsequently followed up with a telephone call and an additional e-mail communication.

From the 176 companies that answered in 2006, with a subsequent follow-up by telephone, 76 valid answers were obtained. The survey therefore had a 43% response rate and a 93% reliability, with a 95% confidence. Table 1 provides the survey profile.

Table 1. Survey information

Study factor	Value

Location	Catalonia (Spain)
Time	2010
Population	535
Sample size	176
Received responses	76
Response rate	43%
Level of confidence p=q=0.5	93%

Source: own elaboration.

The survey included questions regarding the implementation of MSs, the integration level, the use of integration guidelines, the integration difficulties and benefits and the integration of audits. The current study focuses on three specific aspects of the survey, namely, the perceived difficulties and benefits of integration and the integration level of surveyed organizations based on an analysis of the integration of system objectives, resources and processes.

An empirical analysis of the relationship between the level of integration of MSs and the benefits and difficulties of such integration is provided in the next section. The results are presented with the following structure. First, we perform an Exploratory Factor Analysis (EFA) in order to group the variables into latent constructs valid for interpretation and further analysis. Then, we use structural equation modelling to analyze the relationship between the benefits and the difficulties encountered during integration and the level of MS integration achieved by organizations.

4. Findings

4.1. Exploratory factor analysis

In this study, we seek to group the variables related to the difficulties, the benefits and the level of integration of MSs in order to create a small number of unobservable latent variables (Novales, 1997). To do this, we use the exploratory factor analysis (EFA). The EFA is a statistical approach used to examine the internal reliability of a measure and it is used to investigate the theoretical constructs, or factors, that might be represented by a set of items (Novales, 1997). EFA is often recommended when researchers have no hypotheses about the nature of the underlying factor structure of their measure (Novales, 1997).

The first step in the analysis was to create theoretical significant dimensions related with benefits, difficulties and integration level items from the questionnaire. An EFA with varimax rotation was carried out in order to find the most adequate components for each dimension. Table 2 shows, for each dimension related to benefits, difficulties and integration level, the list of items which are chosen for each dimension, the standardized loadings and the reliability measured by Cronbach's Alpha. In the groups of constructs, the analyses performed on the correlation matrix were the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test.

Table 2. Factor analysis and reliability

Variable group	Items	Loadings*	Reliability Cronbach's Alpha
Difficulties Difficulties on integrating multiple MSSs	**1 Lack of resources for integration**		0.702
	Lack of integration guidelines	0.656	
	Lack of specialised auditors	0.610	
	Lack of technological support	0.646	
	Lack of specialised consultants	0.765	
	Excessive time to conduct the integration	0.667	
	2 Difficulties with standards implementation and certification		0.546
	Differences in the models for the implemented standards	0.795	
	Differences in the common elements of the standards	0.842	
	Differences in the scope of the standards	0.588	
	Lack of certifying organizations support	0.682	
	3 Organizational internal difficulties		0.440
	Lack of employees motivation	0.914	
	Lack of internal organizational culture	0.780	
	4 Difficulties with people working with the standards		0.591
	Lack of government support	0.744	
	Lack of human resources	0.698	
	Lack of department collaboration	0.584	
Integration level Integration of Human resources, documentation and procedures	**1 Control procedures**		0.920
	Manual	0.582	
	Internal audits	0.845	
	Management review	0.809	
	Control of nonconformities	0.462	
	Preventive and corrective action	0.844	
	Improvement	0.818	
	Document control	0.849	
	Record control	0.786	
	Internal communication	0.797	
	2 Strategic and operating procedures		0.860
	Policy	0.739	
	Objectives	0.809	
	Planning	0.818	
	Product realization	0.602	
	Determination of requirements	0.648	

Table 6 continued

	3 Documentation resources		0.818
	Procedures	0.734	
	Instructions	0.906	
	Records	0.677	
	4 Human resources		0.926
	Management System Representative	0.962	
	Management System Manager	0.960	
Benefits Benefits from implementing multiple MSs	**1 Internal cohesion benefits**		0.817
	Employee motivation improvements	0.594	
	Department barriers elimination and higher collaboration	0.711	
	Higher stakeholders implication	0.542	
	Organizational culture improvements	0.755	
	Better communication	0.891	
	2 Benefits related to better use of the systems		0.739
	Improvement of the systems understanding and use	0.828	
	Better options to include new systems	0.866	
	3 Organizational strategic benefits		0.500
	Company image improvements	0.877	
	Organizational global strategy improvements	0.689	
	4 System performance benefits		0.487
	Increase of organizational efficiency	0.875	
	Better use of the internal and external audit results	0.744	

** Extraction Method: Principal Component Analysis.*
Rotation Method: Varimax with Kaiser Normalization.

Regarding the results of Table 2, we found four dimensions for the items related to the integration difficulties, four for the level of integration and also four for the benefits of integration.

When analyzing the difficulties, we obtained a total of fifteen variables. However, in the final solution of the analysis, we use fourteen variables, because "not efficient implementation of the first system" presented a very low commonality and the goodness of fit was better without it, so this variable was left out of the model. The analysis of the fourteen variables gave a statistic of χ^2=276.67 with a 0.000 level of significance, for Bartlett's test of sphericity and a KMO of 0.649. The four constructs extracted from the analysis explain 65.96% of the total variance.

The first difficulty dimension called "lack of resources for integration" explains 19.40% of the variance and has an eigenvalue of 4.30. It is explained by five variables related to the lack of resources for integration (time, technology, auditors and guidelines). The variable with the greatest contribution or weight in the factor is the "lack of specialised consultants". In contrast, the variable with the lowest weight is "lack of specialized auditors". This is in line with the results found by Beckmerhagen et al. (2003) and Sutshi and Sohal (2005), related to the difficulties of integrating the resources used by the MSs and to the lack of specialized human resources to implement, integrate and audit the MSs.

The second difficulty dimension is called “difficulties with standards implementation and certification”. The factor, with an eigenvalue of 2.09, is composed of three variables that explain 18.21% of the variance. These variables are about the lack of specialized support necessary for a proper deployment and certification of the IMS within the organization. “Differences in the models for the implemented standards” is the variable that contributes the most to this factor, while the “differences in the scope of the standards” contributes the least. All of the variables are related to the MSSs implemented in the company. Therefore, it is difficult for the organization to overcome these difficulties as they relate to external variables such as the characteristics and requirements of each standard, which is out of the organization’s control, as discussed by Karapetrovic and Willborn (1998a), Wilkinson and Dale (2000), Matias and Coelho (2002), Karapetrovic (2003) and Beckmerhagen et al. (2003). For this reason, the label for this factor is “difficulties with the standards implementation and certification”.

The third factor is made up of two variables, which relate to difficulties that the organisations could overcome by themselves. This factor also coincides with the “internal factors” found by Zeng et al. (2007) in their study. The factor has an eigenvalue of 1.46 and explains 10.46% of the variance. The two variables concern organizational internal difficulties related to the organizational involvement with the MSs. They were the two variables with the highest values in the descriptive analysis of the integration difficulties. The label given to the third factor is “organizational internal difficulties”.

The fourth and final factor is composed of the three remaining variables and indicates that the main obstacles to integrate MSs are problems related to the people (see Wilkinson and Dale, 2000; Zeng et al., 2007; Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Zeng et al., 2007; Asif et al., 2009). The factor has an eigenvalue of 1.37 and explains 9.78% of the variance. The label given to the third factor is “difficulties related to the people working with the standards”.

The analysis for the integration level used 21 variables related to the human resources, the documentation resources and the procedures. As in the previous EFA, not all of the initial variables were considered in the solution. In particular, “inspectors” and “resource management” showed very low commonality and the goodness of fit was better without them.

We performed the EFA with 19 variables and obtained a statistic of χ^2=1148.479 with a significance level of 0.000 for the Bartlett’s test of sphericity, confirming linear dependence among the variables so that we could further analyse the data. The KMO value was 0.74, a value which supports the results of the analysis as valid (Novales, 1997). From this analysis, four factors were extracted, accounting for 74.90% of the initial variance, which is considered a very high proportion of information kept in the analysis. A description of the four factors is presented below.

The first factor has an eigenvalue of 8.94 and explains 47.08% of the variance (Table 6). It covers nine variables related to the work procedures used to review, audit and control the systems in the organization. Indeed, this factor groups all procedures except for planning, product realization and determination of requirements. The label for this factor is “control procedures”.

The second factor is composed of five variables (Table 2), which relate to the planning of the MSs, product realization and the definition of requirements, which are included in Clause 7 of ISO 9001. Therefore, we call this factor "strategic and operating procedures". The percentage of total variance explained by the factor is 10.30%. It has an eigenvalue of 1.95.

The third factor, with an eigenvalue of 1.86 and a percentage of 9.79% of the total variance (Table 2), relates to the documentation involved in the MSs. The label for this factor is "documentation resources".

The fourth factor is "Human Resources" (Table 2). It has an eigenvalue of 1.46 and explains 7.71% of the variance. It involves the MSs representative and manager who are responsible for running the MSs.

This clustering is somewhat different from the classification proposed by Karapetrovic et al. (2006) and Bernardo et al. (2009). These authors present three elements of a standardized MS which can be integrated at different levels, namely goals, processes, and resources. In our clustering, we divide the resources into human and documentation resources. The processes and goals are redifined into control, strategic and operating procedures, differentiating like this the nature of the processes in the organizations.

About the benefits, the analysis accounted for the twelve variables arising from the survey questions. The final solution of the analysis contains eleven variables, because "task simpification" was left out of the model, as it presented a very low commonality and the goodness of fit was better without it. The analysis of the eleven variables gave a statistic of χ^2=246.665 (level of significance, 0.000) for Bartlett's test of sphericity and a KMO of 0.746, which is considered an acceptable result (Novales, 1997). Four constructs extracted from the analysis explain 75.67% of the total variance, which is considered a very good percentage.

The first dimension called "internal cohesion benefits" explains 39.90% of the variance and has an eigenvalue of 4.39. It is explained by five variables related to the strengthening of links in the organization (see, e.g., Karapetrovic and Willborn, 1998a; Kirkby, 2002; Wright, 2000; Zutshi and Sohal, 2005b; Lopez-Fresno, 2010; Griffith, 2000; Douglas and Glen, 2000; Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Pojasek, 2006; Lopez-Fresno, 2010 and Salomone, 2008). The variable with the greatest contribution or weight in the factor is "better communication". In contrast, the variable with the lowest weight is "higher stakeholder's implication". All of the variables in the first factor reflect benefits related to a better cohesion of the people working with the standards. The label given to this factor is "internal cohesion benefits".

The second factor, with an eigenvalue of 1.60, is composed of two variables that explain 14.58% of the variance. The variables relate to the improved use of the systems due to integration and these benefits are similar to the ones proposed by Wilkinson and Dale (1999b). For this reason, the label for this factor is "benefits related to the better use of the systems".

The third factor is made up of two variables, and it is labeled "organizational strategic benefits". It is a more "strategic" factor than the others, and includes aspects that are most fundamental to a firm's identity (Zutshi and Sohal, 2005b; Salomone, 2008; Lopez-Fresno, 2010). The factor has an eigenvalue of 1.22 and explains 11.14% of the variance. The two variables concern topics regarding the strategy and the image of the companies.

The fourth and final factor is composed of the two remaining variables, which relate to the efficiency and results of MSs (Karapetrovic and Willborn, 1998a; Lopez-Fresno, 2010; Tarí et al. 2010; Khanna et al., 2010). The factor has an eigenvalue of 1.10 and explains 10.03% of the variance. The label given to the fourth factor is "system performance benefits".

Each dimension found in this EFA has a score for internal consistency or reliability measured using Cronbach's alpha (Cronbach, 1951). In most of the cases, the Cronbach's alpha exceeds the value of 0.6. This is the value suggested by Malhotra (2004) as the minimum value that would be satisfactory to demonstrate internal consistency. In the cases of "difficulties with standard implementation and certification", "organizational internal difficulties", "difficulties with people working with the standards", "organizational strategic benefits" and "system performance benefits", the Cronbach's alpha was below this value. Additionally, we analyzed the unidimensianality of the factors, confirming that all the variables in each factor, when analysed individually, belong to a single factor.

In the next section, we apply structural equation modelling to our data. Once we found and defined each exogenous benefit, difficulty and integration dimension, we use these dimensions as observed variables in our specified models for the difficulties and the integration level, as well as for the benefits and the integration level. Thus, the proposed models intend to analyze whether the difficulties and the benefits encountered by organisations during the process of integration affected the level of integration of the MSs. The theoretical models are shown in Figure 1 and Figure 3.

4.2. Structural Equation Modelling results

The first theoretical model to be analyzed by means of structural equation modelling illustrates the relationship between the difficulties and the level of integration. Figure 1 shows the model to be analyzed.

-Insert "Figure 1. Path diagram of the difficulties and the integration level" about here-

In order to perform a confirmatory factor analysis using the structural equation modelling software AMOS version 17, we applied the robust estimation method by maximum verisimilitude. The analysis first examined whether the four difficulty factors fit the model well, and then whether the four factors related to the levels of integration of MSs also fit this model well. Relationships between the eight factors were not taken into account.

The first analysis focused on the constructs D1 (lack of resources for integration), D2 (difficulties with the standards implementation and certification), D3 (organizational internal difficulties) and D4 (difficulties related to the the people working with the standards). A first goodness of fit measure for the global model is the χ^2 statistic to test the null hypothesis of no parameter omission, with its associated n number of degrees of freedom (d.f.) and p-value. In our model, we obtained a χ^2 statistic equal to 110.6, with 71 degrees of freedom, and a p-value equal to 0.000, which indicates the rejection of the null hypothesis. Other useful measures that quantify the fit of the model were obtained. These measures are CFI (compared fit index) equal to 0.818 (acceptable above 0.90) and RMSEA (root mean square error of approximation) equal to 0.094 (acceptable below 0.08). The last goodness of fit statistic to be analysed is Hoelter's Critical N (CN). This fit statistic differs substantially from those

previously discussed in that it focuses directly on the adequacy of sample size, rather than on model fit. Its purpose is to estimate a sample size that would be sufficient to yield an adequate model for a chi-square test (Byrne, 2009). A Hoelter value that exceeds 200 is indicative of a model that adequatly represents the sample data (Byrne, 2009). The 0.05 and 0.01 CN values for our hypothesized model are under 200 (53 and 58 respectively). Interpreting this finding, then, leads us to conclude that the size of our sample (n=76) is not satisfactory according to Hoelter's benchmark that the CN should exceed 200. All these measures show a poor fit of the model. Therefore, the data cannot be extrapolated to the population.

The confirmatory factor analysis for the four factors related to integration of the standardized MSs, used the constructs I1 (control procedures), I2 (strategic and operating procedures), I3 (documentation resources) and I4 (human resources).
The chi-square statistic in this case is 523.997, with 129 degrees of freedom, and its probable value of chi-square is 0.000, which must be greater than 0.05 to be significant. The comparative fit index (CFI) is 0.641, which is lower than in the previous analysis and still fails to be significant. The root mean square error of approximation (RMSEA) is 0.338, which is better than in the previous analysis and within the acceptable limit of 0.08 (Byrne, 2009). The conclusion drawn from this analysis is the same as before, i.e., that the model cannot be accepted as a good fit for the data.

The general model (Figure 1) showing the relationship between the difficulties and the level of integration has a chi-square of 1141.971, with 456 degrees of freedom, and its probable value for chi-square is 0.000. As in the previous cases, this is not significant. In this case, the CFI is 0.517. This is lower than in the previous analysis. As it does not fall within the acceptable values, it is not considered significant. The RMSEA is 0.155. As in the previous models, this number falls within the acceptable limit of 0.08 (Byrne, 2009). All these measures show a poor fit of the model. Thus, the proposed hypothesis stating that the difficulties faced by organizations during integration have an effect on the level of integration of their MSs is not supported.

Although the model presented in Figure 1 is not significant, it could help to understand, in an exploratory rather than a confirmatory way, how difficulties during integration may affect the level of integration. The equations of the model, which appear below, show the factors that are significant to 5% in bold.

	Lack of resources for integration (D1)	Difficulties with standards implementation and certification (D2)	Organizational internal difficulties (D3)	Difficulties with people working with the standards (D4)	
Control procedures (I1) =	+0.321D1	-0.636D2	-0.026D3	+0.626D4	+ E1
Strategic and operating procedures (I2) =	**+0.270D1**	-0.603D2	-0.025D3	+0.397D4	+ E2
Documentation resources (I3) =	**+0.287D1**	**-0.507D2**	-0.033D3	+0.592D4	+ E3
Human resources (I4) =	-0.163D1	+0.199D2	-0.160D3	+3.607D4	+ E4

According to the equations defining the model, some of the factors are significant in several variables except for the “organizational internal difficulties” and the factor named “difficulties related to the people working with the standards”.

Results from the final model illustrate a significant positive effect from the "lack of resources for integration" on “strategic and operating procedures" and "documentation resources". This could be because effective management of the strategy and documentation of the organizations surveyed are factors which do not need many resources. The group of variables named "difficulties with the standards implementation and certification" show a significant negative effect on "documentation resources". This means that organizations experiencing difficulties with the MSSs would achieve a lower level of documentation integration.

The relationship between the integration level and the benefits of integration was also tested using Structural Equation Modelling. Figure 2 shows the model to be analyzed.

-Insert “Figure 2. Path diagram of integration level and benefits” about here-

The third analysis considered the benefits constructs B1 (internal cohesion benefits), B2 (benefits related to better use of the systems), B3 (organizational strategic benefits) and B4 (system performance benefits) and gave a chi-square value of 62.3, with 40 degrees of freedom, and its probable value of chi-square is 0.000, which must be higher than 0.05 to be significant. The comparative fit index (CFI) is 0.900, which is just below the minimum acceptable value of 0.95 (Byrne, 2009). Therefore, the fit is not significant. The root mean square error of approximation (RMSEA) is 0.094, which is higher than the acceptable limit of 0.08 (Byrne, 2009). Our 0.05 and 0.01 CN values for our hypothesized model are under 200 (57 and 65 respectively). Interpreting this finding leads us to conclude that the size of our sample (n=76) is not satisfactory according to Hoelter's benchmark that the CN should exceed 200. These values rule out accepting the model as a good fit for the data.

The general model (Figure 2) showing the relationship between the level of integration and the benefits has a chi-square of 1051.118, with 367 degrees of freedom, and its probable value for chi-square is 0.000. The CFI is 0.523 and does not fall within the acceptable values. The RMSEA is 0.172, which falls within the acceptable limit of 0.08 (Byrne, 2009). All these measures show a poor fit of the model. Thus, the proposed hypothesis stating that the level of integration of MSs has an effect on the benefits obtained by organizations during integration is not supported. Although the model presented in Figure 2 is not significant, it could help to understand, in an exploratory rather than a confirmatory way, how the level of integration may affect the benefits perceived by organizations. The equations of the model, which appear below, show the factors that are significant to 5% in bold.

	Control procedures (I1)	Strategic and operating procedures (I2)	Documentation resources (I3)	Human resources (I4)	
Internal cohesion benefits (B1)=	**-0.982I1**	+2.378I2	-0.157I3	-0.016I4	+ E1
Benefits related to better	**-0.843I1**	+1.765I2	-0.153I3	-0.216I4	+ E2

use of the systems (B2)=

Organizational strategic benefits (B3)=	-0.580I1	+2.615I2	**-0.317I3**	-0.151I4	+ E3
System performance benefits (B4)=	-0.106I1	**+1.157I2**	+0280I3	+0.172I4	+ E4

According to the equations defining the model, all the integration factors are significant in some variables except for the “human resources”, which do not affect any of the benefits.

The results from the final model show that "control procedures" have a significant negative effect on "internal cohesion benefits" and on "benefits related to better use of the systems". This could be because the effort that the personnel involved in the IMS has to exert during the control and audit of the systems affects negatively the relationships among them, namely their comunication and collaboration. Therefore, it also makes it more difficult for them to use the systems or even to include new systems. The group of variables named "strategic and operating procedures" has a significant positive effect on "system performance benefits". This means that organizations which have reached a high level of alignment in the objectives and strategy of their different systems experience benefits regarding both the efficiency of the IMS and its audits. Finally, "documentation resources" show a significant negative effect on "organizational strategic benefits", meaning that a high integration of the documentation does not lead to strategic or image improvements for the companies.

Figure 3 shows the significant relationships in the models for the difficulties, the integration level and the integration benefits.

-Insert “Figure 3. Path diagram of significant factors for the difficulties and the benefits” about here-

5. Conclusions

The aim of this study was to test the relationship between the difficulties encountered by organizations during the integration process, the level of integration of standardized MSs and the associated benefits.

The first conclusion to be drawn from the study is that the difficulties of integration can be grouped in four large clusters, which are "lack of resources for integration", "difficulties with the standards implementation and certification", "organizational internal difficulties" and "difficulties with the people working with the standards". This last group of difficulties is the one to receive the most comments in the literature. For example, the attitude and motivation of people is mentioned in Matias and Coelho (2002), Zutshi and Sohal (2005b), Zeng et al. (2007) and Asif et al. (2009).

We have found four clusters that represent the integration benefits, namely, "internal cohesion benefits", "benefits related to better use of the systems", "organizational strategic benefits" and "system performance benefits". Again, the group related to the benefits that the human resources bring to the IMS is among the ones to receive the most attention in the literature (see, i.e. Karapetrovic and Willborn, 1998a; Douglas and Glen, 2000; Griffith, 2000; Wright, 2000; Kirkby, 2002; Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Lopez-Fresno, 2010; Zutshi and Sohal, 2005b; Pojasek, 2006; Salomone, 2008 and Lopez-

Fresno, 2010). Therefore, we can conclude that the attitude and motivation of people when working with the MSs play a vital role during the process of integration of these systems within the organizations studied.

Finally, the clustering pertaining to the IMS has four groups of variables: "control procedures", "strategic and operating procedures", "documentation resources" and "human resources". This classification is in line with Karapetrovic et al. (2006) and Bernardo et al. (2009), although a fourth dimension is added in this study to better represent the nature of the different resources that organizations can benefit from.

As we have been able to find only one study about the relationship between the integration and its benefits (Zeng et al., 2011), and about the relationship of the integration levels with the difficulties (Zeng et al., 2011), we used cluster results to explore the effects of the difficulties of integrating MSs on the level of integration and the effects of this integration on the associated benefits. To do this, a model was presented and tested by means of SEM. The model could not be confirmed, but it was useful in interpreting some aspects of the data. Four difficulty, four benefit and four integration dimensions, as well as the relationships among them, were proposed. A significant positive effect from the "lack of resources for integration" on “strategic and operating procedures" and "documentation resources" was encountered, showing that the effective management of the strategy and documentation of the organizations do not need the resources required in other integration processes. Also, the group of variables named "difficulties with the standards implementation and certification" show a significant negative effect on "documentation resources", demonstrating a strong relationship between the standards implementation process and the level of documentation integration in the companies.

Regarding the integration benefits, "control procedures" have a significant negative effect on "internal cohesion benefits" and on the "benefits related to better use of the systems". These findings indicate the importance of the human resources motivation and the climate of the organizations when managing and controlling an IMS. The group of variables named "strategic and operating procedures" has a significant positive effect on "system performance benefits", showing the relationship between strategy and performance. Finally, "documentation resources" show a significant negative effect on "organizational strategic benefits", meaning that a high integration of the documentation does not lead to global strategic or image improvements for the companies.

The main limitation of our study is the sample size, 76 organizations, which could be the cause that our model is not significant. According to Byrne (2009), the sensitivity of the likelihood ratio test to sample size leads to problems of fit in the models. Also the Goodness of Fit (GFI) index values can be overly influenced by sample size. Moreover, the CN values for our hypothesized model are under 200, leading us to conclude that the size of our sample size is not satisfactory in order to find significant effects between the integration difficulties and benefits and the integration level in the analyzed companies. Further, the sample upon which this study is based was drawn from a single state, Spain, which limits the generalization of the results.

Given the answers regarding the difficulties and benefits experienced by organizations, future research could focus on identifying the relationship between the integration difficulties and

benefits and financial performance measures. It would also be interesting to study how the perception of firms regarding the integration difficulties and benefits evolves over time.

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