Title: Guiding principles of Integrated Management Systems: towards unifying a starting point for researchers and practitioners

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Guiding principles of Integrated Management Systems: towards unifying a starting point for researchers and practitioners

Abstract

The Integrated Management System (IMS) seems to be a suitable strategy to manage multiple systems that have to meet the needs and expectations of various stakeholders. The main objective of this research is to establish the guiding principles of IMS and the essential elements for its development and maintenance in order to move towards unifying a starting point in the literature. This objective was reached through a systematic content analysis with focus on the content analysis of the most cited articles of Scopus and Web of Science databases from 2006 to 2016. The results indicate the existence of 28 elements for development and implementation of IMS. Through the critical analysis of these elements 6 principles of IMS were systematized: 1) Systemic Management; 2) Standardization; 3) Strategic, tactic and operational integration; 4) Organizational learning; 5) Debureaucratization; and 6) Continuous Improvement. Each principle is a pillar for development and maintenance of IMS. The scientific contribution of this study is that it represents a starting point towards the establishment of the IMS theory. Moreover, taking into account these results one can homogenize the basis of IMS, providing research results with a higher degree of comparability. The results of this work may also help company managers better target their efforts in the management of the IMS, serving as a guideline to assist them in developing and maintaining each one of the abovementioned pillars. The best of the authors' knowledge, this is one of the first attempts to unify the literature.

Keywords: Integrated management systems, Literature review, Principles.

1 Introduction

The globalization of the economy, the increased competition in the market and the financial crises have conditioned organizations to operate in a competitive, uncertain and turbulent environment (Oliveira, 2013). To survive in this scenario, companies need to meet the demands of their consumers, who are increasingly expecting improved products and services in terms of price and quality; and other stakeholders, who generally expect a greater companies' commitment to ethics, human beings and the environment (Delai and Takashi, 2013; Oliveira, 2013). In order to meet this wide range of stakeholders' needs, companies have increasingly implemented management systems (MSs), with emphasis on Quality Management Systems (QMS), Environmental Management Systems (EMS), Occupational Health and Safety Management Systems (OHSMS) and, more recently, Corporate Social Responsibility Management Systems (CSRMS) (Klute-Wenig and Refflinghaus, 2015; Abad et al., 2016).

Inasmuch as more systems are deployed and maintained, management as a whole becomes more difficult due to the greater number of activities to be managed, which can lead to problems in their execution and control, excessive bureaucracy, high costs, etc. (Sampaio et al., 2012; Oliveira, 2013). Faced with this and considering the similar structure that the aforementioned management systems were designed, the Integrated Management System (IMS) is seem to be a suitable strategy for the management of multiple needs and expectations of stakeholders (Abad et al., 2014). In an IMS, the elements and functions that are common to the various systems (QMS, EMS, OHSMS, CSRMS, among others) could be gradually integrated in order to ensure a more efficient management, that is, that saves resources, time and reduces efforts by eliminating duplication of tasks, procedures and other bureaucracies (Zeng et al., 2011; Nunhes et al., 2016). The studies on IMS began before the 2000s (e.g., pioneers Zwetsloot, 1995; Karapetrovic and Willborn, 1998) and

since then it has been developed in a basically progressive way, with many researches being published on this subject every year (Domingues et al., 2017; Bernardo et al., 2017).

Recently this area has reached a significant level of development. The studies directed to IMS have gone, in large part, to present approaches to amalgamate the knowledge generated in the last two decades. According to Domingues et al. (2017) this analysis of successful cases, evolutions, discussions, etc. are extremely necessary so that benchmarking can be promoted and thus solid foundations for the development of the IMS area can be built. Some articles recently published in this line include the development of a model to assess the maturity level of IMSs (Domingues et al., 2016), the presentation of a theoretical overview on the evolution of IMS research and opportunities for future studies (Nunhes et al., 2016); the literature review conducted specifically to identify IMS benefits and difficulties (Bernardo et al., 2015); and the empirical analysis on IMS from the perspective of companies located in different countries and from various sectors and sizes (Bernardo et al., 2017; Moumen and El Aoufir, 2017; Gianni et al., 2017).

One can observe in the literature the identification of some structural elements, such as critical success factors (Rebelo et al., 2016; Lopez-Fresno, 2010; Santos et al., 2017) and key drivers (Griffith and Bhutto, 2008; Sampaio et al., 2012; Moumen and Aoufir, 2017) to provide some starting point for the development of researches. However, we observed that these elements were not systematically identified in the literature, which resulted in scattered bases that vary significantly from study to study. In this study we try to move towards a unification of the bases of the IMS from a theoretical perspective. The research question that guided this study is as follows: “What are the guiding principles and the essential elements for IMS development and maintenance?”. The objective of the study is to establish, through a systematic content analysis focusing on the 30 most cited articles from 2006 to 2016, the guiding principles of IMS and the essential elements for its development and maintenance in order to move towards unifying a starting point in the literature.

In the sequence, a synthesis of the theoretical framework on IMSs will be presented, followed by the research method section and the section of results and discussions, which will address the process of systematizing and discussing the guiding principles of IMS in the light of the scientific theory and empirical studies published. The conclusions section closes the paper.

2 Literature Review on Integrated Management Systems

IMS interconnects a set of processes through sharing information, human and financial resources and infrastructure in order to satisfy the needs of different stakeholders (Bernardo et al. 2016; Kopia et al., 2016). It has been much discussed in the academic community of management systems, and as a result, a wide field of research in this area has been developed (Nunhes et al., 2016; Domingues et al., 2017; Bernardo et al., 2017). Pioneering studies such as Zwetsloot (1995) and Karapetrovic and Willborn (1998) pointed out that the areas that comprise the management systems influence each other. Therefore, the individual optimization of the systems is, at its best, a sub-optimization if evaluated from a broader managerial perspective.

Griffith and Bhutto (2008) point out that the needs of the corporate business are holistic and for this reason, it is necessary to rethink the IMS system's focus in accordance with these various needs. Asif et al. (2009) developed a systemic approach for IMS that is supported by the top management through the inclusion of integration elements in strategic planning, in resource allocation process, in promotion of organizational culture, and in the joint design and management of key processes. According to Lopez-Fresno (2010) the holistic view of the IMS is important to achieve the objectives in a joint and integrated manner, reducing the chances of having a functional and restricted approach, which could hamper the development of the IMS.

Standardization helps ensure the unity of the IMS and is supported by the common structure of the various management system standards, which are identical in nature and share key concepts that facilitate the implementation and integration of other systems. The integrated management of the common elements strengthen the system uniformity (Jørgensen, 2008). The elements and functions

most commonly integrated are manuals, policies, objectives and goals, structure and responsibilities, top management, work instructions, document and record control, training, internal communication, emergency response, performance indicators, nonconformity management, control of monitoring and measuring equipment, preventive and corrective actions, internal and external audits and critical analysis (Santos et al., 2013; Nunhes et al. al., 2017). Other activities and operations that are not possible to be integrated should be, whenever possible or desirable, redesigned in such a way that they become synergic with the integrated elements and functions (Asif et al., 2010; Oliveira, 2013).

The IMS literature has shown that the integration of common elements to the systems can help reduce bureaucracy resulting from the management of isolated functions (Asif et al., 2010; Santos et al., 2011; Nunhes et al., 2017). The elimination of excessive bureaucracy from the processes improves the work of the employees and stimulates the teamwork (Asif et al., 2010; Oliveira, 2013).

Bernardo et al. (2015) conducted a literature review in the Web of Science, Science Direct, Scopus and Emerald databases to identify the benefits and difficulties arising from implementation and use of IMSs. In all, 18 empirical articles were analyzed and the results showed that the companies which integrate their management systems have obtained more benefits when compared with companies that choose to manage the systems separately. Among the IMS benefits highlighted in the studies by Abad et al. (2014) and Bernardo et al. (2015) are: improvement in efficiency through optimization of resource use, time, etc.; improvement in capacity to meet customer needs; higher level of employee satisfaction, which involves improvement in motivation, organizational climate and capacity for teamwork; improvement in communication and knowledge sharing; improvement in the systematization of procedures, work instructions, definition of responsibilities, etc.; reduction of bureaucracy; improvement of the organizational image and market competitiveness and better relationship with stakeholders.

Regarding the difficulties faced in implementing IMSs, Simon et al. (2012) verified four main clusters of difficulties, which are: lack of resources for integration; difficulties with the implementation and certification of management systems according to standards; internal difficulties; and difficulties of understanding and use of norms by employees. The first cluster of difficulties is related to the lack of resources such as financial capital, knowledge, technology, time, consultants, specific guidelines for systems integration, etc. (Simon et al., 2012; Bernardo et al., 2012). Faced with these impossibilities, the integration of the management systems is carried out to a limited extent, based on the managers' own experiences, which although committed to the project, often do not have the necessary know-how to implement the IMS, train employees to be knowledge multipliers, create means to spread the new IMS culture in the company, etc. (Asif et al., 2009; Oliveira, 2013).

As to the second cluster, the difficulties are related to the dissimilarities that still exist among the standards and that complicate the integration (Abad et al., 2014). With regard to the internal difficulties, it is important to note that organizations traditionally maintain working groups separated, and their integration can generate cultural conflicts, resistance to change and communication, etc. (Zeng et al., 2008; Bernardo et al., 2012). The fourth cluster is related to the difficulties arising from the lack of motivation, attitude and expertise of the employees in using the standards, which can also affect the execution of the tasks in an integrated way (Simon et al., 2012; Bernardo et al., 2012).

IMS needs strategic support from IMS models and methodologies to help companies to achieve the expected results (Karapetrovic and Casadesús, 2009; Oliveira, 2013). In order to be a basis for IMS, the model have to: a) provide the foundation to integrate the common elements of different management systems, b) be generic and applicable to all types of organizations and accommodate the further integration of other management systems into the IMS, c) be flexible to meet the multiple needs of IMS systems, d) be compatible with individual systems management models (such as PDCA) in order to facilitate the transition to IMS, and e) be supported by related methodologies to manage the IMS (Jonker and Karapetrovic, 2004).

Both academics and certification bodies have proposed models and methodologies for IMS implementation considering its main purposes and objectives (Bernardo et al., 2012; Oliveira, 2013; Domingues et al., 2015). The implementation and use of different methodologies lead companies to achieve different results and levels of integration (Domingues et al., 2016). The lack of a common understanding on the main aspects of integration to avoid this type of disparity is pointed out by Nunhes and Oliveira (2018).

Asif et al. (2009) presented an overview of some strategies for IMS implementation and pointed out that they are largely limited. The authors argued that the IMS models reviewed were supported by incomplete methodologies for MSs amalgamation. They are inapplicable to certain situations, such as when the organization has no management system implemented and fail to explain where the integration process should start from, what to do and how to do. Karapetrovic and Willborn (1998) suggested that the IMS models and methodologies could be based on a systems approach. Wilkinson and Dale (1999), in turn, suggested that the IMS implementation could be based on standards, the total systems approach, the TQM, and based on the EFQM model combined with the Total Quality philosophy.

To verify whether these recommendations were considered to base on the subsequent IMS models and to identify whether other alternatives than these were used, we conducted a review on the main researches that presented models for IMS implementation and assessment (Table 1).

Table 1

The models for IMSs design, implementation and assessment were largely based on the standards ISO 9001, ISO 14001, OHSAS 18001, the ISO High Level Structure (more recently) and other ISO guides, as can be seen in Table 1. Wilkinson and Dale (1999) highlighted that the use of standards as a basis for the design of integration models can limit the models developed for two main reasons: 1) standards do not address the organizational culture and 2) the addition of other standards increases the complexity of the model. Regarding the first question raised by Wilkinson and Dale (1999) and corroborated by Jørgensen (2006), it is argued that the new versions of ISO 9001 and ISO 14001 standards (both published in 2015) are already leading the top management to reflect on the understanding the organization and its internal and external context (ISO, 2018). The ISO structure began to suggest, albeit timidly in the notes to users, that the values and organizational culture can be considered in the analysis of the internal context.

Jørgensen (2006) pointed out that the management model of ISO 14001:2004 left something to be desired as it did not approach the stakeholder engagement and the product chain. However, over the years there has been a global trend towards the institutionalization of sustainable development in business processes and a greater engagement in dealing with social and environmental responsibility issues has been noticed. Now the need for organizations to understand the needs and expectations of interested parties is a mandatory requirement of ISO 9001, ISO 14001 and ISO 45001 (occupational, health and safety MS). In addition, ISO 14001:2015 recommends that organization should consider a life cycle perspective when determining environmental aspects (ISO, 2018).

Several models were based on the PDCA methodology (Labodová, 2004; Jørgensen, 2006; Rebelo et al., 2014; Majerník et al., 2017) and the ISO high-level structure (Majerník et al., 2017). The Annex SL (or ISO high-level structure) is the new structure present in ISO standards. It is divided into 10 chapters that aims to improve the integration between the ISO family management standards (ISO/IEC, 2016). The ISO high-level structure is already present in the ISO standards that had revisions published from 2015 onwards, such as ISO 9001 and ISO 14001 (both revised in 2015) and ISO 45001 (published in 2018).

Fonseca (2018) emphasizes that the integration approach present in the revised versions of ISO has been received in a positive way by the companies that see integration an alternative that can

bring them benefits. The adoption of new terminologies and the introduction/reinforcement of approaches to revised ISO standards are important points to be discussed. With regard to terminology, it is noted that there is no longer the term "exclusions" and "management representative"; the term "products" has been replaced by "products and services"; documented records, procedures, among others documents are now referred to "documented information"; "work environment" changed to "environment for the operation of process ", "purchased product" changed to "external provider" and "supplier" changed to "external provider" (Fonseca, 2015). Regarding the introduced/reinforced approaches, the revised versions of ISO standards highlight the importance of Risk-Based Thinking, Interested Parties, Change Control, Strategic Direction, Knowledge Management and Leadership (Nunhes e Oliveira, 2018).

The ISO high-level structure (HLS) is gradually being included in the ISO revised standards in order to make the management systems compatible, and linking them to the PDCA methodology phases, where Plan comprises the ISO clauses 4, 5, 6, 7; Do - clause 8; Check - clause 9 and Act - clause 10 of new the standards with the HLS structure (Rebelo et al., 2014; Majerník et al., 2017; ISO, 2018). In view of all these changes, one can note a significant evolution of the ISO standards model to a more suitable structure for integration. Although the latest ISO standards still present some limitations concerning organizational culture, it is argued this model will probably continue to be used as a basis for the development of future IMS strategies.

Only the model proposed by Rocha et al. (2007) was elaborated considering the systems approach base, which was also suggested by Karapetrovic and Willborn (1998). In the systems approach, the organization is considered as a single system, in the various areas are derivations of this system adapted to meet the needs and expectations of its stakeholders. The system is top-down viewed, so that top management is the first to commit to the IMS and to make the necessary efforts for the members of the system also identify and commit to the project (Jonker and Karapetrovic, 2004).

According to Wilkinson and Dale (1999) the systems approach involves the study of the social and technical elements of the single system. The authors argued that the Karapetrovic and Willborn (1998)’s model does not make it clear how to approach the social elements of the systems approach (e.g orgnizational culture), focusing only on the technical elements through ISO standards. When analyzing the model proposed by Rocha et al. (2007), which was based on a systems approach, it was verified that the organizational culture and other social/sustainability issues are more clearly addressed in the 7 principles of the model (stakeholders, resources, leadership, processes, values, objectives and resources). The authors advocate that the model based on the systems approach allows the integration of sustainability in the company's business processes. Although they make it clear that they based the model (and the principles) on the systems approach, there is no information on what was the method that led to the composition of the 7 principles used in the study.

Domingues et al. (2016) used three axes of elements to compose the base of their maturity model for IMSs. The first axis comprises a set of 21 key process agents, which were first identified in the literature and then validated by two surveys. The second axis approaches the so-called externalities, which are external features that impact the maturity level of the IMS. Four externalities were identified from the literature review: macro ergonomics, life cycle analysis, successful sustainability, and social accountability. The third axis of the model is based on the following eight excellence management pillars: customer focus, leadership, involvement, process approach, systemic approach, continuous improvement, decisions based on evidences and mutual beneficial relationships.

The review presented in this section is in line with the results of Nunhes and Oliveira (2018) in the sense that the integration models is an important research area in IMS. It is under development and began to contemplate sustainability issues, especially in the social pillar.

With respect to the model proposed by Domingues et al. (2016), although the authors acknowledge the literature review of their study was performed through a theoretical sampling that considered "the topics closely related to the specific topic IMSs", this choice limited the model, since the literature review was restricted to the analysis of only 13 articles.

The theoretical framework and literature reviews conducted in the studies do not cover a complete analysis of the state-of-the-art of IMS, focusing on a few studies, which compromises its use as a basis for the development of models. The academic bases used to develop the models are from IMS-related areas, such as risk management (Labodová, 2004), management excellence (Asif et al., 2009; Tarí and Molina-Azorín, 2010), etc. Going beyond this finding, we conducted a search to verify the principles of other areas that have been explicitly cited in the IMS literature. The results of this search are shown in Table 2.

Table 2

An analysis of Table 2 shows the important relationship of the IMS areas with other disciplines, whereas makes explicit the lack of specific IMSs principles to assist the development of new studies and the proliferation of the own theory of IMSs in the academic community in a unified way. It is necessary to go beyond the use of the general principles of management or common principles to the management systems. The knowledge of the IMS theory itself should be used to propose its own principles.

3 Research method

This section presents information about the methodological choices used in the study, the classification of the research and its methodological flow (Figure 1).

Figure 1

The description of the methodological flow shown in Figure 1 is as follows:

- *Theme, Objective and Research Method*

The first step to perform the research was the establishment of the key elements needed to prepare the project, such as the definition of the theme in view of its relevance and originality, objective, delimitation and justification. The potential of the theme was perceived by means of a search conducted in the Scopus and Web of Science databases (the most important databases in IMS area), from which it was noted that the proposal to systematize the IMS principles had not been explored by means of a content analysis. From this, the authors defined the purpose of the study, which is to establish, through a systematic content analysis and focusing on the 30 most cited articles from 2006 to 2016, the guiding principles of the IMS and the essential elements for its development and maintenance.

This study was delimited to be theoretical with a qualitative approach. It aims to provide greater familiarity with the problem, explaining scientifically the characteristics of the phenomenon observed (Miguel et al., 2012). The qualitative approach was developed through the systematic content analysis, which is a method widely used in review papers (e.g. Moldavska and Welo, 2017; Park and Park, 2017; Xia et al., 2018). It consists of a systematic reading and classification of material using the codification to identify themes and patterns (Moldavska and Welo, 2017). Systematic content analysis is used for interpretation of text data, enabling to clarify the reader how the connections between the data and the results were made (Elo et al., 2014). In order to comply with these requirements, the method used to perform the systematic content analysis in this study is

presented in this section in detail, giving emphasis to the steps of collection, coding and evaluation of the material to explain how the principles were systematized.

Content analysis can be performed by means of deductive and/or inductive approaches. In the case of deductive approaches categories are assessed based on existing theories, looking for testing hypotheses or principles (Bengtsson, 2016; Seuring and Gold, 2012). This study, however, is in line with the purpose of inductive approaches, through which categories are proposed from the material under examination itself (Seuring and Gold, 2012). There is a wide range of methodological possibilities for developing such a study. However, the method of systematic content analysis (inductive) was chosen as more appropriate for this work considering the current fragmentation of the state of state-of-art in IMS. Therefore, the process of systematization of the principles fulfills the requirements of the inductive content analysis because categories were created from raw data, since there are no previous studies dealing with the phenomenon and because the knowledge is fragmented (Moldavska and Welo, 2017).

There is no "common recipe" to perform inductive content analysis, and for this reason, the reliability of the analysis can be improved from a detailed description of the steps of preparation, organization and assessment of the results (Elo et al., 2014; Moldavska and Welo, 2017). In this way, we describe here and in the following topics of this section the step-by-step of the study, highlighting the method used to perform the content analysis.

– *Literature Review*

The literature review has the purpose of acclimating the reader with the theme IMS and with the proposal of this study. This section begins with the presentation of general and important topics about IMS and then, it focuses on the critical review of the models for IMS implementation, addressing the principles and bases used to develop them. This step was important to support and justify the subsequent stages of the study.

In order to carry out a trustworthy review of the literature, the most cited articles and also the most recent papers published in journals of relevance in the IMS area were prioritized, such as the TQM Journal, Journal of Cleaner Production, Quality Progress, the Journal of Environmental Management, Environmental Quality Management, among others (Nunhes et al., 2016).

The most cited articles are those cited in other articles published in journals indexed in the Scopus and Web of Science databases. The criterion of using the most cited articles was adopted considering that they were the most pulverized knowledge in the literature on IMS, being used in the development of the state-of-the-art in this field. Therefore, the most cited articles are relevant sources to be used to provide the reader an acclimatization on the subject approached in the paper.

– *Material Collection*

After conducting the literature review, the first stage of the content analysis was developed. It consisted of the collection of material (articles and reviews) used in the systematization of the principles. The search for the articles and reviews was carried out in the Scopus and Web of Science databases on 02 May 2017, using the term "integrated management system*s" and its variations, such as “management system integration”, “integration of management systems”, “management systems” and “integration” in titles, keywords and abstracts. The result was limited to articles published from 2006 to 2016, because it was a period in which the highest number of papers was verified. Another filter used was the document type (articles or reviews only) and the language (English only).

The search with the refinements of the filters resulted in 196 articles in Scopus and 161 in Web of Science. Scott (2006) warns that whenever possible content reviews should include a wide range of relevant sources. Therefore, the 196 and 161 articles of Scopus and Web of Science were ranked in descending order of citations and among them we excluded articles that were out of the scope of the study according to the three researches’ screening with background in IMS. After

applying these filters, the 30 most cited in IMS from 2006 to 2016 were selected to compose the portfolio of documents used in the content analysis of this study. Most articles contemplated in the literature review (previous step) were also contemplated in the content analysis because they were in the top 30 most cited articles.

Table 4 presents information on this portfolio. The content analysis method suggests that the main documents of the sample should be selected and effectively analyzed according to a selection criterion. In this study, the 30 most cited articles were the ones that most pulverized their contributions in the literature on IMSs (together they add up to more than 1400 citations). For this reason, the results of these articles had a significant impact on the development of the state-of-the-art of the IMS field. Although the other papers also presented their contributions, they received considerably smaller numbers of citations (at the time of the search, less than 20 citations). This indicates that their results had a smaller impact in terms of effective use in advances in the IMSs field. Therefore, as a matter of feasibility of analysis and focus on the most impactful studies, we decided to select the articles presented in detail in Table 3.

Table 3

The articles used in the content analysis are concentrated in certain journals, however, the sample is the result of a general search in which the impact of articles in the IMS area was prioritized in terms of the number of citations. Thus, the articles with the greatest impact considered in this study are those that, independently of the published journal, had a greater importance over the period analyzed in the development of the state of the art of IMS. The journals that contributed most significantly to the portfolio reach a considerable range of readership, which has led to the pulverization of the results in many other journals.

– *Coding and Material Evaluation*

The 30 articles in the portfolio were coded with a numeric identifier (from 1 to 30) that represents the identity of an article analyzed. It was performed an initial analysis of these articles selected for content analysis to examine the journal it was published, the number of citations received until May 2017, the research method and the main conclusions.

Content analysis seeks to identify in a document the frequency with which categories of a particular subject are addressed. They may vary from study to study, according to the researcher's assumptions and the nature of the research (Scott, 2006). The IMSs elements were identified in the portfolio of articles, and the frequency in which they are cited in the 30 articles was verified, as shown in Table 4.

Table 4

The literature on content analysis suggests that only the researchers themselves have the ability to understand, analyze and evaluate the results obtained adequately. Otherwise, the inclusion of external participants to the research to verify and analyze the results may threaten its validity. The dialogue between co-researchers is often recommended when it comes to qualitative content analysis (Morse et al., 2002; Elo et al., 2014). Considering this, the identification of the elements was developed with the participation of all the authors of this article, who have great experience in research on IMS.

The identification of the elements was performed in a manual and extremely careful way. The authors first carried out an in-depth reading of the texts, in which they analyzed methodology, main insights, contributions and conclusions of the 30 articles of the portfolio. These and other details about the articles used as basis for developing the principles are in Table 3.

Several notes of the articles were taken and interpreted. The development of this stage was led by a researcher with background in content analysis, while the other two researchers (with expertise in research on IMS) focused on performing the analysis of the relevant selected papers. The elements identified by each researcher were discussed in some weekly meetings until the result presented in this work was reached.

Encoding was also used to assist in the representation of IMS elements. At first, the code labels of the elements were extracted directly from the articles. After, the codes which had similar meanings were revised and renamed to become a single element. This process was based on the authors' understanding and experience in order to avoid redundant information. The elements identified in the articles received 28 unique numerical identifiers (from 1 to 28), as can be seen in Table 4. This encoding was used to reference the articles and the elements in all subsequent analyzes of the study.

Once identified these elements, their cross analysis was carried out to identify how many and which articles have mentioned each element. The elements that had the highest frequencies in the content analysis led to the formation of the principles, while the others were clustered to them. The categories created were named using content-relevant wording. The set of elements was then grouped into categories of principles or pillars, considering their frequency and their content similarities.

The criterion of selecting the elements most cited in the literature to guide the establishment of principles is in line with Scott (2006), Vaismoradi et al. (2013) and Bengtsson (2016), who advise the creation of groups from the content analysis should consider how often the elements appear. However, as there is no minimum frequency stipulated, we have adopted the threshold of 70% for convenience. Nevertheless, the other elements (with less than 70% of frequency) were not disregarded, but rather allocated in the groups created. The few elements that were kept even though they were not very frequent were those that the authors based on their experiences judged to be important.

The procedure of accounting for the frequency of the elements was necessary for the accomplishment of the content analysis and this punctual analysis does not mischaracterize the main nature of the work, which is primarily qualitative. In order not to limit the conclusions of the study, the section of results and discussion was developed based on articles present or not present in the portfolio used to systematize the principles and the literature review presented in section 2. This choice took into account the need for the discussions of the study to go beyond what is presented in the portfolio of articles. In this way, some studies used in the discussion of the principles may not be in the portfolio. The principles in section 4 are the proposed IMSs basis, which may assist in the development of new strategies, methodologies and guidelines for IMSs implementation and use. In the next section of results and discussion the pillars and their systematization are presented in light of the literature and based on the authors' experience.

4 Results and discussion

In this section the identification of the IMSs elements and the systematization of its principles are presented. In the sequence, the principles are discussed in view of the content analysis conducted in this study and the existing literature review. The elements address several aspects of IMSs, such as standardization of documents, unification of procedures, integration of responsibilities, communication, training, etc. Some of them, however, occur much more often than others in the articles analyzed, as in the case of element 6, which compared to element 26 appears with a frequency 90% higher (elements 26 and 6 have, respectively 97% and 7% of frequency). These most cited elements are highlighted in Figure 2.

Figure 2

Figure 2 shows the frequencies in which the identified elements are addressed in the articles analyzed. The elements in the highlighted area are more recurring in the portfolio of articles. This means that the elements 1, 3, 6, 9, 10, 11, 12, 14, 15 and 20 are mentioned in at least 70% of the articles, what make them elements essentially important for a good development and maintenance of the IMS. These elements are the following: 1) Align and/or integrate the responsibilities and authorities of top management and functional management and promote their engagement with the IMS; 3) Manage synergistically and provide human and financial resources to implement and maintain the IMS; 6) Standardize processes; 9) Investing in workforce training; 10) Integrate systems at the strategic level; 11) Integrate systems at the tactical level; 12) Integrate systems at the operational level; 14) Engaging employees in the process of implementing the IMS; 15) Promote the sharing of individual and group-level knowledge and experiences; and 20) Eliminate duplication and inconsistencies between documents, processes and procedures.

The "stronger" elements highlighted in Figure 2 led the systematization of the pillars, while those that did not appear so often in the portfolio were clustered by similarity. The development and maintenance of the IMS is dependent on all the pillars, regardless of the weights of the elements that compose it. The process of grouping the elements of Figure 2 into principles is illustrated in Figure 3 below.

Figure 3

The elements of Figure 2 were separated into groups (Figure 3) by means of a critical analysis that indicated the existence of 6 points or guiding principles that can support the development of the IMS, which are: 1) Systemic Management; 2) Standardization; 3) Strategic, tactic and operational integration; 4) Organizational learning, 5) Debureaucratization and 6) Continuous Improvement (Figure 3). Each principle corresponds to a pillar for guiding IMS development, which is the result of a clustering of similar and/or related elements. It is worth noting that element 9 "Invest in education and training of the workforce" appears more than once in figure 3, since training is considered essential for the development of the principles "standardization" and "integration (strategic, tactical and operational)".

The strategy used to systematize the principles consisted of relating the similar elements, that is, that have some kind of conceptual link, in groups that comprise important areas for the development and maintenance of an IMS. These key elements have make up the theory of IMSs spread out over the years. Despite this, we verified that up to date they have not been systematically grouped to enable the understanding of how IMS structure works. Bearing this in mind, we amalgamated them into the previously mentioned principles.

This strategy is effective because IMS scholars through their highly influential works have disseminated the elements used to base these principles, leading them to be considered in many other studies beyond the 30 most cited. It is easy to perceive the diffusion of these elements in the literature if we consider that the 30 articles from which the elements were extracted today add up to more than 1400 citations distributed in various journals. Therefore, it is argued these principles cover, in a clear and effective way, the elements that were widely mentioned in the analyzed literature, but which had not been systematically grouped to enable the understanding of how IMS structure works. An illustration of the principles within a possible structure for an IMS is shown in Figure 4.

Figure 4

The principles should be operationalized by applying the IMS elements to the quality management systems, environment, health and safety, social responsibility, and any other management system that the organization wishes to integrate. They are not sequential, once they are

naturally interrelated. While the good development of one principle may support the development of others; its poor development can result in losses that compromise the whole system. Therefore, both for theoretical and practical purposes (e.g. development of researches on IMS and IMS implementation in companies) users should contemplate all 6 principles in a balanced and integrated way, so that the development and management of the IMS will be harmonious and interrelated. Next, the IMS principles will be presented and discussed one by one in the light of the scientific literature.

- *Pillar 1 – Systemic Management*

The IMS is the fusion of two or more management systems that are coordinated based on a holistic approach (Sampaio et al., 2012). It is exactly this the approach of the pillar of systemic management, which focuses on the goals of the organization as a whole, by reducing or eliminating overlaps of departmental interests.

For the development of the IMS it is important to remove the barriers that naturally exist between management systems and that hinder integration, since they promote the isolation and distancing of different perspectives and knowledge, resulting in conflicts that impair the performance of the organization (Santos et al., 2011; Bernardo et al., 2012).

The disciplines of quality, environment, health and safety and social responsibility are transversal to the organization and their existence does not need necessarily to be linked to a specific sector/department. For this reason, the IMS should be developed through systemic management that encompasses the alignment and/or integration of the responsibilities of the QMS, EMS, OHSMS, CSRMS, etc., at all levels, which will promote the engagement of the managers of all these areas with the IMS. The leaderships have to disseminate and accompany the process of developing the culture of IMS in the organization (Bernardo et al., 2012; Rebelo et al., 2016).

The top management commitment is essential for the process of integration and maintenance of the IMS in the organization. The top management must be engaged to the implementation of the IMS, promoting its implementation by, for example, the inclusion of the IMS in the strategic planning; communicating the IMS objectives and its plans to the managers and operational employees; providing the correct allocation and prioritization of the material, technical and financial resources required for integration, etc. (Zeng et al., 2010).

To use the systemic management, it is important to identify and analyze the elements that can be effectively integrated (this issue will be explained in more detail in Pillar 3: integration). It will be possible to better manage the interrelationships between the systems, that is, to potentialize synergies and to work incompatibilities that exist among the elements of the QMS, EMS, OHSMS, CSRMS, among others.

The identification of the critical success factors (CSFs) that involve the development and maintenance of IMSs is important for systemic management. CSFs are important "ingredients" for IMS achieving good performance (Rebelo et al., 2016). Companies must therefore shed their efforts in a number of areas to successfully identify and achieve their CSFs.

Rebelo et al. (2016) conducted a theoretical and empirical study that identified 89 CSFs that influence on the development of IMSs, among which at least 6 must be measured. The “commitment and leadership” CSF is more related to this pillar of systemic management. The top management should seek to meet the needs of the stakeholders in all subsystems of IMS by providing a balanced and consistent allocation of resources, tasks and labor to the areas of quality, environment, health and safety, social responsibility, etc., as appropriate. This is in line with Asif et al. (2013), which argued that IMSs should present a structured approach to meeting stakeholders’ demands in a coherent and synergistic manner.

- *Pillar 2 - Standardization*

The standardization achieved from the use of MSs has the objective of organizing and standardizing the work processes, so that the expectations of the stakeholders are met in the most efficient way, that is, at the lowest possible cost and variability (Asif et al., 2010; Su et al., 2015).

By standardizing the QMS, for example, it is possible to reduce the waste of resources and thereby minimize the impact that the disposal would have on the environment. In addition, the standardization obtained with the QMS could also help mitigating possible risks to the worker's health, and the environmental contamination (Llach et al., 2013; Savino and Mazza, 2014).

Standardization should be applied to documents and processes in order to standardize practices, terms and concepts of all management systems that IMS encompasses (Oliveira, 2013). The standardization of documentation should simplify the execution of the activities of issuing, distribution, disposal and control of documents, making them more objective and minimizing process errors (Lopez-Fresno, 2010; Oliveira, 2013).

To this end, it is recommended to establish a system for creating, updating and controlling the documented information, which may include the use of specific software for document management. It is important to note that regardless of the approach used for managing documents, it is advisable to periodically backup the necessary information, and create actions for authorization and access control of employees to documents.

Still regarding document standardization, Oliveira (2013) emphasizes that it is important to simplify the structure of the documents by using graphics, photos and other illustrations; their filling method, making it as objective as possible; and the language used, making it easy to be understood by all who will have access to the document.

The standardization of processes can be developed by elaborating procedures that describe how a given operation or task should be performed. In an IMS, it shall take into account the processes adequacy to internal rules of the organization; requirements of customers; and environmental, occupational health and safety, social responsibility and others requirements, as applicable (Jørgensen, 2008; Tarí and Molina-Azorín, 2010). Among the procedures that can be integrated are stand out the document management; corrective action; prospecting, development and evaluation of suppliers; education and training of the workforce; internal audit; communication; control of monitoring and measuring equipment, etc. (Santos et al., 2011).

The pattern should correspond to the best way to perform a given task among the possible options to be put into practice. The patterns can be changed whenever a "new way" of performing a task (which is better than the current one) is identified. In this case, if there is a consensus in favor of using the new method, the documents (procedures, work instructions, etc.) should be reviewed, so that the new pattern can be followed by all. The documents are understood as the written procedures of the IMS (Abad et al., 2014). They can be controlled through operational procedures, software and other types of control evidence. It is important to create a document control to ensure that IMS documents will be properly: a) distributed, accessed, retrieved and used; b) stored and preserved; c) controlled (for example, version control and traceability); and d) retained and available (ISO 9001, 2015).

To continually improving the patterns used, it is important for employees to be encouraged to identify and communicate opportunities for improvement in their activities. Contrary to what many people think, standardization was not thought to be an obstacle that limits the organization’s capability of creating novel ideas (Manders et al., 2016).

The standardization cycle SDCA (Standard, Do, Check, Act) can help managers implementing the standardization system. In a nutshell, to standardize it is necessary to map the processes and identify the critical activities involved, which will be those that have a significant impact on the final outcome of the process. Thereby, among all the activities of the organization the priority of standardization should be given to those that are critical, that is, that present the most significant operational risks of quality, environment and health and safety.

Once the critical activities have been identified, the operational procedures should be developed. The operational procedures are documents describing how the activities have to be carried out. Finally, training should be provided for the employees involved, as well as a periodic monitoring of the standardization process to see if the current pattern is adequate or if revisions are needed.

Internal communication and investment in education and training of the labor force are important so that employees are able to use the documents and operate the processes in accordance with the standard set out in the scope of the IMS (Tarí and Molina-Azorín, 2010; Oliveira, 2013).

- *Pillar 3 - Integration*

The integration of the management systems at the strategic, tactical and operational levels is another important pillar to be developed. Bernardo et al. (2009) observed the top-down approach is the most commonly approach used for integration. In this approach, the integration process generally begins with the integration of more strategic decisions, integrating tactical and operational issues at a later stage (Santos et al., 2011). This path to integration has been shown to be effective in the literature of IMS, and therefore its use is recommended (Zeng et al., 2007; Santos et al., 2011; Oliveira, 2013).

The integration at the strategic level provides the necessary basis for disseminating the culture and the integration practices at the tactical and operational levels. It is advisable to start the integration with a self-assessment of the company's strategic and operational situation in order to identify the synergies between systems that could, through integration, bring cost, waste and bureaucracy reduction to the company (Oliveira, 2013). At the strategic level, it is common to integrate responsibilities, plans, mission, vision, policy and objectives (Tarí and Molina-Azorín, 2010).

At the tactical level the goals, indicators, and activities of intermediate level should be integrated in order to monitor and measure the performance from an integrated and standardized perspective (Nunhes et al., 2017). The evolution of the integrated goals and indicators should be disseminated across the sectors, thus making the information on IMS performance available to everyone in the company and supporting decision-making and strategic planning.

To do so, it is recommended the formulation of a system for measurement and monitoring of activities and processes that group the existing goals and indicators. For example, suppose a company has three indicators that allow evaluating the compliance of its products and services, having one of which measuring compliance with internal quality requirements, another with respect to legal environmental requirements, among others. If these indicators and goals are grouped, the quality and consistency of the final product conformity assessment can be improved.

Finally, at the operational level one must identify and integrate elements at the level of processes and of the individual. It is essential to define the inputs and outputs of processes to identify who are the customers, and what are the essential processes that can be integrated, etc. At the operational level it is common the integration of work instructions and document control (Zeng et al., 2007; Oliveira, 2013; Nunhes et al., 2017).

In addition, it is advisable for organizations that want to integrate their management systems to conduct audits and workforce training in an integrated manner, so that employees can be properly integrated with the IMS (Bernardo et al., 2010; Simon et al., 2014). The integrated internal audits are more effective as they involve a single audit team, with a single audit plan and a single final report, which may contain specific nonconformities and improvement opportunities both for each management system and for the IMS as a whole (Simon et al., 2014).

It is important to plan an internal audit program that establishes the frequency with which they will be conducted, the scope, the selection criteria of auditors ensuring that audits will be carry out with impartially and ensure that their results are treated by senior management and, if appropriate, corrective actions are taken.

- *Pillar 4 – Organizational Learning*

Developing and maintaining the IMS is a process of continuous reconstruction and adaptation to constant updates and innovations (Jørgensen, 2006, 2008). It is advisable that the organization develop a learning culture and strategic flexibility, which could give support to the management of the challenges and complex issues that the internal and external environments present (Jørgensen, 2006; Asif et al., 2010; Sampaio et al., 2012).

It is important to find ways to facilitate the creation and sharing of knowledge in the IMS. Through the development of learning, it is possible to improve the communication between the top management, employees and stakeholders. It also fosters the development of transversal competences that favors the systemic management (Saide and Mahendrawathi, 2015).

To develop this pillar, it is first suggested to determine the human competencies required for the development of processes, products, services and their integration. Competence is the set of knowledge, skills and attitudes that individuals intend to develop (Jacobs et al., 2013). The human resources area can assist the identification, evaluation and detailing of the core competencies for the activities of the QMS, EMS, OHSMS, CRSMS and of the IMS as a whole (Longenecker and Fink, 2013).

In addition, it is necessary to identify the available sources to acquire these competences, which may be intellectual property, lessons learned from failures and successful projects, workshops, lectures, training, and others (Bierema and Callahan, 2014; Ubeda-García et al., 2013). The intellectual property involves the granting of patents (inventions, utility models, industrial and design models) or trademarks (industry, service, advertising), by means of which the company can obtain an essential competence.

The promotion of workshops can help in integrating the IMS working group through the exchange of knowledge, experiences, discussion on good practices, code of ethics, etc. Eventually, the workshops can be open to clients, suppliers and community in order to integrate them into the organization. It can help better understand the stakeholders and thereby obtain important information about credibility, size, market influence and positioning on investment, community, and environmental issues. This information can be used in the organization's strategic planning.

Workshops and trainings can be part of awareness campaigns about, for example, safety on-the-job, everyday issues such as hygiene, safety, food, sexually-transmitted diseases, among others. More generic workshops and trainings that stimulate teamwork, exchange of ideas, communication, problem-solving, time use, planning, among other topics can also be taught to all employees, so that a leveling of team knowledge is established about the subject matter, facilitating a common understanding and the adoption of working standards.

Trainings should be conducted to prepare employees to act in the process of IMS implementation. The human resources area together with top management should define the necessary trainings for the IMS team and develop a plan to apply them. It is recommended that this plan contains interaction dynamics to help develop, integrate and unite collaborators and teams, which is essential in an IMS (Oliveira, 2013). It is important that top management make the necessary efforts and participate in training planning to guarantee that the training needs are outlined in the company's strategic planning and the necessary resources are provided, and that the other members of the system also realize the importance of committing themselves to the implementation project of the IMS (Jonker and Karapetrovic, 2004; Zeng et al., 2010).

IMS managers should be responsible for organizing the workshops and trainings. They themselves can give it or the company may provide consultants with specific expertise (depending on the subject matter) to do so. All employees in the IMS sector (if the company already has a specific IMS sector) should participate in the trainings and, as a priority, key employees at all levels of each IMS subarea. Key personnel who receive the training should be instructed by the IMS manager to share the knowledge acquired with their co-workers. It is recommended that the results of the

training be evaluated by the person who gave them and, if necessary, complementary actions be established.

To develop the organizational learning pillar of the IMS, it is important to stimulate the participation of the employees by creating, for instance, employee suggestion systems through which they can propose incremental improvements and shed light on opportunities for innovation. Also, opportunities for improvements and innovations can arise from consulting independent IMS experts, which has the advantage of providing a wide, impartial and external view of the system. It is recommended to train employees to be knowledge multipliers. They should be able to know how to adapt the technical language to the public in order to disseminate knowledge (Asif et al., 2011; Oliveira, 2013; Bernardo, 2014).

- *Pillar 5 - Debureaucratization*

The pillar of debureaucratization seeks to combat the excess of bureaucracy by reducing and simplifying processes in the organization. The organization needs bureaucratic stabilization, efficiency, and appropriate structures to enable employees to perform their tasks better (Adler and Borys, 1996). Thus, the objective of this pillar is not to eliminate the bureaucracy of the system, but to develop an enabling bureaucracy, that is, to promote the autonomy and empowerment of employees, through the use of documents and procedures as tools to support the work of the employees rather than reinforcing the authority of superiors (Asif et al., 2010; Oliveira, 2013).

Bureaucracy is indispensable to help employees achieve the desired goals, as it supports them to understand and execute their activities with more efficiency and excellence. However, when the bureaucracy of management systems is not integrated, there is an accumulation of rules, regulations, procedures, manuals, documents and responsibilities which make difficult to perform tasks, decision making, and management as a whole (Jørgensen, 2006; Tarí and Molina-Azorín, 2010; Santos et al., 2011).

In order to develop this pillar, it is necessary to carry out, as mentioned also in the standardization pillar, the mapping of the processes and the identification of the critical activities of each of them. With this, it will be possible to identify wastage of time, material, labor, financial resources, etc. Therefore, it is recommended to analyze carefully the process map in order to identify improvement opportunities that can simplify processes, keeping only the activities, resources and documents that are in fact indispensable.

The debureaucratization of the MSs can be achieved through the integration of management manuals, processes and procedures; integration of authorities and responsibilities; development of the learning culture, promoting the development and involvement of employees with less dependence on specialization; training for staff adaptation to the IMS culture; and development of systemic management as the basis for systems development.

Many of the problems that generate excessive bureaucracy in management systems are related to infrastructure, documents and activities that do not add value. Thus, it is important that during the development of the IMS these problems be identified, measured and eliminated; otherwise all expected results with integration may be compromised.

- *Pillar 6 – Continuous improvement*

The continuous improvement pillar should support the development and improvement of the elements of the other IMS pillars. Continuous improvement, or Kaizen, is a set of processes that are developed so that the entire organization seeks improvements in quality, productivity, safety, competitiveness, etc. (Juburg et al., 2017; Lleo, 2017). It should be structured to quickly identify organizational problems and solve them through small steps that, over time, can bring significant improvements to the company (Gonzalez and Martins, 2015; Silva et al., 2017).

Continuous improvement should be developed in the company culture using the processes of identification, analysis and definition of actions and deadlines to solve a given problem (Sokovic et

al., 2010). Managers should seek the continuous improvement of the IMS through the creation of an improvement plan based on the PDCA and SDCA cycles. The PDCA (Plan, Do, Check, Act) is a method widely used to develop these improvement routines and generate positive changes (Asif et al., 2013). This plan could present a diagnosis of the opportunities for improvement at all levels and processes of the company, describe the actions, resources and goals necessary for its optimization, etc. The SDCA (Standard, Do, Check, Act) will support the standardization and sharing of improvements across the company. The improvement plan should focus on the standardization of good results, in order to allow to replicate them consistently, thus reducing the variability among the systems and reducing costs and waste (Figure 5).

Figure 5

The use of PDCA and SDCA (Figure 5) can help improve the IMS performance. The actions that will be part of these plans can vary from company to company, according to the degree of maturity of the IMS. It is advisable to conduct a periodic evaluation of the system to identify the level of maturity of the IMS so that, based on the results of the evaluation, a feasible improvement plan is drawn up. We recommend reading Domingues et al. (2016), which presented a model for assessing the degree of maturity of IMSs that allows managers to direct their efforts towards the evolution of the system from one level to another, as the case may be.

The elements selected to compose the pillar of continuous improvement characterize "fully integrated" systems, or systems that are "expanding integration" by means of the incorporation of other elements, such as cleaner production, sustainability, risk management, etc. In this way, it is expected the elements of this pillar can support companies to move its IMSs towards excellence.

In order that the organization culture can support the development of IMS actions, it is needed the IMS elements be inserted into the routine activities of the company, and also be communicated by senior management to employees and stakeholders, as previous discussed in pillar 4. The IMS should directly influence the development of the companies' competitive strategies. If the IMS is properly considered by the managers, it will be easier to use the organizational culture to foster IMS development (Barbosa et al., 2017). The continuous improvement of the IMS depends on the development of a lean infrastructure to meet the stakeholders' needs, which involves identifying opportunities to avoid and/or reduce waste (Jørgensen, 2006). Investing in employee preparedness actions (pillar 4), for instance, can make employees aware about health, safety and environmental issues to the point that they understand the waste of certain hazardous substances can be harmful to their own health, the quality of the final work is related to their well-being and quality of life at work, etc.

It is important for continued improvement of the IMS that it be supported and/or integrated with other programs, management systems, and the entire supply chain. Jørgensen (2008) emphasized that it is important the focus of the IMS is on the entire production chain. A more collaborative approach with stakeholders could bring opportunities to improve practices, products and processes, besides allowing to direct and balance the system for sustainability.

Therefore, it is recommended the integration of IMS with tools and techniques such as Cleaner Production, Product Life Cycle Assessment and Cost of Living, Eco-design, Risk Assessment Sustainability Indicators and Reports, Codes of Conduct, etc., according to the reality and need of the company (Jørgensen, 2008; Asif et al., 2010; Rebelo et al., 2014). Also, tools inherent to a specific discipline can be applied in other and for different purposes, as is the case of Quality Function Deployment and Failure Mode and Effects Analysis (QFD), which although came from quality management, can also be used to develop elements of sustainability in the IMS, supporting, for instance, the development of products, and the environmental impact assessment of products and processes.

This pillar was the only one based on elements that did not have been mentioned in more than 70% of the articles analyzed. However, the elements related to the continuous improvement pillar have been presented in the literature more recently, which means that as the research on IMS advances, more elements for its continuous improvement are being explored and new opportunities to innovate are being suggested.

5 Conclusions

The main objective of this research is to establish the guiding principles of IMS and the essential elements for its development and maintenance. This objective was reached through a systematic content analysis with focus on the most cited articles on IMS from 2006 to 2016. Based on the results obtained, several important conclusions can be highlighted.

First, it was identified the existence of 28 elements for the development and maintenance of the IMS in the portfolio of articles analyzed. Among these, it was verified that some are addressed more frequently than others, which make it possible to conclude that there are elements that are essential to provide a basis for the IMSs. In all, 6 principles of IMS were systematized: 1) Systemic Management; 2) Standardization; 3) Strategic, tactic and operational integration; 4) Organizational learning; 5) Debureaucratization; and 6) Continuous Improvement. Each principle is a result of a grouping of elements by similarity and corresponds to a pillar for development and maintenance of IMS.

The management of an IMS must contemplate the balanced management of the 6 pillars, since they will provide the necessary basis for the system to be developed and maintained in a more homogeneous, consistent and integrated manner. The adequate development of one principle can support the development of others, that is, they are correlated and the poor development of one of them can result in damages that compromise the whole system.

The theoretical contribution of this study is to be a starting point towards the unification of the IMS theory. The results of this paper will open space for dialogue towards the unification of concepts and will help other researchers to develop researches on the subject through the use of these principles in the proposition of models, performance of case studies, surveys, etc. If considered in future studies the principles can help to unify the basis of IMS theory by providing researches with a stronger and more consistent theoretical basis.

Despite focusing on contributing academically, the paper also brings applied contributions. The principles can act as a practical guideline to assist company managers in better target their efforts and allocate resources in the management of the IMS. The guidelines address key points that must be considered by any manager who wishes to implement or who has already implemented an IMS in the company. The results bring about practical examples of actions, practices and tools that can assist the development of the IMS.

The method used in this study has a strong emphasis on the interpretation of written word. The interpretation in turn is influenced by the perceptions of the author's experiences, which limited the results. Therefore, the inclusion of external domain experts in the discussion of the pillars is an opportunity for continuity and improvement of this research. Future studies could investigate the possible relationships between the proposed principles of IMS with the principles of other disciplines, such as ISO 9001: 2015 Quality Management, Human Resources Development, etc. Future researches could also conduct confirmatory studies to identify characteristics of the IMSs principles empirically. Finally, it is suggested to future studies to develop integration methodologies that contemplate the principles systematized in this study.

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References

Abad, J., Cabrera, H.R., Medina, A., 2016. An analysis of the perceived difficulties arising during the process of integrating management systems. Journal of Industrial Engineering and Management. 9, 860–878.

Abad, J., Dalmau, I., Vilajosana, J., 2014. Taxonomic proposal for integration levels of management systems based on empirical evidence and derived corporate benefits. Journal of Cleaner Production. 78, 164–173.

Adler, P.S., Borys, B, 1996. Two Types of Bureaucracy: Enabling and Coercive. Administrative Science Quarterly, 41, 61.

Asif, M., Searcy, C., Zutshi, A., Fisscher, O., 2013. An integrated management systems approach to corporate social responsibility. Journal of Cleaner Production, 56, 7–17.

Asif, M., Searcy, C., Zutshi, A., Ahmad, N., 2011. An integrated management systems approach to corporate sustainability. European Business Review. 23, 353–367.

Asif, M., Fisscher, O.A.M., Bruijn, E.J., Pagell, M., 2010. Integration of management systems: A methodology for operational excellence and strategic flexibility. Operations Management Research. 3, 146–160.

Asif, M., Bruijn, E.J., Fisscher, O.A.M., Searcy, C., Steenhuis, H.-J., 2009. Process embedded design of integrated management systems. International Journal of Quality and Reliability Management. 26, 261–282.

Barbosa, L.C.F., Nunhes, T.V., Santos, G., Oliveira, O.J., 2017. Alinhamento dos Sistemas de gestão integrados com a cultura organizacional (Alignment of integrated management systems with organizational culture). *In: Proceedings of the 13th Iberian-American Congress of Mechanical Engineering*. CIBEM, Lisboa, Portugal.

Baumann, S.L., 2012. Making a Meaningful Contribution to Theory. International Journal of Operations and Production Management. 25, 155–159.

Bengtsson, M., 2016. How to plan and perform a qualitative study using content analysis. NursingPlus Open. 2, 8–14. doi: 10.1016/j.npls.2016.01.001.

Bernardo, M. , Gianni, M., Gotzamani, K., Simon, A., 2017. Is there a common pattern to integrate multiple management systems? A comparative analysis between organizations in Greece and Spain. Journal of Cleaner Production. 151, 121–133.

Bernardo, M., Gotzamani, K., Vouzas, F., Casadesus, M., 2016. A qualitative study on integrated management systems in a non-leading country in certifications. Total Quality Management and Business Excellence. 1–28. http://dx.doi.org/10.1080/14783363.2016.1212652.

Bernardo, M., Alexandra, S., Tarí, J.J., Molina-Azorín, J.F., 2015. Benefits of management systems

integration: A literature review. Journal of Cleaner Production. 94, 260–267.

Bernardo, M., Casadesus, M., Karapetrovic, S. and Heras, I., 2012. Do integration difficulties influence management system integration levels? Journal of Cleaner Production. 21, 23–33.

Bernardo, M., Casadesus, M., Karapetrovic, S., Heras, I., 2010. An empirical study on the integration of management system audits. Journal of Cleaner Production. 18, 486–495.

Bernardo, M., Casadesus, M., Karapetrovic, S., Heras, I., 2009. How integrated are environmental, quality and other standardized management systems? An empirical study. Journal of Cleaner Production. 17, 742–750.

Bierema, L., Callahan, J.L., 2014. Transforming HRD: A Framework for Critical HRD Practice. Advances in Developing Human Resources. 16, 429–444.

BSI Group [British Standards Institution]. OHSAS standards and certificates survey. http://www.bsigroup.com. (accessed 12 August 2017).

Delai, I., Takahashi, S., 2013. Corporate sustainability in emerging markets: Insights from the practices reported by the Brazilian retailers. Journal of Cleaner Production, 47, 211–221.

Domingues, P., Sampaio, P., Arezes, P.M., 2017. Management systems integration: Survey results. International Journal of Quality and Reliability Management. 34, 1252-1294.

Domingues, P., Sampaio, P., Arezes, P.M., 2016. Integrated management systems assessment: a maturity model proposal. Journal of Cleaner Production. 124, 164–174.

Domingues J.P.T., Fonseca L., Sampaio P., Arezes, P.M., 2016. Integrated versus nonintegrated perspectives of auditors concerning the new ISO 9001 revision. IEEE International Conference on Industrial Engineering and Engineering Management, 866-870.

Domingues, P., Sampaio, P., Arezes, P.M., 2015. Analysis of integrated management systems from various perspectives. Total Quality Management & Business Excellence. 26, 1311–1334.

EEQM [European Foundation for Quality Management]. EFQM fundamental concepts. http://www.efqm.org model/fundamental-concepts. (accessed 04 April 2018).

Elo, S. et al., 2014. Qualitative Content Analysis: A focus in trustworthiness. SAGE Open, 4(1), 1-10. doi: 10.1177/2158244014522633.

Fonseca, L. M., 2015. From Quality Gurus and TQM To ISO 9001:2015: A review of several quality Paths. International Journal for Quality Research, 9(1), 167–180.

Fonseca, L. M., 2018. Exploratory Research of ISO 14001:2015 Transition among Portuguese Organizations. Sustainability, 10, 1–16. doi: 10.3390/su10030781.

Garengo, P., Biazzo, S., 2013. From ISO quality standards to an integrated management system: an implementation process in SME. Total Quality Management & Business Excellence, 24, 310-335.

Gianni, M., Gotzamani, K., Vouzas, F., 2017. Food integrated management systems: dairy industry insights. International Journal of Quality and Reliability Management. 34, 194–215.

Gonzalez, R., Martins, M., 2015. Competências habilitadoras da melhoria contínua: estudo de casos em empresas do setor automobilístico e de bens de capital (Enabling skills of continuous

improvement: case studies in companies of the automotive and capital goods sectors). Gestão e Produção. 22, 725-742.

Gorenflo, G., Moran, J.W., 2009. The ABCs of PDCA. Accreditation Coalition, Min- nesota, USA.

Griffith, A., Bhutto, K., 2008. Improving environmental performance through integrated management systems (IMS) in the UK. Management of Environmental Quality. 19, 565–578.

Heras-Saizarbitoria, I., Boiral, O., 2013. ISO 9001 and ISO 14001: Towards a Research Agenda on Management System Standards. International Journal of Management Reviews. 15, 47–65.

ISO [International organization for Standardization]. The ISO survey. https://www.iso.org/the-iso-survey.html. (accessed 03 April 2017).

ISO [International organization for Standardization]. Updates. https://www.iso.org. (accessed 10 April 2018).

ISO [International organization for Standardization], 2001. Guide 72: Guidelines for Justification and Development of Management System Standards, pp. 26.

ISO [International organization for Standardization] 26000, 2010. Guidance on social responsibility.

ISO [International organization for Standardization], 2015. Quality management principles. https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/pub100080.pdf. (accessed 21 May 2018).

ISO [International organization for Standardization] 9001, 2015. *Quality management systems requirements (ISO 9001:2015)*. Berlin: Beuth Verlag.

ISO/IEC, 2016. IEC Directives Supplement.

Jacobs, R., Manion, R., Davies, H.T., Harrison, S., Konteh, F., Walshe, K., 2013. The relationship between organizational culture and performance in acute hospitals. Social Science and Medicine. 76, 115–125.

Jonker, J., Karapetrovic, S., 2004. Systems thinking for the integration of management systems. Business Process Management Journal. 10, 608–615.

Jørgensen, T.H., 2008. Towards more sustainable management systems: through life cycle management and integration. Journal of Cleaner Production, 16, 1071–1080.

Jørgensen, T.H., Remmen, A., Mellado, M.D., 2006. Integrated Management Systems- three different levels of integration. Journal of Cleaner Production. 14, 713-722.

Juburg, D., Viles, E., Tanco, M., Mateo, R., 2017. What motivates employees to participate in continuous improvement activities? Total Quality Management and Business Excellence. DOI: 10.1080/14783363.2016.1150170.

Karapetrovic, S., Casadesús, M., 2009. Implementing environmental with other standardized management systems: Scope, sequence, time and integration. Journal of Cleaner Production. 17, 533–540.

Karapetrovic S, Casadesus M, Heras I., 2006. Dynamics and integration of standardized management

systems. Girona, Spain: Documenta Universitaria.

Karapetrovic, S., Willborn, W., 1998. Integration of quality and environmental management systems concepts Integration of quality and environmental. The TQM Magazine, 10, 204–213.

Klute-Wenig, S., Refflinghaus, R., 2015. Integrating sustainability aspects into an integrated management system. The TQM Journal, 27, 303–315.

Kopia, J., Kompalla, A., Ceauşu, I., 2016. Theory and practice of integrating management systems with high level structure. Quality - Access to Success. 17.

Labodová, A., 2004. Implementing integrated management systems using a risk analysis based approach. Journal of Cleaner Production. 12, 571–580.

Leopoulos, V., Voulgaridou, D., Bellos, E., Kirytopoulos, K., 2010. Integrated management systems: Moving from function to organisation/ decision view. TQM Journal. 22, 594–628.

Llach, J., Perramon, J., Alonso-almeida, M. D. M., Bagur-femenías, L., 2013. Joint impact of quality and environmental practices on firm performance in small service businesses: An empirical study of restaurants. Journal of Cleaner Production. 44, 96–104.

Lleo, A., Villes, E., Jurburg, D., Lomas, L., 2017. Strengthening employee participation and commitment to continuous improvement through middle manager trustworthy behaviours, Total Quality Management and Business Excellence. 28(9–10), 974–988. doi: 10.1080/14783363.2017.1303872.

Longenecker, C.O., Fink, L.S., 2013. Creating human-resource management value in the twenty-first century: Seven steps to strategic HR. Human Resource Management International Digest. 21, 29–32.

Lopez-Fresno, P., 2010. Implementation of an integrated management system in an airline: a case study. The TQM Journal, 22, 629–647.

Luo, H., LI, G., LI, C., 2015. Research on integration method of integrated management system, The Open Automation and Control Systems Journal. 1, 1802–1807.

Manders, B., De Vries, H. J., Blind, K., 2016. ISO 9001 and product innovation: A literature review and research framework. Technovation. 48–49, 41–55.

Majerník, M., Daneshjo, N., Sančiová, G., Chovancová, J., 2017. Design of Integrated Management Systems According To the Revised Iso Standards. Polish Journal of Management Studies. 15, 135–143.

Miguel, P. A. C., Souza, R., 2012. O método de estudo de caso na engenharia de produção, in: Metodologia de pesquisa em engenharia de produção e gestão de operações [Research methodology in production engineering and operations management], 2nd edn. Rio de Janeiro: Elsevier, pp. 131 - 148.

Moldavska, A., Welo, T., 2017. The concept of sustainable manufacturing and its definitions: A content-analysis based literature review. Journal of Cleaner Production. 166, 744–755.

Moumen, M., El Aoufir, H., 2017. Quality, safety and environment management systems (QSE): analysis of empirical studies on integrated management systems (IMS). Journal of Decision Systems, 26**,** 207–228.

Nunhes, T.V., Ferreira Motta, L.C., Oliveira, O.J., 2016. Evolution of integrated management systems research on the Journal of Cleaner Production: Identification of contributions and gaps in the literature. Journal of Cleaner Production. 139, 1234–1244.

Nunhes, T.V., Motta Barbosa, L.C., Oliveira, O.J., 2017. Identification and analysis of the elements and functions integrable in integrated management systems. Journal of Cleaner Production. 142, 3225–3235.

Nunhes, T. V., Oliveira, O. J., 2018. Analysis of Integrated Management Systems research: identifying core themes and trends for future studies. Total Quality Management & Business Excellence. 1–23. doi: 10.1080/14783363.2018.1471981.

Oliveira, O. J., 2013. Guidelines for the integration of certifiable management systems in industrial companies. Journal of Cleaner Production, 57, 124–133.

Park, S. B., Park, K., 2017. Thematic trends in event management research. International Journal of Contemporary Hospitality Management. 29(3), 848–861. doi: 10.1108/IJCHM-09-2015-0521.

Rebelo, M.F., Santos, G., Silva, R.U.I., 2016. Integrated management systems : critical success factors. Journal of Global Economics, Management and Business Research. 5, 109–124.

Rebelo, M.F., Santos, G., Silva, R., 2015. Integration of management systems: Towards a sustained success and development of organizations. Journal of Cleaner Production. 127, 96-111.

Rebelo, M., Santos, G., Silva, R., 2014. Conception of a flexible integrator and lean model for integrated management systems. Total Quality Management and Business Excellence. 25, 683–701.

Rocha, M., Searcy, C., Karapetrovic, S., 2007. Integrating sustainable development into existing management systems. Total Quality Management and Business Excellence, 18, 83–92.

SAAS. Social Accountability Accreditation Services. http:// www.saasaccreditation.org/certfacilitieslist. (accessed 15 April 2017).

Saide, Mahendrawathi, E. R., 2015. Knowledge management support for enterprise resource planning implementation. Procedia Computer Science. 72, 613–621.

Salah, S., Carretero, J.A., Rahim, A., 2010. The integration of quality management and continuous improvement methodologies with management systems. International Journal of Productivity and Quality Management. 6, 269–288.

Sampaio, P., Saraiva, P., Domingues, P., 2012. Management systems: integration or addition? International Journal of Quality and Reliability Management. 29, 402–424.

Santos, D., Ferreira Rebelo, M., Doiro, M., Santos, G., 2017. The integration of certified Management Systems. Case study - organizations located at the district of Braga, Portugal. Procedia Manufacturing. 13, 964–971.

Santos, G., Barros, S., Mendes, F., Lopes, N., 2013. The main benefits associated with health and safety management systems certification in Portuguese small and medium enterprises post quality management system certification. Safety Science. 51, 29–36.

Santos, G., Mendes, F., Barbosa, J., 2011. Certification and integration of management systems: The experience of Portuguese small and medium enterprises. Journal of Cleaner Production. 19, 1965–1974.

Savino, M.M., Batbaatar, E., 2015. Investigating the resources for Integrated Management Systems within resource-based and contingency perspective in manufacturing firms. Journal of cleaner production. 104, 392–402.

Savino, M.M., Mazza, A., 2014. Toward environmental and quality sustainability: An integrated approach for continuous improvement, 171–181.

Scott, J. Content Analysis, 2006, in: Jupp, V., *The sage dictionary of social research methods*. Sage Publications Ltd., 79-249.

Seuring, S., Gold, S., 2012. Conducting content□analysis based literature reviews in supply chain management. Supply Chain Management: An International Journal, 17(5), 544–555. doi: 10.1108/13598541211258609.

Simon, A., Karapetrovic, S., Casadesús, M., 2012. Difficulties and benefits of integrated management systems. Industrial Management and Data Systems, 112, 828–846.

Simon, A., Yaya, L.H.P., Karapetrovic, S., Casadesús, M., 2014. An empirical analysis of the integration of internal and external management system audits. Journal of Cleaner Production. 66, 499-506.

Sinha, N., Garg, A.K., Dhall, N., 2016. Effect of TQM principles on performance of Indian SMEs: the case of automotive supply chain. The TQM Journal. 28, 338–359.

Silva, A.S., Medeiros, C.F., Vieira, R.Q., 2017. Cleaner Production and PDCA cycle: Practical application for reducing the Cans Loss Index in a beverage company. Journal of Cleaner Production. 150, 324-338.

Sokovic, M., Pavletic, D., Pipan, K.K., 2010. Quality improvement methodologies e PDCA cycle, RADAR matrix, DMAIC and DFSS. Journal of Achievements in Materials and Manufacturing Engineering. 43, 476-483.

Souza, J.P.E., Alves, J.M., 2016. Lean-integrated management system: A model for sustainability improvement. Journal of Cleaner Production. 172, 2667–2682.

Su, H., Dhanorkar, S., Linderman, K., 2015. A competitive advantage from the implementation timing of ISO management standards. Journal of Operations Management. 37, 31-44.

Tarí, J.J., Molina-Azorín, J.F., 2010. Integration of quality management and environmental management systems: Similarities and the role of the EFQM model. The TQM Journal. 22, 687–701.

Ubeda-garcía, M., Marco-Laraja, B., Sabater-Sempere, V., García-Lillo, F., 2013. Does training influence organisational performance? Analysis of the Spanish hotel sector. European Journal of Trainning and Development. 37, 380-413.

UNGC [United Nations Global Compact]. Corporate sustainability principles. https://www.unglobalcompact.org/what-is-gc/mission/principles. (accessed 14 April 2018).

Vaismoradi, M., Turunen, H., Bondas, T., 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nursing and Health Sciences, 15(3), 398–405. doi: 10.1111/nhs.12048.

Wilkinson, G., Dale, B.G., 1999. Models of management system standards: a review of the integration issues. International Journal of Management Reviews. 3, 279–298.

Xia, B., Olanipekun, A., Chen, Q., Xie, L., 2018. Conceptualising the state of the art of corporate social responsibility (CSR) in the construction industry and its nexus to sustainable development. Journal of Cleaner Production. 195, 340–353. doi: 10.1016/j.jclepro.2018.05.157.

Zeng, S.X., Xie, X.M., Tam, C.M., Shen, L.Y., 2011. An empirical examination of benefits from implementing integrated management systems (IMS). Total Quality Management and Business Excellence. 22, 173–186.

Zeng, S.X., Tam, V.W.Y., Le, K.N., 2010. Towards Effectiveness of Integrated Management Systems for Enterprises. Inzinerine Ekonomika-Engineering Economics, 21, 171–179.

Zeng, S.X., Tam, V.W.Y., Tam, C.M. 2008. Towards occupational health and safety systems in the construction industry of China. Safety Science. 46, 1155–1168.

Zeng, S. X., Shi, J.J., Lou, G.X., 2007. A synergetic model for implementing an integrated management system: an empirical study in China. Journal of Cleaner Production. 15, 1760–1767.

Zwetsloot, G.I.J.M., 1995. Improving cleaner production by integration into the management of quality, environment and working conditions. Journal of Cleaner Production. 3, 61–66.

Table 1 – IMS models and their respective theoretical and conceptual basis

Author(s)/Year	About the model	Basis	
		Conceptual	Empirical
Karapetrovic and Willborn (1998)	The authors present a model of a generic performance MS and a model for integrated audit system	- ISO 9001 - ISO 14001 - Systems approach - Authors theoretical framework	-
Wilkinson and Dale (2001)	IMS model based on empirical research addressing the issues of scope and culture	- Key IMS issues identified in by Wilkinson and Dale (2000)	- Survey conducted among companies (57 valid answers)
Labodová (2004)	Model for IMS implementation using a risk analysis-based approach	- Plan-Do-Check-Act (PDCA) methodology - OHSAS 18001 - Risk-management approach - Authors conceptual framework	- 2 case studies
Rocha et al. (2007)	IMSs implementation model for enhance sustainability in business infrastructure	- Authors theoretical framework - Systems approach	-
Zeng et al. (2007)	Multi-level synergy model (strategic synergy, organizational structural-resource-cultural synergy, and documentation synergy) for an effective implementation of IMS	- Authors literature review	- Survey conducted among companies (104 valid answers)
Jorgensen (2006)	IMS model based on a culture of learning and continuous improvements with three ambition levels of integration	- Authors theoretical framework - ISO Guide 72 - ISO 9001:2000 - ISO 14001:2004 - OHSAS 18001:2000 - PDCA methodology	- IMS standards in Denmark and Spain are analyzed regarding the ambition level for integration
Asif et al. (2009)	Process-based strategy for IMS implementation and institutionalization	- Author's literature review	-
Lopez-Fresno (2010)	Model based on a systemic approach that proved successful for the design and implementation of an IMSs in an airline	- Author's literature review	- 1 case study
Rebelo et al. (2014)	Flexible integrator and lean model for IMSs	- ISO Guide 72 - PDCA methodology - Authors literature review	- 1 case study
Domingues et al. (2016)	Maturity Model for IMS Assessment	- 8 excellence management pillars - Authors literature review	- Survey conducted among companies (53 valid answers) - Survey conducted amid experts' panel (7 respondents)
Majerník et al. (2017)	Innovative model for IMSs implementation and maintaining according to the revised ISO standards	- ISO High-Level Structure - PDCA methodology	-

Table 2 - Set of principles cited in IMS studies

IMS-Related Principles	Citing Studies
Management systems principles	Karapetrovic and Willborn (1998), Labodová (2004), Zeng et al. (2007), Lopez-Fresno (2010), Santos et al. (2011), Rebelo et al. (2014), Luo et al. (2015), Abad et al. (2016), Domingues et al. (2016), Gianni et al. (2017).
Quality management principles	Zeng et al. (2007), Salah and Carretero (2010), Rebelo et al. (2014), Luo et al. (2015), Abad et al. (2016), Gianni et al. (2017)
TQM principles	Salah and Carretero (2010), Savino and Batbaatar (2015), Souza and Alves (2018)
Key principles of success for innovative businesses	Fresner and Engelhardt (2004)
Main basic principles of management systems	Sampaio et al. (2012)
Lean and clean principles	Rebelo et al. (2015), Souza and Alves (2018)
Corporate sustainability principles	Gianni et al. (2017)
Corporate social responsibility principles	Leopoulos et al. (2010), Asif et al. (2013), Gianni et al. (2017), Souza and Alves (2018)
EFQM principles	Garengo and Biazzo (2013), Souza and Alves (2018)
Organizational principles	Zwetsloot (1995)
Principles of excellence management	Domingues et al. (2016)
ISO High Level Structure principles	Majerník et al. (2017)

Table 3 – The 30 most cited articles in Integrated Management Systems from 2006 to 2016

Nº	Title	Author(s)/Year	Journal/ISSN	Times cited
1	Integrated management systems – three different levels of integration	Jørgensen *et al.* (2006)	Journal of Cleaner Production/0959-6526	135
2	A synergetic model for implementing an integrated management system: an empirical study in China	Zeng *et al.* (2007)	Journal of Cleaner Production/0959-6526	116
3	Integrated management systems: experiences in Italian organizations	Salomone (2008)	Journal of Cleaner Production/0959-6526	112
4	How integrated are environmental, quality and other standardized management systems? An empirical study	Bernardo *et al.* (2009)	Journal of Cleaner Production/0959-6526	106
5	Implementing environmental with other standardized management systems: Scope, sequence, time and integration	Karapetrovik and Casadesús (2009)	Journal of Cleaner Production/0959-6526	89
Nº	Title	Author(s)/Year	Journal/ISSN	Times cited
6	Towards more sustainable management systems: through life cycle management and integration	Jørgensen (2008)	Journal of Cleaner Production/0959-6526	71
7	An integrated management systems approach to corporate social responsibility	Asif *et al.* (2013)	Journal of Cleaner Production/0959-6526	60
8	Certification and integration of management systems: The experience of Portuguese small and medium enterprises	Santos *et al.* (2011)	Journal of Cleaner Production/0959-6526	58
9	Towards occupational health and safety systems in the construction industry of China	Zeng *et al.* (2008)	Safety Science/0925-7535	49
10	Integration of standardized environmental and quality management systems audits	Simon *et al.* (2011)	Journal of Cleaner Production/0959-6526	46
11	An empirical study on the integration of management system audits	Bernardo *et al.* (2010)	Journal of Cleaner Production/0959-6526	45

12	Integration of quality management and environmental management systems similarities and the role of the EFQM model	Tarí and Molina-Azorín (2010)	The TQM Journal/ 1754-2731	41
Nº	Title	Author(s)/Year	Journal/ISSN	Times cited
13	Process embedded design of integrated management systems	Asif *et al.* (2009)	International Journal of Quality and Reliability Management/ 0265-671X	41
14	Do integration difficulties influence management system integration levels?	Bernardo *et al.* (2012)a	Journal of Cleaner Production/0959-6526	37
15	Integrated management systems in Indian manufacturing organizations some key findings from an empirical study	Khanna *et al.* (2010)	The TQM Journal/ 1754-2731	34
16	An empirical examination of benefits from implementing integrated management systems (IMS)	Zeng *et al.* (2011)	Total Quality Management and Business Excellence/1478-3371	33
17	Evolution of Integrated Management Systems in Spanish firms	Simon *et al.* (2012)a	Journal of Cleaner Production/0959-6526	31
18	Difficulties and benefits of integrated management systems	Simon *et al.* (2012)b	Industrial Management and Data Systems/ 0263-5577	28
Nº	Title	Author(s)/Year	Journal/ISSN	Times cited
19	Management systems: Integration or addition?	Sampaio *et al.* (2012)	International Journal of Quality and Reliability Management/0265-671X	28
20	Implementation of an integrated management system in an airline: A case study	López-Fresno (2010)	The TQM Journal/ 1754-2731	28
21	Guidelines for the integration of certifiable management systems in industrial companies	Oliveira (2013)	Journal of Cleaner Production/0959-6526	25
22	An examination of strategies employed for the integration of management systems	Asif *et al.* (2010)a	The TQM Journal/ 1754-2731	25
23	The integration of quality management and continuous improvement methodologies with management systems	Salah *et al.* (2010)	International Journal of Productivity and Quality Management/1746-6474	24
24	Improving environmental performance through integrated management systems (IMS) in the UK	Griffith and Bhutto (2008)	Management of Environmental Quality/1477-7835	24

Nº	Title	Author(s)/Year	Journal/ISSN	Times cited
25	Use of different sustainability management systems in the hospitality industry. The case of Spanish hotels	Rodríguez-Antón *et al.* (2012)	Journal of Cleaner Production/0959-6526	23
26	Rediscovering performance management: Systems, learning and integration	Brudan (2010)	Measuring Business Excellence/ 1368-3047	22
27	Integration of standardized management systems: Does the implementation order matter?	Bernardo *et al.* (2012b)	International Journal of Operations and Production Management/0144-3577	21
28	Integrated management systems: Moving from function to organisation/ decision view	Leopoulos *et al.* (2010)	The TQM Journal/ 1754-2731	20
29	Integration of management systems: A methodology for operational excellence and strategic flexibility	Asif *et al.* (2010)b	Operations Management Research/ 1936-9735	20
30	Better environmental performance: A framework for integrated management systems (IMS)	Griffith and Bhutto (2009)	Management of Environmental Quality/ 1477-7835	20

Table 4 - Review of the main elements for implementing Integrated Management Systems

#	Elements	MOST CITED ARTICLES (2006 - 2016)																														Freq.
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	Align and / or integrate the responsibilities and authorities of top management and functional management and promote their engagement with the IMS	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x	x			x		x	x	x	24
2	Identify and work on the interrelationships between the systems (synergies and antagonisms)	x	x	x		x	x	x							x	x	x	x	x		x		x		x	x		x	x			17
3	Manage synergistically and provide human and financial resources to implement and maintain the IMS	x	x		x	x	x	x		x	x		x	x	x	x	x	x		x	x		x	x		x				x	x	21
4	Consider stakeholders' needs	x	x		x	x	x	x					x	x	x	x				x	x	x	x	x		x			x	x		18
5	Standardize terms and concepts	x	x		x	x	x			x				x						x												8
6	Standardize processes	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	29
7	Standardize documentation	x	x		x		x	x	x	x	x			x		x	x	x		x			x	x						x		15
8	Developing mechanisms for internal communication	x	x							x			x		x	x			x	x	x				x						x	11
9	Investing in workforce training	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x		x	x	x	x	x		x	x	x		x		24
10	Integrate systems at the strategic level	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	x		x	x	x	x	x	26
11	Integrate systems at the tactical level	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	x		x	x	x	x	x	26
12	Integrate systems at the operacional level	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	29
13	Conduct integrated audits	x	x	x	x				x	x	x	x			x	x	x	x	x	x	x	x	x									17
14	Engaging employees in the process of implementing the IMS	x	x	x		x	x		x	x	x		x	x	x	x		x	x	x	x		x	x		x		x		x	x	22
15	Promote the sharing of individual and group-level knowledge and experiences	x	x	x		x	x	x	x		x		x		x	x		x	x	x	x	x	x	x			x		x	x	x	22
16	Develop capacity for innovation and openness to change	x	x			x	x	x	x	x				x				x				x		x		x	x			x	x	15
17	Develop multipliers and use incentive systems													x						x			x										3
18	Establish an effective flow of information	x	x										x		x	x		x		x	x	x		x	x					x	x	13

#	Elements	MOST CITED ARTICLES (2006 - 2016)																														Freq.
19	Seek technical advice from experts		x							x	x			x	x	x		x	x				x			x						10
20	Eliminate duplication and inconsistencies between documents, processes and procedures	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x					x	x	24
21	Reduce conflicts between documents, processes and procedures	x	x		x		x	x	x	x	x		x	x		x	x	x		x			x	x	x					x		18
22	Standardize and simplify documentation	x	x		x		x	x	x	x	x			x		x	x	x		x			x	x						x		16
23	Merge the documentation	x	x				x							x	x	x	x	x	x	x	x		x	x						x		14
24	Use organizational culture to support the development of the IMS	x	x				x	x						x	x	x		x	x	x			x	x			x					13
25	Identify opportunities to avoid and/or reduce waste	x	x				x	x		x			x			x								x						x	x	10
26	Go beyond legal compliance	x											x																			2
27	Promote communication and interaction with stakeholders	x	x				x	x					x		x						x	x										8
28	Integrate the IMS with other programs, management systems and/ or the entire supply chain	x				x	x	x					x	x						x			x	x	x					x		11

Figure 1 – Methodological flow

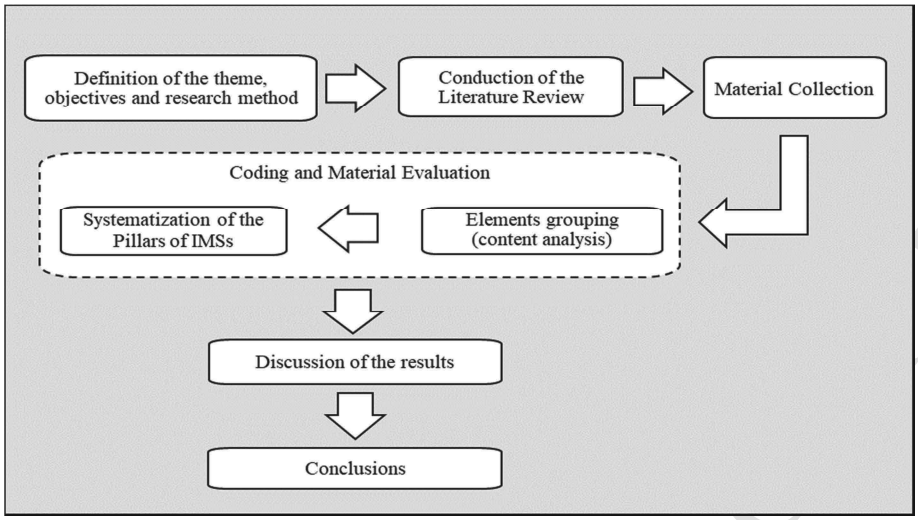
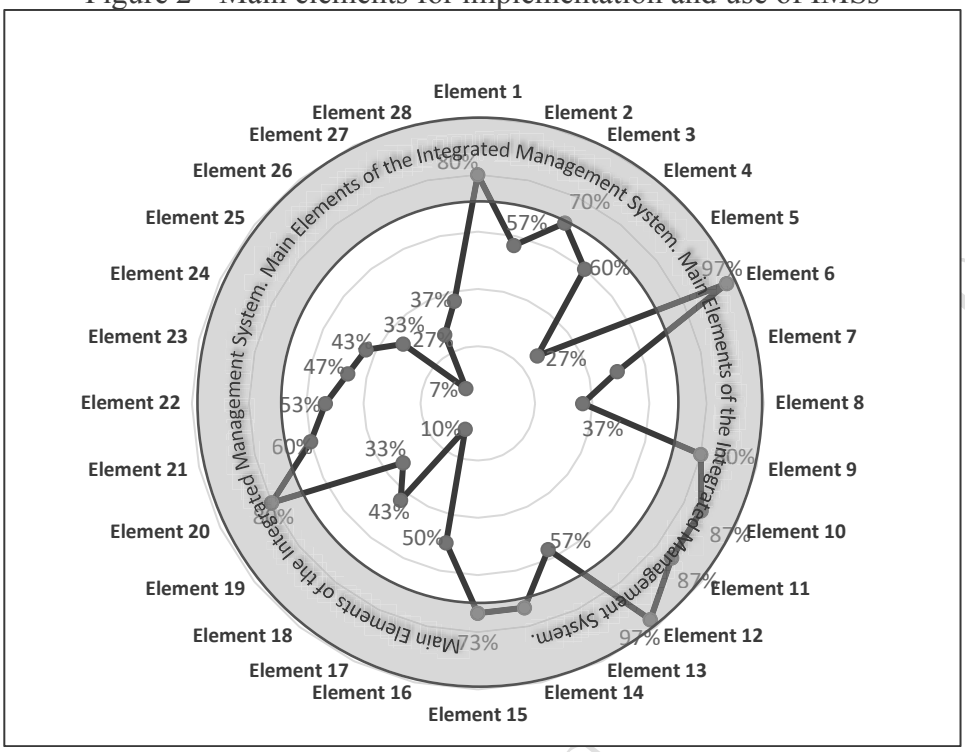
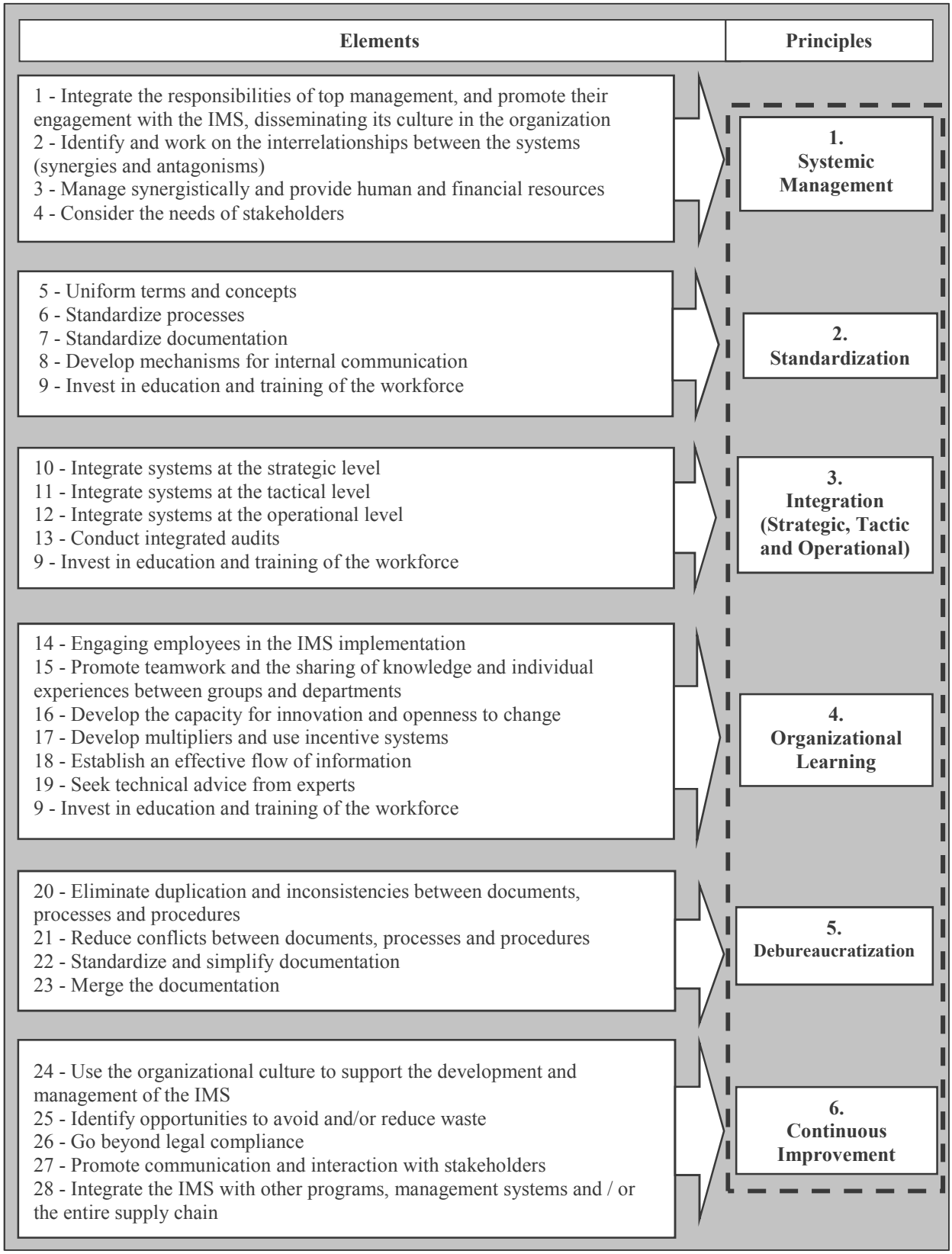


Figure 2 - Main elements for implementation and use of IMSs



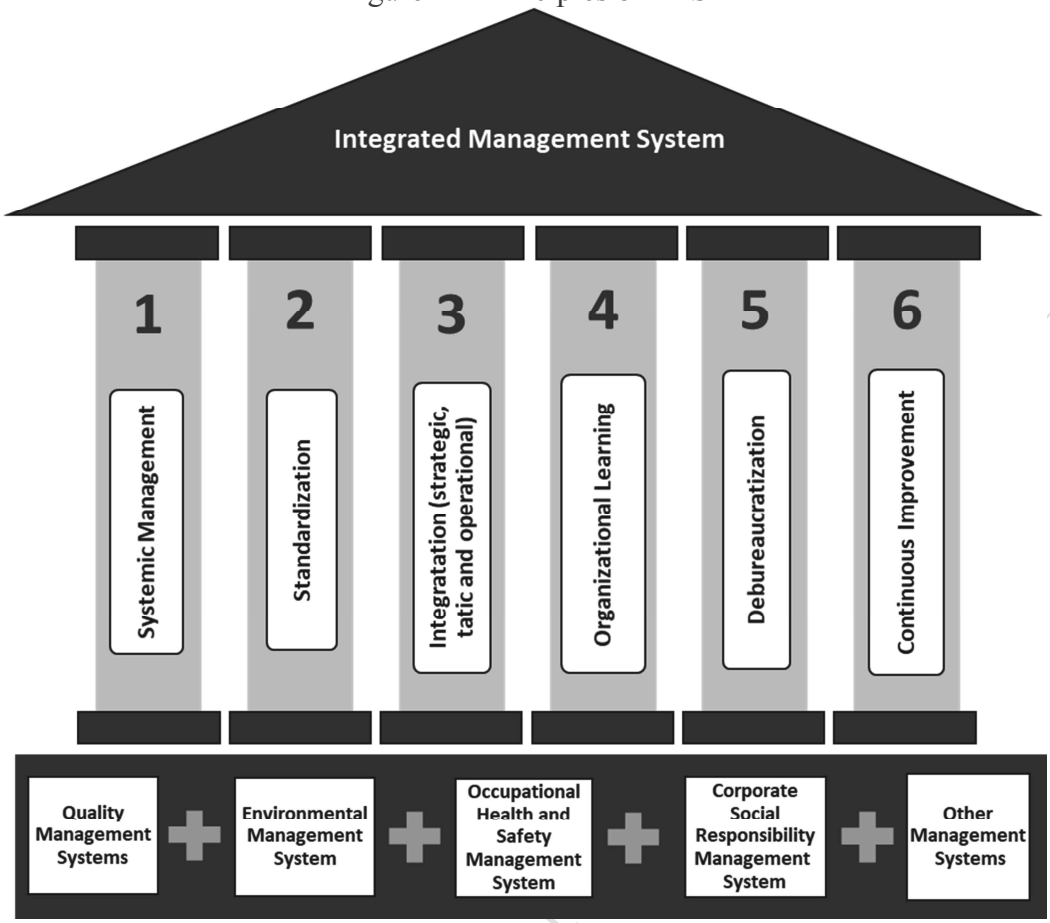
Source: Authors.

Figure 3 - Systematization of the principles of IMS



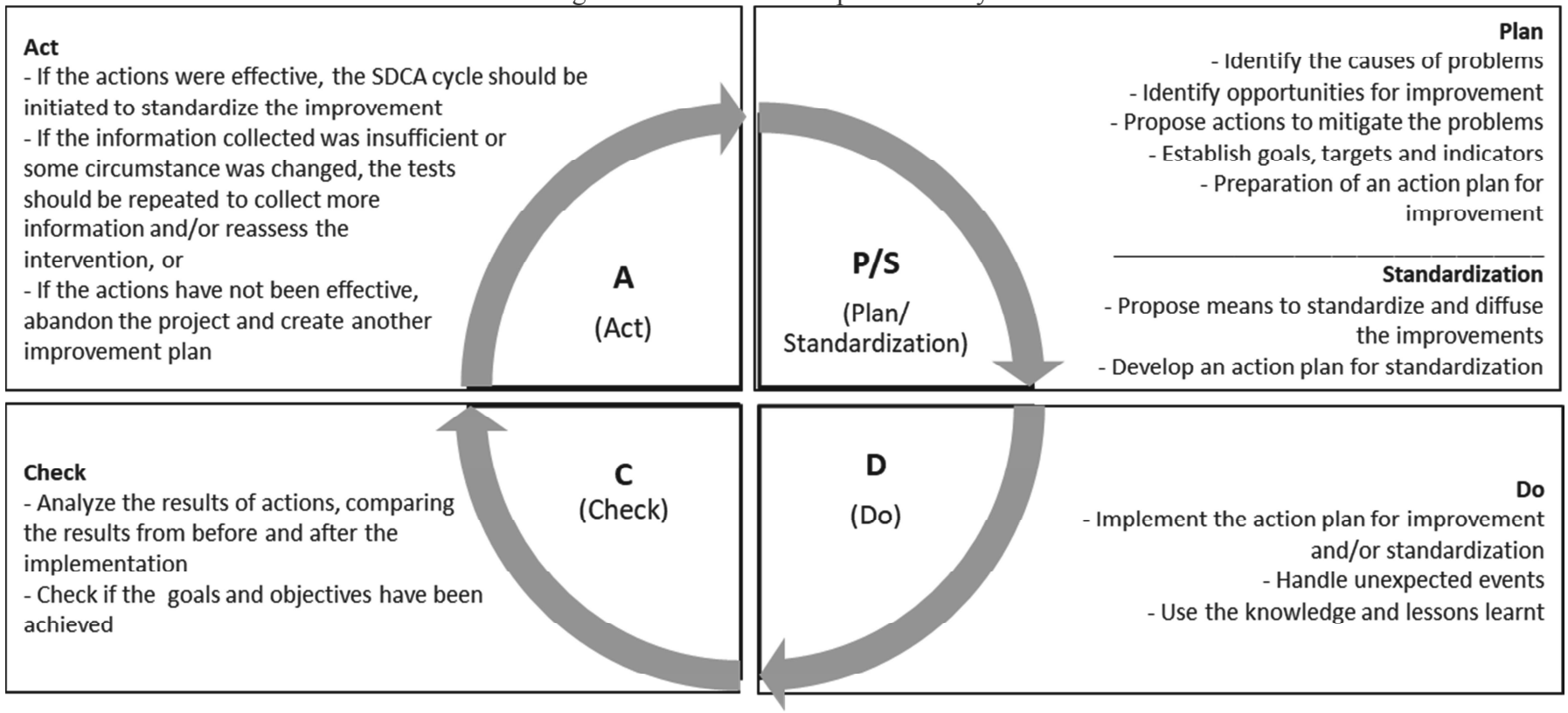
Source: Authors.

Figure 4 – Principles of IMS



Source: Authors.

Figure 5 – Continuous improvement cycle



Source: Based on Gorenflo and Moran (2009).