



## Do integration difficulties influence management system integration levels?

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### ABSTRACT

The objective of this article is to empirically analyse whether there is a relationship between the difficulties found in the integration process and the level of system integration achieved.

A sample of 362 organisations registered, at least, to both ISO 9001:2000 and ISO 14001:2004, is examined. Structural equation modelling is applied to their responses to a mailed survey. Two different groups are studied depending on the number of management systems implemented: two systems for the first group and three for the second.

The results demonstrate that organisations with three implemented management systems face difficulties in the integration process that affect the level of integration, while this relationship is not significant for those organisations with two management systems.

This paper is one of the first studies focussing on integration difficulties and their effect on the level of integration achieved.

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### 1. Introduction

Increasingly, organisations are implementing multiple management system standards (MSSs) to enhance their efficiency and competitiveness. This is apparent, for example, in the rise in the number of the most common MSS certificates, namely ISO 9001 and ISO 14001 (see ISO, 2010). In 2009, according to the latest “ISO Survey” (ISO, 2010), the worldwide levels of ISO 9001 and ISO 14001 registrations increased by 8% and 18%, respectively. Other examples of standardised management systems (MSs) that have been implemented in organisations address occupational health and safety (OHSAS, 18001), corporate social responsibility (SA 8000), information security (ISO 27001) and customer satisfaction (ISO 10000 series).

In this context, organisations with multiple standardised MSs are seeking to integrate these systems in order to manage them better and to simultaneously exploit the related synergies (Karapetrovic and Willborn, 1998a, 1998b; Wilkinson and Dale, 1999a; Douglas and Glen, 2000; Karapetrovic and Jonker, 2003;

Zutshi and Sohal, 2005a; Karapetrovic and Casadesús, 2009). Since the process for integrating MSs is not itself “standardised”, it differs across organisations (for more information see e.g., in Bernardo et al., 2009, 2010). This different application or interiorization of the integration process can lead to different results, affected differently by benefits and difficulties.

Related to the latter, a variety of factors can limit or hinder the integration process and its outcome. Among these factors are the model used in the process, as different models can be seen as incompatible (see, e.g., Karapetrovic and Willborn, 1998b), the motivation of human resources in the organisation, as they are the key for the process success (see, e.g., Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Zeng et al., 2007; Asif et al., 2009), and the number and sequence in which the MSs have been implemented, because both can condition the process (see, e.g., Karapetrovic and Willborn, 1998a; Karapetrovic, 2002a; Labodová, 2004; Griffith and Bhutto, 2008; Bernardo et al., 2009). These factors, among others, can be considered as difficulties in the integration process and their impact can differ among organisations.

The objective of this article is twofold. First, it is to analyse whether the difficulties faced by organisations during the integration process affect the level of integration achieved in the resulting Integrated Management System (IMS). By identifying which difficulties hinder integration, organisations can be better prepared to face and overcome them in the integration process.

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Second, it is to analyse if the impact of difficulties is the same for all organisations, or it depends on the number of management system standards implemented. This is accomplished by comparing two groups of organisations, one with two MSSs (ISO 9001 and ISO 14001) and the other with three (ISO 9001, ISO 14001 and OHSAS 18001 or a corporate social responsibility standard).

The subsequent sections of this paper set out the literature review, the methodology used in the analysis, a discussion of the results and, lastly, the conclusions drawn from the analysis.

## 2. Literature review

The integration of management systems can be defined as “putting together different function-specific management systems into a single and more effective IMS” (Beckmerhagen et al., 2003). Different management systems, and not only the ones related to quality, are considered during the integration process, despite the outstanding importance of quality management systems in the field (see, e.g., Zu, 2009; Gutierrez Gutierrez and Fernandez Perez, 2010; Kristal et al., 2010; Sitko-Lutek et al., 2010). Four principal aspects can be identified in the process of integrating management systems: implementation strategy, integration methodology, level of integration and audit integration.

The first aspect concerns the sequence by which MSs have been implemented, for example, if the organisation has implemented a quality management system (QMS) first, and then an environmental management system (EMS) second, or the strategy has been just the opposite, i.e., both of these MSs have been implemented simultaneously. This determines the strategy for integration (see, e.g., Karapetrovic and Willborn, 1998a; Karapetrovic, 2002a; Karapetrovic and Jonker, 2003; Labodová, 2004; Griffith and Bhutto, 2008; Bernardo et al., in press).

The second aspect relates to the methodology used in the process. In this respect, a number of national standards are available to support integration (see, for example, SAI Global, 1999; Dansk Standard, 2005; AENOR, 2005; BSI, 2006) and ISO published a handbook with integration advice, methodology and examples (ISO, 2008a). Academic authors have also proposed a variety of methodologies, including Karapetrovic and Willborn (1998a); Karapetrovic (2003); Labodová (2004); Zeng et al. (2007); Asif et al. (2009, 2010); Lopez-Fresno (2010).

The third aspect involves determining the level of integration to be attained by the IMS. For example, three levels can be defined according to the literature (used in this study): no integration (keeping the systems separate), partial integration (some components of the management system are integrated, for instance, the manual is the same for all MSs, but records are kept separate, meaning a partial integration of documentation), and full integration (all components of the MSs are integrated) (see, e.g., Wilkinson and Dale, 1999a; Kirkby, 2002; Karapetrovic, 2002a, 2003; Beckmerhagen et al., 2003; Pojasek, 2006). According to Bernardo et al. (2009), who analysed the integration level of the IMSs in a sample of 435 Spanish companies, 86% of these organisations integrated their management systems, either partially or fully. Bernardo et al. (2009) could identify MSs aspects (related to the specific ISO 9001 chapters) that were more integrated, than the others, classifying these aspects into three main groups (Karapetrovic and Willborn, 1998b): objectives, resources and procedures. They concluded that organisations begin the integration “with the most strategic goals, documentation and procedures (policy, objectives and manual in the case of the goals and documentation, and record control, internal audits and internal communication for procedures), integrating operations and tactics later on.” (Bernardo et al., 2009).

Following the literature above, the first hypothesis is the following:

*H1 The level of integration of MSs is defined by the integration level of objectives, resources and procedures*

The fourth aspect addresses the question of integrating internal and external audits (see, e.g., Karapetrovic and Willborn, 2000; ISO, 2002, 2008b; Karapetrovic, 2002b; Bernardo et al., 2010).

Normally, however, the decision to begin integration is preceded by an analysis of the advantages and difficulties that the integration will pose to the organisation (e.g., see ISO, 2008a). Some advantages are:

- Greater flexibility and opportunities to include other systems (Karapetrovic and Willborn, 1998a; Beckmerhagen et al., 2003),
- Avoiding duplication of effort (Wilkinson and Dale, 1999b, 1999c; Beckmerhagen et al., 2003; Zutshi and Sohal, 2005b; ISO, 2008a; Zeng et al., 2011),
- Making greater use of the synergies among standards (Karapetrovic and Willborn, 1998b; Beckmerhagen et al., 2003),
- Audits are integrated (Beckmerhagen et al., 2003; ISO, 2008a) and auditors are multi-functional (Douglas and Glen, 2000),
- Reducing the amount of documentation (Beckmerhagen et al., 2003; Zeng et al., 2005, 2011), and
- Optimising resources (McDonald et al., 2003; Zutshi and Sohal, 2005b; Salomone, 2008).

A summary of the most-highlighted difficulties during the integration process discussed in previous studies, which are largely theoretical in nature, is presented in Table 1. Integration difficulties have been classified into external and internal, basing the classification on Zeng et al. (2007)’s, who identified internal factors as “human resources (44%), organisational structure (23%), organisational culture (14%), and understanding and perception (11%)”, while the external factors were found to be “technical guides (33%), certification bodies (30%), stakeholders and customers (14%), and institutional environment (14%)” (Zeng et al., 2007).

According to the Zeng et al. (2007)’s classification, a second hypothesis can be posed:

*H2 The difficulties during the integration process are defined by both internal and external difficulties*

Overall, very few empirical studies have examined the integration of management systems (see, e.g., Douglas and Glen, 2000; Fresner and Engelhardt, 2004; Zeng et al., 2005, 2007 and 2011, Zutshi and Sohal, 2005a, 2005b; Karapetrovic et al., 2006; Salomone, 2008; Griffith and Bhutto, 2008; Bernardo et al., 2009, 2010, in press; Karapetrovic and Casadesús, 2009). No empirical studies were found that specifically focus on the obstacles encountered during the integration process, although in four of the above empirical studies the difficulties are analysed as a part of the process. For example, Zutshi and Sohal (2005b) analysed the integration process in three Australian organisations, identifying the benefits and the barriers encountered. From the latter, they highlighted: “people’s attitudes” (resistance to change the present situation), “lack of strategic planning” (it can mean resistance and delays), “lack of expertise and use of consultant’s (lack of qualified personnel and high fees not all organisations can afford), “continually changing regulations and guides” (challenge of updating and reviewing the MSSs), “reporting of results” (to ensure a fast reporting system to avoid delays), and “time-delays in integration” (lack of employees training that need more time than expected) (Zutshi and Sohal, 2005b). Karapetrovic et al. (2006) analysed the

**Table 1**  
Main difficulties during the integration process reported in the existing literature.

|                      |   |
|----------------------|---|
| External Standards   | Insufficient harmonisation of the standards from the ISO 9000 and ISO 14000 series (e.g., Karapetrovic and Willborn, 1998a). MSSs are based on two different models, i.e., the “process-based approach” of ISO 9001 and the “PDCA cycle” of ISO 14001, OHSAS 18001 and SA 8000, which are incompatible to some extent (Karapetrovic, 2003; McDonald et al., 2003; Salomone, 2008). Differences in the general elements of the standards and in their specific requirements (Matias and Coelho, 2002; Karapetrovic, 2002a, 2003; Beckmerhagen et al., 2003).   |
| Consultants          | Lack of experience and use of consultants, particularly the difficulty of finding qualified consultants, as well as the lack of the ability to pay for and devise adequate training to maintain the implemented system (Zutshi and Sohal, 2005b)  |
| Certification bodies | Lack of support from the certification bodies (Zeng et al., 2007; Salomone, 2008)   |
| Internal Systems     | Differing perceptions of who the main stakeholders are, given that those are parties who receive a product or service in the QMS (i.e., customers as defined in ISO 9000: 2005), but in the EMS they are the society at large, local communities and the government (Karapetrovic and Willborn, 1998a; Beckmerhagen et al., 2003; Zeng et al., 2007; Asif et al., 2009). Risk of creating a ranking of systems by different areas of responsibility (McDonald et al., 2003; Salomone, 2008).  |
| Resources            | People’s attitudes, given that the behaviour and the attitude of workers can affect the successful implementation of the system (Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Zeng et al., 2007; Asif et al., 2009). This difficulty encompasses fear and resistance to change, communication problems and loss of “ownership” of systems (Matias and Coelho, 2002; Zutshi and Sohal, 2005b; Zeng et al., 2007; Asif et al., 2009).<br>Lack of resources, for example funds and knowledge (Asif et al., 2009).<br>High costs of multiple audits, even when the systems are integrated (Karapetrovic, 2002a).<br>Difficulties in preparing reports of the results of integration, which are necessary to be able to improve the system (Zutshi and Sohal, 2005b).   |
| Organisation         | Loss of power by some roles in the hierarchy (Matias and Coelho, 2002; Karapetrovic, 2002a) and fear of job losses (Beckmerhagen et al., 2003).<br>Inter-functional conflicts, given that interests and motivations differ (Karapetrovic and Willborn, 1998a).<br>Lack of knowledge of the process, resulting in integration delays caused by the need of departments for more time to understand and implement the integrated system, which then affects the execution of the entire implementation (Wilkinson and Dale, 2000; Zutshi and Sohal, 2005b; Zeng et al., 2007; Salomone, 2008).<br>Problems related to the organisational culture (Wilkinson and Dale, 1999c, 2000; Zeng et al., 2007).<br>Increased bureaucracy, which will be more complex in an IMS as a result of the interconnectedness of the systems (Matias and Coelho, 2002; McDonald et al., 2003).<br>Difficulties after the IMS implementation, which may be caused by ineffective design or implementation affecting the flexibility of the organisation (Asif et al., 2009). |

Source: Adapted from Zeng et al. (2007).

integration process of 176 Catalan organisations. According to their results, “companies with integrated management systems encounter fairly insignificant difficulties with the integration process”. The “lack of human resources” is the most highlighted aspect, followed by the “lack of government support” (Karapetrovic et al., 2006). Zeng et al. (2007)’s study has been commented previously, with their main contribution is the classification of difficulties into internal and external. Finally, Salomone (2008) studied the integration process in a sample of Italian companies, analysing the differences among regions, company’s sizes and sectors. She found that the most valued difficulties were the “risk of not assigning the right level of importance to each variable (MSSs)” and the “difficulties in organising an IMS” (48% and 46% respectively). Valued at a lower level, 18%, there was “personnel may confuse the standards”, at 16%, the “insufficient integrability of the standards”, and at 11%, “inadequate support of certifiers” (Salomone, 2008). It is also notable that the 10% of these organisations declared that they had no difficulties during the process (Salomone, 2008).

Taking into consideration the lack of empirical studies on integration difficulties, the third research hypothesis of this study is:

*H3 The level of integration of standardised MSSs is negatively related to the difficulties found by the organisation during the integration process.*

Thus, the tested model is represented in Fig. 1.

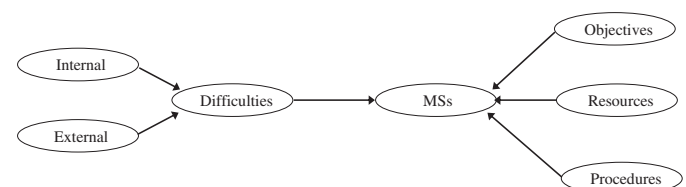
The methodology used in the empirical study is presented below.

### 3. Methodology

With the aim of addressing the proposed hypotheses, we obtained data from a survey conducted in 2006 and 2007 in Spain. The

survey was mailed to the managers responsible for quality and/or environmental management systems in a sample of 1615 Spanish companies which, according to the data from Forum Calidad (2005), had both the ISO 9001: 2000 and ISO 14001: 2004 certifications, at a minimum. The surveyed companies were located in Catalonia, the Basque Country and Madrid, which are the three autonomous communities in Spain with the highest rate of MS registrations (Heras and Casadesus, 2006). The motivation to perform the study in Spain is because it ranks in the top five countries with the most certifications. In 2009, the latest year for which data is available, Spain ranks fourth worldwide in the number of organisations holding ISO 9001 certificates, and third worldwide in terms of ISO 14001 registrations (see ISO, 2010).

The number of valid responses in the survey was 435. For the Catalan sample, two reminders were necessary and for the Basque Country and Madrid, all the responses were obtained in the first wave. Finally, the total number of valid responses was obtained, representing a response rate of 27%. This rate was considered good enough to conduct the research and no non-response analysis was realized. Therefore, this is one of the limitations of this study.



**Fig. 1.** Tested model analysing the relationship between integration difficulties and levels.

Table 2 sets out the key characteristics of the sample. Some of the surveyed organisations had also implemented other MSSs, in addition to ISO 9001 and ISO 14001. In particular, 75 organisations had implemented the OHSAS 18001 standard for the management of occupational health and safety and 47 also applied an MSS for corporate social responsibility (CSR).

With respect to the size of these organisations, 31.12% are small, having 50 employees or less. 38.72% are medium sized, with the number of employees between 51 and 250, while 30.17% are large, having more than 250 employees, according to the European Commission's classification (European Commission, 2003).

The survey asked for information on 16 different aspects of the integration of standardised MSs, such as the models used in the process (e.g., the Plan-Do-Check-Act cycle and process mapping), the integration of internal and external audits, the reasons for not integrating the implemented MSs in cases where they were left as separate, the level of integration of the IMS, the difficulties faced during the process, and the perceptions on the current and future use of MSSs. An initial descriptive analysis of the survey results in Catalonia appeared in Karapetrovic et al. (2006).

The current study focuses on two aspects from the survey, specifically:

- (1) An evaluation of a set of difficulties encountered during the process of integration. These were measured using a Likert scale from 1, meaning “unimportant” to 5, meaning “very important”. The variables included in the study are summarized in the Annex.
- (2) The level of integration achieved across the standardised MSs based on an analysis of the integration of system objectives, resources and processes (Karapetrovic and Willborn, 1998a, 1998b). These were measured following the levels of integration defined in Wilkinson and Dale (1999a); Kirkby (2002); Karapetrovic (2003); Pojasek (2006) “not integrated”, “partially integrated” and “fully integrated”.

Regarding the sample used in the study, two considerations were taken:

- (a) The sample comprises those organisations stating that they had integrated their standardised MSs to a certain level, i.e., either partially or fully (362 organisations from the total of 435). Bernardo et al. (2009) provide more information regarding the integration level. It is noteworthy to say that those organisations that had not integrated their management systems did not answer this question. They were asked about the reasons for not integrating and the main problems were related to the lack of resources and ignorance of the advantages (Bernardo, 2009);
- (b) The sample was divided into two groups depending on the number of management systems implemented.

Such grouping was performed because, as more MSs get implemented, it is likely that the organisations would face more difficulties during the integration process. The groups are:

**Table 2**  
Characteristics of the sample.

| Survey Aspect                         | Value     |
|---------------------------------------|-----------|
| Location                              | Spain     |
| Time period                           | 2006–2007 |
| Estimated population                  | 2530      |
| Sample size                           | 1615      |
| Number of valid responses             | 435       |
| Response rate                         | 27%       |
| Level of confidence ( $p = q = 0.5$ ) | 96%       |

Source: Bernardo et al. (2009, 2010).

1. Organisations with two standardised management systems (ISO 9001 and ISO 14001);
2. Organisations with three standardised management systems (ISO 9001, ISO 14001, OHSAS 18001 or CSRMSs).

The methodology used in the treatment of data involved three steps. The first step featured a descriptive analysis of each of the analysed variables. The second step applied an exploratory factor analysis to categorize variables into groups representing latent constructs or variables for the purposes of interpretation and treatment. The last step involved the use of structural equation modelling to analyse the relationship between the difficulties encountered during integration and the level of MS integration achieved.

A brief explanation of each step and for each group appears in the following section, along with the results obtained.

#### 4. Results

In order to reach the objective of the study, two different groups have been tested according to the number of MSs implemented.

The first group consists of 246 organisations that have implemented two MSs: a quality management system (QMS) and an environmental management system (EMS).

The second group comprises 82 organisations with three MSs implemented, namely a combination of a QMS, an EMS, an occupational, health and safety MS (OHSMS) and a corporate social responsibility MS (CSRMS). Specifically, 56 organisations had a QMS, an EMS and an OHSMS, and 26 had a QMS, an EMS and a CSRMS.

The main results for each step are presented and discussed next.

##### 4.1. Descriptive analysis

The results of the descriptive analysis are shown separately for each of the two variables studied. The aim of this analysis is to introduce the variables and to analyse them individually before relating them. Due to the large amount of information, only general considerations are presented. Similar results appear in Karapetrovic et al. (2006), involving the same empirical study that was, however, limited to the organisations located in Catalonia.

With respect to the difficulties posed by the process, organisations integrating their MSs rated the importance of a list of twelve difficulties on a Likert scale of 1–5. On this scale, “1” denoted “unimportant”, “2” indicated that a difficulty was rated to be “of little importance”, “3” was “important”, “4” meant “quite important”, and “5” denoted a “very important” difficulty. For ease of representation, the responses of “1” and “2” have been integrated into a single category labelled “not important”. The same is done for the ratings for “4” and “5”, which have been labelled together as “very important”. Finally, rating “3” is left unchanged, i.e., “important”. The first conclusion that can be drawn from Fig. 2 (where the first (top) horizontal bar corresponding to each difficulty relates to the group 1 (G1) organisations and the second (bottom) bar refers to the group 2 (G2) organisations) is that most of the difficulties presented in the questionnaire are valued as “not important” (as in Karapetrovic et al., 2006). The common “least important” difficulties are:

- Inadequate implementation of the first MS (as addressed in Zeng et al., 2007; Salomone, 2008);
- Lack of time for integration (see e.g., Asif et al., 2009).

In contrast, the two common difficulties in the “very important” category are:

- The differences between the models underpinning the standards (discussed by, e.g., Karapetrovic and Willborn, 1998b;

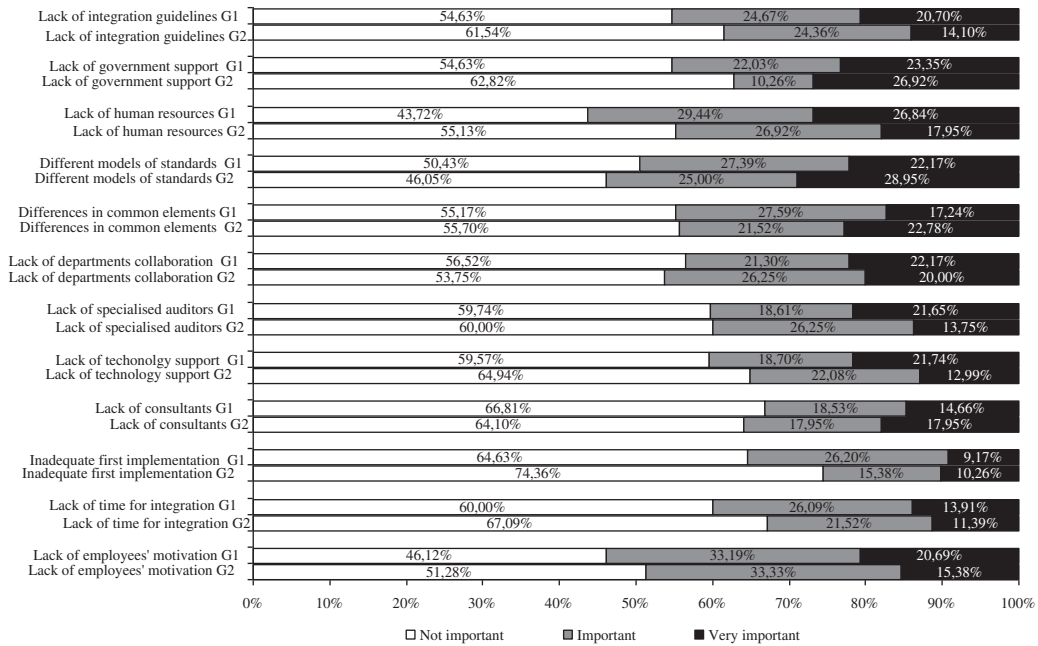


Fig. 2. Evaluation of difficulties during the integration process for groups 1 and 2.

Karapetrovic, 2003; McDonald et al., 2003; Beckmerhagen et al., 2003; Salomone, 2008).

- Lack of support from government (see, e.g., Zutshi and Sohal, 2005b).

Overall, as Fig. 2 shows, two difficulties were characterized as “important” by almost a third of the respondents, namely the “lack of human resources” and the “lack of employees’ motivation”. The issue of motivation was discussed, for instance, in Karapetrovic and Willborn (1998b); Matias and Coelho (2002); Zutshi and Sohal (2005b); Zeng et al. (2007); Asif et al. (2009).

With respect to the second aspect of the study, addressing the level of integration of standardised MSs, it was analysed in depth by Bernardo et al. (2009). In that work, the analysis focused on the level of integration of objectives, documentation and procedures used in the responding organisations’ MSs. The results are similar for both groups, with the most integrated objectives and documentation resources being the policy, objectives and the manual (Fig. 3, where the first (top) horizontal bar corresponding to each objective and documentation resource relates to the group 1 (G1) organisations and the second (bottom) bar refers to the group 2 (G2) organisations); and the most integrated procedures being

documentation and record control and internal communication (Fig. 4, where the first (top) horizontal bar corresponding to each procedure relates to the group 1 (G1) organisations and the second (bottom) bar refers to the group 2 (G2) organisations). As concluded in Bernardo et al. (2009), the results show a high level of integration and that organisations integrate more strategic procedures first.

The initial conclusions that can be drawn from this analysis are the low importance given by organisations to the various difficulties in the integration process, on one hand, and the high level of integration of their standardised MSs, on the other. However, this level of integration is higher for group 1 than for group 2, according to the available data. Therefore, one might expect that the difficulties affect the level of integration in the organisations from group 2 (with three MSs) more than in those from group 1 (with two MSs).

The next section discusses the exploratory factor analysis conducted prior to the application of structural equation modelling.

#### 4.2. Exploratory factor analysis

The exploratory factor analysis (EFA) sought to group the variables related to the difficulties and the level of integration of MSs in order to create a small number of unobservable latent variables.

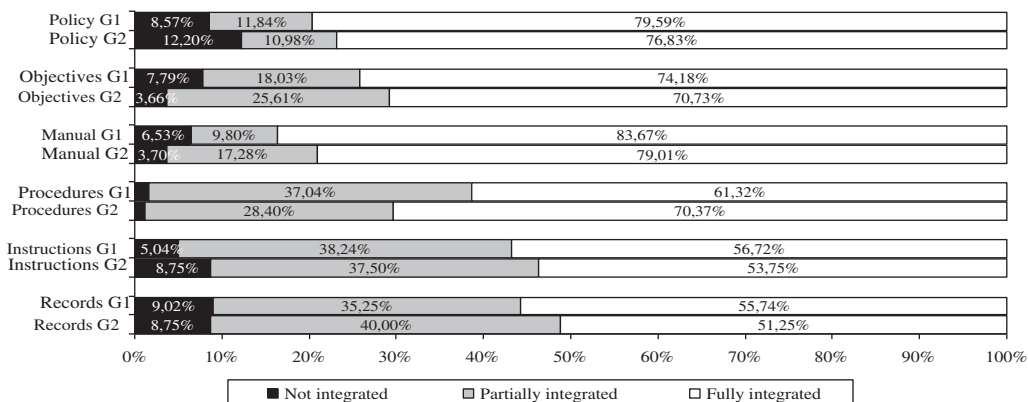


Fig. 3. Integration of objectives and documentation resources for groups 1 and 2.

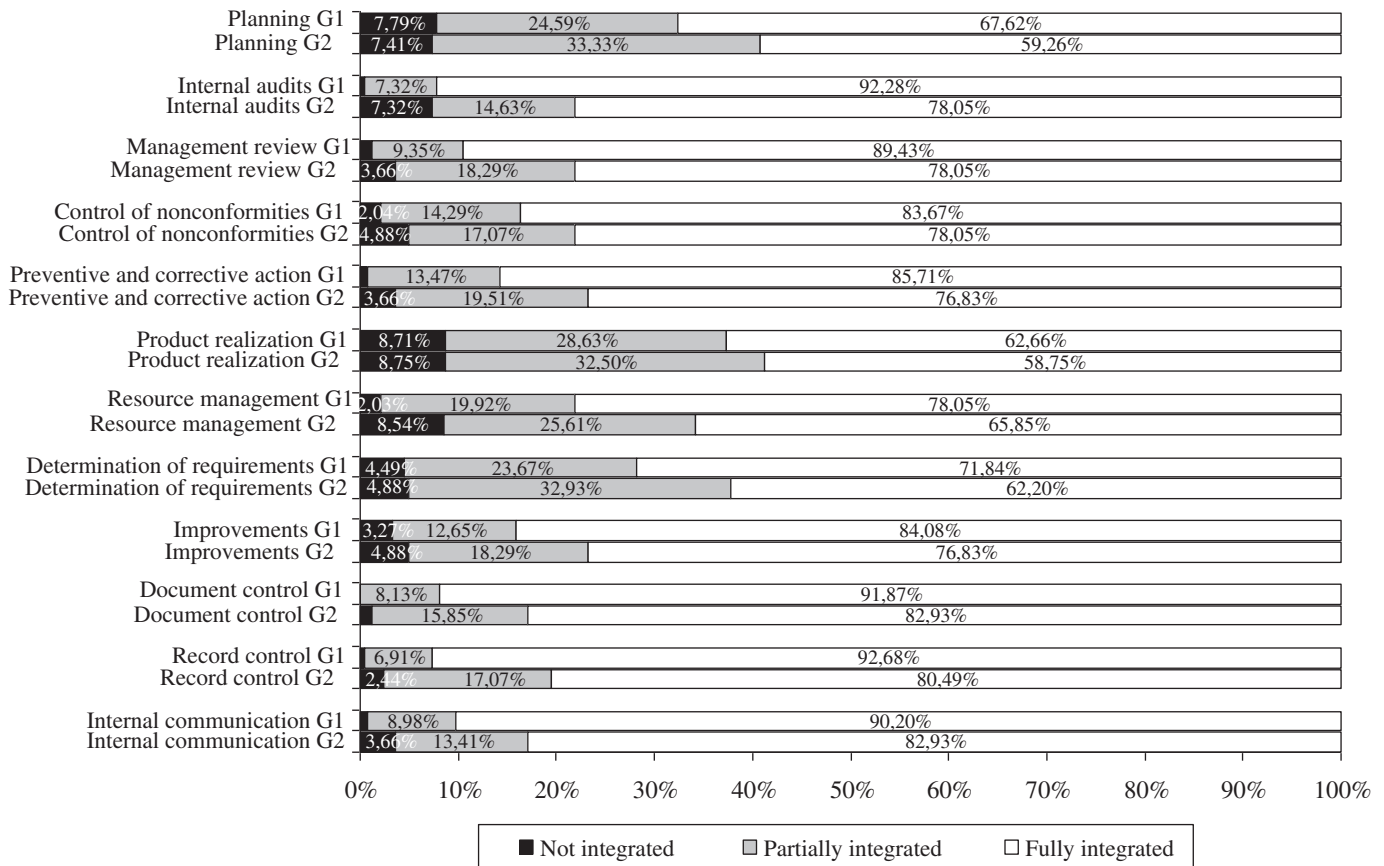


Fig. 4. Integration of procedures for groups 1 and 2.

The approach enables the related variables to be clustered according to a single theme or issue (Spearman, 1904).

As in the previous step, we performed two EFAs, one for each of the two sets of variables, namely the integration difficulties and the integration levels. In both cases, the analyses performed on the correlation matrix were the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test. When the level of significance of the former is 0 and KMO is higher than 0.7, the results confirm a linear dependence between the variables and support the view that the results are sound (Visauta, 1998). The criterion used to extract the factors was the Kaiser criterion, which enables retention of only those factors that show eigenvalues equal to or greater than 1 (Kaiser, 1960). These factors were extracted by applying the varimax rotation and obtaining weights for each factor in each of the variables. The total variance extracted is another important indicator, and the higher percentage of variance is extracted, the better is the fit. Finally, to demonstrate the internal consistency of each factor, Cronbach's alpha was calculated. When this indicator is above 0.6, the factor is consistent (Malhotra, 1996).

Tables 3 and 4 show the EFAs performed for both groups. The results confirm a linear dependence between the variables and support the view that the results are sound (Visauta, 1998), for each group. Table 3 shows the analysis for the integration difficulties. Regarding the factors extracted, both groups extract three factors, although the variables belonging to each factor are not the same for each group. Overall, these factors could be labelled in order as:

- Internal difficulties (variables related to the management of the organisation that the organisations could overcome by themselves);
- External difficulties (variables external to the organisation), and

- Difficulties with the standards (variables relating to the structure and the content of MSSs).

In addition, all factors are internally consistent, as all Cronbach's alpha values are above 0.6 (Malhotra, 1996). Regarding fit indexes, group 2 has a slightly better goodness of fit than group 1, considering that the former has a higher KMO value and extracts a higher percentage of total variance.

To some extent, this clustering differs from Zeng et al. (2007), who only considered internal and external factors. In the analysis performed for this article, "external difficulties" and "difficulties with the standards" could be considered as a single factor, as occurs in the Zeng et al. (2007) study. However, in the present analysis, they are statistically differentiated. That explains why an additional difficulty factor appears in comparison with the clustering in Zeng et al. (2007).

Table 4 shows the analysis of the level of MSs integration. In this case, there is a difference between the groups: group 1 extracted four factors and group 2 extracted three. An analogy between the integration of these procedures and the clauses from the ISO 9001 standard (ISO, 2008c) can be realized (as discussed in Bernardo et al., 2009), and is presented next to each factor. For group 1, the factors could be labelled as:

- F1: Documentation resources (Clause 4 of ISO 9001);
- F2: Control and measurement (Clauses 4 and 8 of ISO 9001);
- F3: Operating procedures (Clauses 5, 6, 7 and 8 of ISO 9001);
- F4: Strategic procedures (Clause 4 of ISO 9001).

For group 2, the factors could be labelled as:

- F1: Control and communication (Clauses 4 and 5 of ISO 9001);

**Table 3**

Results of the EFA of the integration difficulties for groups 1 and 2.

| Variables                                   | Group 1 |       |       | Group 2 |       |       |
|---|---------|-------|-------|---------|-------|-------|
|   | F1      | F2    | F3    | F1      | F2    | F3    |
| Lack of employees' motivation               | 0.815   |       |       | 0.780   |       |       |
| Lack of collaboration among departments     | 0.703   |       |       | 0.790   |       |       |
| Inadequate first implementation             | 0.640   |       |       |         |       |       |
| Lack of human resources                     | 0.559   |       |       | 0.643   |       |       |
| Lack of specialised auditors                |         | 0.803 |       | 0.673   |       |       |
| Lack of consultants                         |         | 0.777 |       |         | 0.704 |       |
| Lack of technology support                  |         | 0.619 |       |         | 0.794 |       |
| Lack of time for integration                |         |       |       | 0.463   |       |       |
| Lack of government support                  |         |       | 0.492 |         | 0.566 |       |
| Different models for standards              |         |       | 0.795 |         |       | 0.800 |
| Differences in common elements of standards |         |       | 0.763 |         |       | 0.789 |
| Lack of integration guidelines              |         |       | 0.637 |         |       |       |
| Eigenvalues                                 | 3.89    | 1.32  | 1.09  | 3.64    | 1.36  | 1.02  |
| Value of Cronbach's alpha                   | 0.703   | 0.723 | 0.694 | 0.758   | 0.602 | 0.623 |
| $\chi^2$                                    | 626.65  |       |       | 175.86  |       |       |
| p-value (level of significance)             | 0.000   |       |       | 0.000   |       |       |
| KMO   | 0.786   |       |       | 0.790   |       |       |
| Total variance extracted                    | 57.30%  |       |       | 60.11%  |       |       |

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalisation.

The rotation converged in five iterations.

- F2: Documentation resources (Clause 4 and 6 of ISO 9001);
- F3: Objectives, audit and review (Clauses 4, 5 and 8 of ISO 9001).

Both groups' factors have internal consistency, as all Cronbach's alpha values are above 0.6 (Malhotra, 1996). As for the integration difficulties, group 2 has slightly better goodness of fit than group 1, considering the values of KMO and the total variance extracted.

These extracted factors are not following the expected structured or classification, because according to Karapetrovic and Willborn (1998b), three factors should be obtained, one for the objectives, one for the resources and another for the processes. The MSS aspects have not been grouped according to the ISO 9001

clauses either, because some of them are mixed in the factors (see Gotzamani, 2010, for additional information about ISO 9001 clauses). This grouping could be explained by the different levels of integration of each aspect in each organisation (for additional information see Bernardo et al., 2009).

The application of a structural equation model is illustrated next. The aim of this model was to analyse whether difficulties encountered by organisations during the process of integration affected the level of integration of the MSs being integrated. The a-priori expectation, taking into account Figs. 2 to 4, is that group 1 results will not be significant, because the evaluation of difficulties made by participating organisations is very low and the integration level is very high. For group 2, difficulties are more highly valued

**Table 4**

Results of the EFA for the level of integration of standardised MSs for groups 1 and 2.

| Variables                         | Group 1 |       |       |       | Group 2 |       |       |
|-----------------------------------|---------|-------|-------|-------|---------|-------|-------|
|                                   | F1      | F2    | F3    | F4    | F1      | F2    | F3    |
| Working procedures                | 0.893   |       |       |       |         |       |       |
| Working instructions              | 0.860   |       |       |       |         | 0.843 |       |
| Records                           | 0.832   |       |       |       |         | 0.853 |       |
| Internal communication            |         |       |       |       | 0.797   |       |       |
| Documentation control             |         | 0.868 |       |       | 0.867   |       |       |
| Records control                   |         | 0.858 |       |       | 0.871   |       |       |
| Corrective and preventive actions |         | 0.598 |       |       |         |       |       |
| Control of non-conformities       |         | 0.512 |       |       |         |       |       |
| Product realization               |         |       | 0.802 |       |         |       |       |
| Resource management               |         |       | 0.688 |       |         | 0.679 |       |
| Definition of requirements        |         |       | 0.602 |       |         |       |       |
| Planning                          |         |       | 0.517 |       |         |       |       |
| Improvements                      |         |       | 0.441 |       |         |       |       |
| Policies                          |         |       |       | 0.775 |         |       |       |
| Objectives                        |         |       |       | 0.733 |         |       | 0.752 |
| Manuals                           |         |       |       | 0.612 | 0.615   |       |       |
| System review                     |         |       |       |       |         |       | 0.786 |
| Internal audits                   |         |       |       |       |         |       | 0.650 |
| Eigenvalues                       | 4.78    | 1.85  | 1.60  | 1.21  | 4.70    | 1.22  | 1.08  |
| Value of Cronbach's alpha         | 0.879   | 0.772 | 0.753 | 0.677 | 0.844   | 0.784 | 0.693 |
| $\chi^2$                          | 1456.70 |       |       |       | 397.06  |       |       |
| p-value (level of significance)   | 0.000   |       |       |       | 0.000   |       |       |
| KMO                               | 0.753   |       |       |       | 0.801   |       |       |
| Total variance extracted          | 62.93%  |       |       |       | 69.95%  |       |       |

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalisation.

The rotation converged in five iterations.

**Table 5**  
Goodness of fit indices for each group.

| Goodness of fit indices | Group 1 | Group 2 |
|-------------------------|---------|---------|
| CFI                     | 0.913   | 0.927   |
| RMSEA                   | 0.05    | 0.068   |
| $\chi^2$                | 293.811 | 75.627  |
| Degrees of freedom      | 194     | 57      |
| <i>p</i> -value         | 0.0000  | 0.04998 |

and the level of integration is lower. Therefore, the relationship could be significant. These expectations are reinforced considering the findings in Bernardo et al. (in press), because the conclusions of this study about the relationship between the integration level and the implementation strategy show that those organisations with two MSSs achieve higher levels of integration. The highest level is reached in those organisations implementing both standards simultaneously, followed by those implementing first the QMS and then the EMS (Bernardo et al., in press).

#### 4.3. Structural equation model

The application of structural equation modelling focuses on whether there is any relationship between the difficulties and the level of integration.

The first step was to perform a confirmatory factor analysis, for both models, using the structural equation modelling software “EQS” (Byrne, 1994). Applying the robust estimation method by maximum verisimilitude, the analysis first examined whether the difficulty factors fit the model well, and then whether the factors related to the integration of MSs also fit this model well, for each group. None of them was significant, meaning that the data cannot be extrapolated to the population and the results of the confirmatory factor analyses do not allow conclusions to be drawn from the model. That is, the following analysis must be considered only as exploratory, and not confirmatory.

To analyse the goodness of fit for each model, three main fit indexes have been studied: the Comparative Fit Index (CFI), the Root Mean-Square Error of Approximation (RMSEA), and the *p*-value of Satorra–Bentler scaled chi-square. A model fits well if the CFI is equal to or greater than 0.95, RMSEA is lower than 0.08 (Byrne, 1994; Hu and Bentler, 1999), and the *p*-value of Satorra–Bentler scaled chi-square is equal to or greater than 0.05. In addition, all variables should be significant to a confidence level of 5%. Table 5 shows the goodness of fit values for each group, where all variables are significant at this level.

For group 1, the relationship between the difficulties and the level of integration is not significant. The CFI value is lower than 0.95 and the *p*-value of Satorra–Bentler scaled chi-square is 0, thus lower than 0.05 (Table 5). These results allow us to conclude that those organisations of the sample with two management systems implemented, namely QMS and EMS, have no significant difficulty during the integration process that affect the integration level.

For group 2, as can be observed in Table 5, the CFI value is not significant (0.927), but the *p*-value of Satorra–Bentler scaled chi-square is 0.05 (rounded off). The reliability indexes are not

**Table 6**  
Loadings on integration difficulties and level of integration variables.

|                                 |   | Loadings <sup>a</sup> | R <sup>2</sup> |
|---------------------------------|---|-----------------------|----------------|
| Internal difficulties           | Lack of human resources                 | 0.634                 | 0.402          |
|                                 | Lack of collaboration among departments | 0.716                 | 0.512          |
|                                 | Lack of specialised auditors            | 0.681                 | 0.464          |
| Difficulties with the standards | Lack of time for integration            | 0.473                 | 0.223          |
|                                 | Lack of employees' motivation           | 0.615                 | 0.379          |
|                                 | Different models for standards          | 0.685                 | 0.470          |
| Documentation resources         | Differences in common elements          | 0.643                 | 0.413          |
|                                 | Working instructions                    | 0.904                 | 0.817          |
|                                 | Records                                 | 0.924                 | 0.853          |
| Objectives, audit and review    | Resource management                     | 0.478                 | 0.228          |
|                                 | Objectives                              | 0.396                 | 0.156          |
|                                 | Internal audit                          | 0.928                 | 0.861          |
|                                 | System review                           | 0.726                 | 0.527          |

<sup>a</sup> These are standardised loading estimates from Confirmatory Factor Analysis. All parameters significant at  $p < 0.05$ .

significant, meaning that the conclusions extracted must be taken with caution. Cronbach's alpha is 0.592 (lower than 0.6) and Reliability Coefficient Rho is 0.811 (lower than 0.9). This means that integration difficulties affect the level of integration in those organisations of the sample with three MSs implemented, namely QMS, EMS and OHSMS or CSRMS. But these results must be taken with caution because of the limitations in the goodness of fit and reliability. Fig. 5 shows the final significant model. Table 6 illustrated the model loadings.

Regarding the difficulties, those affecting the integration process are the internal difficulties and the ones related to the standards. External difficulties, such as the “lack of technology support”, “lack of consultants” and “lack of government support”, do not affect the level of integration of standardised MSs in the organisations of the sample (Fig. 5). For the difficulties, both types contribute almost the same, but the difficulties with the standards are slightly higher than the internal difficulties, meaning that those are the difficulties affecting more the integration level more. For the level of integration of MSs, those aspects affected by the integration difficulties are related to the documentation resources (working instructions and records and resource management), which are the most affected by the difficulties, and objectives, internal audits and system review, which are affected at a lower level. In contrast, documentation and record control, manuals and internal communication are not affected by the integration difficulties.

These results give organisations some difficulties to consider when they integrated more than two MSs (three management systems in our sample). If these organisations can overcome them, then the integration process could be adequately undertaken, meaning that organisations may be more efficient and can profit from the systems synergies.

The conclusions are presented next.

## 5. Conclusions

The objective of this article was to determine whether any relationship exists between the difficulties encountered by organisations during the process of integration and the level of integration of standardised MSs in these organisations. To test the hypothesis, we performed one of the first empirical studies focused specifically on this aspect of integration, namely the difficulties encountered during the process, using two groups of organisations located in Spain. Group 1 had 246 organisations with two MSs implemented and group 2 consisted of 82 organisations with three MSs. From the results, the following conclusions can be drawn.

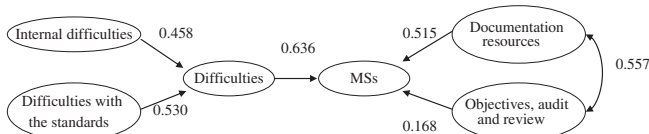


Fig. 5. Final model.



The first conclusion is that the difficulties of integration can be grouped in three large clusters, which are “internal difficulties”, “external difficulties” and “difficulties with the standards”. This clustering is an extension of the work in Zeng et al. (2007), who differentiate between internal and external difficulties. The difference is that the current clustering finds two differentiated types of external difficulties.

The second conclusion, related to the integration difficulties, is the low importance participating organisations give to these difficulties, with the least valued ones being the “inadequate implementation of the first management system” (Zeng et al., 2007; Asif et al., 2009) and “lack of time for integration” (Asif et al., 2009). The most valued are the “differences between the models underpinning the standards” (Karapetrovic and Willborn, 1998b; Karapetrovic, 2003; McDonald et al., 2003; Beckmerhagen et al., 2003; Salomone, 2008) and the “lack of support from government” (Zutshi and Sohal, 2005b).

The third conclusion concerns the clustering pertaining to the IMS. A high level of integration was found in both groups (similar to Bernardo et al., 2009), but group 1 presented higher levels than group 2, meaning that more MSs implemented could reduce the level of integration. Objectives, documentation resources and procedures were grouped into different factors according to the level of integration of standardised MSs. Group 1 had four such factors: (1) documentation resources, (2) control and measurement, (3) operating procedures, and (4) strategic procedures; while group 2 had three: (1) control and communication, (2) documentation resources, and (3) objectives, audit and review. In addition, these factors have analogies with the specific clauses of the ISO 9001 standard. For example, Clause 4 “Quality Management System” is the most represented in both groups.

Regarding the analysed models, different results have been obtained depending on the number of MSs implemented. For those organisations of the sample with two management systems (QMS and EMS), i.e., group 1, no relationship exists between the integration difficulties, on one hand, and the level of MS integration, on the other. This result was expected in that the descriptive analysis of the difficulty variables found very low values for their importance. One explanation for these values could be the effect of time. Although the dates when the sampled organisations started the integration process were not available, the responses obtained would appear to indicate that most of them had already reached the final stages of the process or had already completed it at the time of the survey. At the start of the integration process, the perception of the difficulties that would be encountered is probably much higher than it is later. With time, the relative gravity of the problem declines and it is not seen as very important. A similar effect appears in studies on the perception of the benefits from the implementation of the various standards (see, e.g., Gotzamani and Tsiotras, 2002; Casadesús and Karapetrovic, 2005). Another explanation is related to the increasing similarity between these two MSSs (see the comparison in ISO, 2008c), and the experience that organisations have in managing them.

On the other hand, for group 2, i.e., organisations with three MSs implemented (QMS, EMS and OHSMS or CSRMS), a significant relationship exists between difficulties and integration levels, although it has to be discussed with caution. This model holds that “internal difficulties” and “difficulties with the standards” are the factors with the greatest effect on the process, and affect specific elements of the MSs, such as the documentation resources, objectives and the procedures related to internal audits and management system reviews. These difficulties receive most comments in the literature. For example, the attitude and motivation of people

already feature in Matias and Coelho (2002); Zutshi and Sohal (2005b); Zeng et al. (2007); Asif et al. (2009). This is also the case with the lack of resources (see, e.g., Asif et al., 2009). For “difficulties with the standards”, comments appear on the differing models (see, e.g., Karapetrovic and Willborn, 1998a; Beckmerhagen et al., 2003; Karapetrovic, 2003; McDonald et al., 2003; Salomone, 2008), and the differing common elements (see, e.g., Matias and Coelho, 2002; Karapetrovic, 2002a, 2003; Beckmerhagen et al., 2003).

These results could be useful for organisations wanting to integrate their MSs, for example by putting more effort into managing internal difficulties, which organisations can overcome by themselves, and the difficulties with the standards, trying to better understand the structure and aspects of the MSSs, especially the ones related to documentation resources, objectives, internal audits and management review. The main suggestion to overcome the internal difficulties, although it would be difficult because a cultural change is needed, is training and education of all the employees at all hierarchical levels, in order to improve their understanding of the process and thus, their motivation. To make departments collaborate. could be realized internally by the IMS manager, or for those companies that can afford it, by contracting a qualified consultant to help them. To overcome the difficulties with the standards, again, the main solution is training the people who are managing them. The difficulties based on the differences in common elements will probably be reduced because of the compatibility analysis that the standard provides (ISO, 2008c) and the ISO handbook (ISO, 2008a). Both practitioners and academics can help in overcoming these difficulties by training organisations with their knowledge.

For those organisations with two MSs implemented, namely QMS and EMS, which are willing to integrate them but have not initiated the process, the results of this study show that the integration difficulties when integrating these two MSs are not hindering integration, and that they can undertake the process without important problems. In contrast, the organisations with three MSs (QMS, EMS, OHSMS or CSRMS) may face difficulties during the integration process, related to internal organisation and to the standards that will condition the integration level of some components of the management system. If organisations are aware of the integration difficulties, they will face the integration process more prepared and the probability of finishing the process successfully will increase, and training the personnel could help in this challenge. This can make organisations more efficient and competitive. Another implication pointed out in this study, important for organisations, is that the level of integration of MSs is higher in organisations with two management system than in those organisations with three (as also found in Bernardo et al., in press). This is probably related to the difficulties faced during the integration process. The more known these difficulties and their impact on the integration process are, the less valued they will be, making the integration easier and allowing organisations to achieve fully integrated management systems.

The main limitation of this study is the sample itself, as the models obtained are only exploratory and these results cannot be extrapolated to other regions of Spain or other countries. Additional limitations related to the previous one are the non-response analysis as the response rate was considered good enough, and the low reliability of the model, because, as commented, the results and conclusions must be taken with caution.

Lastly, the principal subject matter of future research is to analyse the benefits obtained from integration, i.e., analyse whether the anticipated benefits are actually obtained. With this data, we should be able to compare difficulties and benefits of

integration to demonstrate empirically that the latter are greater than the former.

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## List of acronyms

|       |   |
|-------|---|
| ISO   | International Organisation for Standardisation    |
| MS    | Management System                                 |
| MSS   | Management System Standard                        |
| IMS   | Integrated Management System                      |
| QMS   | Quality Management System                         |
| EMS   | Environmental Management System                   |
| OHSMS | Occupational, Health and Safety Management System |
| CSRMS | Corporate Social Responsibility Management System |
| PDCA  | Plan-Do-Check-Act                                 |
| EFA   | Exploratory Factor Analysis                       |
| KMO   | Kaiser-Meyer-Olkin                                |

## Annex

| Difficulties in the theoretical model | Main authors  |
|---------------------------------------|---|
| Lack of integration guidelines        | Zutshi and Sohal (2005b); Karapetrovic et al. (2006)  |
| Lack of government support            | Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Zeng et al. (2007)  |
| Lack of human resources               | Karapetrovic (2002a); Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Asif et al. (2009)  |
| Different models of standards         | Karapetrovic and Willborn (1998a); Karapetrovic (2003); McDonald et al. (2003); Karapetrovic et al. (2006); Salomone (2008)   |
| Differences in common elements        | Karapetrovic and Willborn (1998a); Matias and Coelho (2002); Beckmerhagen et al. (2003); Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Zeng et al. (2007); Asif et al. (2009) |
| Lack of departments collaboration     | Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Asif et al. (2009)  |
| Lack of specialised auditors          | Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Kraus and Grosskopf (2008)  |
| Lack of technology support            | Karapetrovic et al. (2006)  |
| Lack of consultants                   | Zutshi and Sohal (2005b); Karapetrovic et al. (2006)  |
| Inadequate first implementation       | Karapetrovic et al. (2006)  |
| Lack of time for integration          | Wilkinson and Dale (2000); Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Zeng et al. (2007); Salomone (2008)  |
| Lack of employees' motivation         | Matias and Coelho (2002); Beckmerhagen et al. (2003); Zutshi and Sohal (2005b); Karapetrovic et al. (2006); Zeng et al. (2007); Asif et al. (2009)                                    |

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