

Information Security and Quality Management Systems Integration: Implementation in an Institution Specialized in Exams Organization

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Abstract

This research aims to analyze critical factors to support information security and quality management systems integration, based on ISO 27001 and ISO 9001. The literature review raised factors such as: implantation model, human resources, resource availability, standards issues and standards integration. In a qualitative research conducted with experts' consultants, the theoretical factors were analyzed. It is important to understand the critical factors to ensure that managers allocate resources appropriately when implementing and maintaining an integrated certified management system.

Keywords

Critical Factors, Integrated Certified Management Systems, ISO 27001, ISO 9001 and Analytic Hierarchy Process.

1. Introduction

The certified management systems implementation aims to continuously improve companies results, with professionalization and efficiency gains. The business success depends on satisfaction and overcoming of customer expectations in questions such as service quality, meeting the agreed terms, information's reliability. Adequacy to certified systems makes processes more efficient, improves specifications and provides greater control. The process standardization and the definition of responsibilities make companies more organized, with less rework and waste, generating increased efficiency and quality of products and services (Maekawa et al. 2013).

The ABNT NBR ISO 9001:2015 - Quality Management Systems (ABNT 2015) standard promotes the adoption of a process approach when developing, implementing and improving the effectiveness of a quality management system, aiming to increase customer and stakeholder's satisfaction, attending their requirements (Mesquida and Mas 2015).

In a competitive world, only organizations that take advantage of the benefits that the best information can provide for decision making are able to prosper (Proença and Borbinha 2018, Gaspar and Popescu 2018, and Fomin et al. 2008). With technological advances, access to privileged information can become a differential, so companies are subject to invasion by malicious people or organizations. The information leakage can damage companies' reputation and competitiveness (Proença and Borbinha 2018; Tatiara et al. 2018, Rienzo et al. 2018, and Fazenda and Fagundes 2015).

The adequacy to ABNT NBR ISO/IEC 27001:2013 - Information Security Management Systems (ABNT 2013) standard allows organizations to conduct and effectively protect critical information, reflects the assessment of information processes, a proactive attitude of the company in relation to information security and shows that, in compliance with an international standard, the institution can be more trustworthy. In a competitive market, ISO 27001 can be a differentiation point from competitors (Longras et al. 2018, Hsu et al. 2016, and Fomin et al. 2008).

Several companies choose to implement more than one certified management system to guarantee the effectiveness and reliability of their processes. The need to have a global view of these systems, in order to align the objectives and facilitate decision making provokes the desire to integrate the systems (Mesquida et al. 2010). The integration of

certified management systems can be understood as the combination of different systems in a single more effective one (Bernardo et al. 2008, and Beckmerhagen et al. 2003).

Rebelo et al. (2015) indicate that one of the difficulties that companies are facing is not having a model that guides the integration of management systems, therefore, the assessment of the real situation, motivations, advantages, disadvantages and limitations is an area of research needed. Nunhes et al. (2013) and Bernardo et al. (2008) suggest researching the difficulties faced in the integration of certified management systems. Abad et al. (2016) researched the difficulties in integrating certified management systems (quality, environmental and occupational health and safety) in Spanish companies and suggest new studies in different sectors and in different geographical contexts.

As an academic contribution, this study can collaborate to the current literature, increasing the existing content about information and quality management systems integration and it is important to understand the critical factors to ensure that managers allocate resources appropriately when implementing and maintaining an integrated certified management system.

With the current competition, one of the companies' challenges is to ensure that the customer does not choose the product/service at value but sees the cost-benefit of choosing an institution with a certified quality management system and in search of the certification of its information security system, with strong commitment to ethics, transparency and confidentiality.

This article is structured as follows: section 2 contains a literature review on certified management systems, quality management systems, information security management systems and integration of certified management systems, followed by a presentation of the method used in this research, in section 3. Subsequently, in section 4 the data collection is presented. In section 5 the empirical results are discussed. Section 6 presents the conclusion, followed by bibliographic references.

1.1 Objectives

The objective of this research is to analyze the factors that influence the integration of a certified information security management system based on ISO 27001 with an already certified quality management system based on ISO 9001, to guide the allocation of resources, in an institution that provides services for competitions, entrance exams and educational assessments, with 40 years of experience, that has 220 employees, works annually on more than 120 projects, evaluating about 3 million people and that deals with confidential exams information and candidates data. The exams organization market is competitive, moves many resources and impacts many people, so the institution's information security system is a constant target for invasion attempts.

2. Literature Review

The adoption of certified management systems according to the standards of the International Organization for Standardization (ISO), which are accepted worldwide, is a reality justified by competitive factors or by formal requirements of customers. Certification makes procedures more accurate and clearer and helps competition in globalized markets (Longras et al. 2018, Majernik et al. 2017, Rebelo et al. 2015, Britvic et al. 2014, Nunhes et al. 2013, Oliveira 2013, and Tari et al. 2012).

According to a report published by ISO, in Brazil in 2018 16,351 ISO 9001 certificates and 110 ISO 27001 certificates were issued. 878,664 ISO 9001 certificates and 31,910 ISO 27001 certificates were issued worldwide (The ISO Survey 2018).

Companies that implement a quality management system focus on providing more value to their customers and stakeholders and improving the processes efficiency. Continuous improvement of processes and product quality leads to increased revenues through product reliability and reduced costs (Tari et al. 2012).

There are several benefits perceived with ISO 9001, such as improvement in internal organization, in information flow and in the ability of employees to develop new products, progress in communication and in company's routine, greater clarity of objectives with strategic guidelines and business goals, and reliability of the company's brand with

consumers (Almeida et al. 2017, Maekawa et al. 2013, and Santos et al. 2011). ISO 9001 directly improves decision flow management by improving procedures and policies and can be a catalyst for change at all hierarchical and process levels (Almeida et al. 2017).

2.1 Information Security Management Systems

Driven by competition, improved services and work efficiency, most organizations work more with information technology. With the increase in cyber-attacks and viruses it is necessary to adopt strict security procedures (Tu and Yuan 2014, and Abusaad et al. 2011).

According to Boehmer (2009), the companies most susceptible to loss of profit due to a successful cyber-attack are those that would have an interest in protecting information technology assets. Therefore, it would be possible to think that only information technology companies or that deal with critical and confidential information such as banks, financial institutions, telecommunications industries, could benefit from ISO 27001 certification, however, currently one of the most important aspects of organizations is information security. Managing and protecting information has become a challenge because companies' assets are increasingly digitalized, gradually the work is more based on information technology and there is greater interaction between institutions (Proença and Borbinha 2018, Khajouei et al. 2017, and Fomin et al. 2008).

In addition, in their research, Longras et al. (2018) released data from a report that analyzed 53,000 information security incidents and 2,216 data breaches. The conclusion points out that part of the attacks is committed by internal agents to the organizations, which demonstrates that the human factor is one of the vulnerability points, increasing the difficulty of preventing incidents.

Several organizations are seeking ISO 27001 to comply with information security rules, aiming to feel more secure, while demonstrating credibility to their customers. Certification enables companies to meet security auditing demands, promotes confidence in the organization's stakeholders by establishing appropriate control processes to manage and protect confidential information. Monitoring is necessary to verify that the system's performance is as expected (Longras et al. 2018).

The establishment of an information security management system may not immediately reduce risks, but it is a tool that allows the organization to systematically control the level of information security and performance (Longras et al. 2018, and Britvic et al. 2013). The objective of ISO 27001 standard is to manage the system to avoid losses. It is necessary to identify, control and treat the existing risks in the organization's environment, minimizing their effects (Longras et al. 2018, and Hsu et al. 2016).

Fazenda and Fagundes (2015) conducted qualitative approach interviews in ISO 27001 certified companies or with the established management system and identified the main benefits that the establishment of this management system was bringing to organizations: image and marketing improvements, increase the availability of Information Technology infrastructure environments, reduction in infrastructure costs, important support in the governance process, mapping of security flaws in organizational environments and credibility with customers.

In Table 1, there is a compilation of factors that influence implementation of ISO 27001 and ISO 9001 standards, researched by several authors. The purpose of this compilation is to verify whether common factors are perceived in the implementation of the two standards. The table was organized with words or phrases different from those presented in the articles, but which were grouped due to the understanding that they are similar.

Table 1. Common ISO 27001 and ISO 9001 factors

Factor	Standard	Description	Authors
Leadership	ISO 27001	Support/involvement from top management.	Fazenda and Fagundes 2015, Abusaad et al. 2011
	ISO 9001	Top management commitment.	Almeida et al. 2017
Human Resources	ISO 27001	Team training.	Fazenda and Fagundes 2015, Mueller et al. 2011, Abusaad et al. 2011
	ISO 27001	Employee resistance to change.	Longras et al. 2018, Fazenda and Fagundes 2015, Abusaad et al. 2011
	ISO 9001	Reliability and commitment of the quality team.	Almeida et al. 2017
	ISO 9001	Making people aware of the meaning of ISO 9001.	Almeida et al. 2017
	ISO 9001	Defined responsibilities and authorities.	Almeida et al. 2017, Pinto et al. 2006
	ISO 9001	Employee resistance to change.	Maekawa et al. 2013
Organizational Culture	ISO 27001	Influence of local culture.	Fazenda and Fagundes 2015, Abusaad et al. 2011
	ISO 9001	Influence of local culture.	Almeida et al. 2017
Resource Availability	ISO 27001	Implementation and certification cost.	Longras et al. 2018
	ISO 9001	Resource availability.	Almeida et al. 2017
	ISO 9001	Calculation of expenses and gains with the program.	Pinto et al. 2006
Implementation activities	ISO 27001	Need for adequate risk analysis.	Fazenda and Fagundes 2015
	ISO 27001	Need of support for integration of local security tools.	Mueller et al. 2011
	ISO 27001	Need to establish a common vocabulary between the different hierarchical levels.	Mueller et al. 2011
	ISO 27001	Need to identify the organization's assets.	Abusaad et al. 2011
	ISO 27001	Importance of scoping.	Longras et al. 2018
	ISO 27001	Importance of standard interpretation.	Longras et al. 2018, Abusaad et al. 2011
	ISO 27001	Importance of correctly allocating roles or tasks to different employees.	Longras et al. 2018
	ISO 9001	Programming for implementation, process of approach and analysis of the measurement system.	Almeida et al. 2017
	ISO 9001	Preparation of the necessary documents for certification.	Pinto et al. 2006
	ISO 9001	Integration between departments.	Almeida et al. 2017
ISO 9001	Complexity of operations carried out by organizations.	Almeida et al. 2017, Pinto et al. 2006	

In an analysis of the table, is perceived the similarity between the factors that influenced the implementation of management systems based on the two standards, such as the importance of support from senior management, the involvement of human resources, the influence of local culture, the relevance of making resources available and the need to carry out activities effectively for the success of the implementation.

The factors identified in literature review are described below:

- **Leadership:** this factor is related to the support that top management gives to employees during the process, ensuring efficient guidance and communication so that the final objective is achieved (Almeida et al. 2017, and Tu and Yuan 2014), as well as the contribution resources needed (Fazenda and Fagundes 2015, and Tu and Yuan 2014).
- **Human resources:** team training and knowledge of the standard to be implemented are facilitators during the process (Fazenda and Fagundes 2015, and Abusaad et al. 2011); resistance to change is due to the implementation of more controls, tasks seen as bureaucratic, greater effort for employees (Fazenda and Fagundes 2015).
- **Organizational culture:** beliefs that characterize organizational behavior (Almeida et al. 2017). Regarding information security, it needs to evolve, because in some cases, employees tend to protect only computers. There is an excess of confidence in co-workers and there is no adequate record of information security incidents (Fazenda and Fagundes 2015).
- **Resource availability:** the implementation of a certified management system depends on support, structure and technical capabilities (Almeida et al. 2017).
- **Implementation activities:** importance of support and knowledge to perform the tasks of implementing a standard, such as the preparation of risk analysis (in the case of ISO 27001), which impacts the project, as it is from this process that policies are generated (Fazenda and Fagundes 2015).

2.2 Certified Management Systems Integration

Maintaining separate certified management systems requires duplicate tasks, causes complexity in internal management increasing failures possibilities, low efficiency, cultural incompatibility, increases costs and has a negative impact on most stakeholders, including employees and customers (Nunhes et al. 2013, Heston and Phifer 2011, Zeng et al. 2007, and Beckmerhagen et al. 2003).

In a survey carried out in Catalonia with 176 companies, Karapetrovic and Casadesús (2009) concluded that 85% of them decided to implement certified management systems in an integrated manner. A similar conclusion was reached by Britvic et al. (2014) in a survey of 210 companies in Croatia.

With the certified management systems integration, advantages can be realized, such as eliminating conflicts between individual management systems, optimizing resources, strategic organizational benefits, reducing the number of audits, as well as the time spent in associated costs (Rebelo et al. 2015, Olaru et al. 2014, Oliveira 2013, Simon et al. 2012, Tari et al. 2012, Santos et al. 2011, and Salomone 2008). Actions are recommended for the efficient management of resources and the establishment of a plan, specifying the objectives. It was observed that motivation of people involved is an important factor for integration success.

The current editions of ISO standards are organized in a high-level structure and allow greater effectiveness in management systems integration, therefore, attempts to maintain several management systems simultaneously are difficult (Majernik et al. 2017, Mesquida et al. 2010, Fomin et al. 2008, and Zeng et al. 2007).

Table 2 summarizes the factors identified in the literature review that influence certified management systems integration. The table was organized with phrases different from those presented in the articles, but which were grouped due to the understanding that they are similar.

Table 2. Factors perceived in certified management systems integration

Factor	Description	Authors
Implantation Model	It is important to have a model to support the integration process.	Rebelo et al. 2015
	Technical guidance.	Zeng et al. 2007
Human Resources	Internal competence to deal with integrated systems.	Rebelo et al. 2015, Simon et al. 2012
	Training and changes in the organization's methods and culture.	Santos et al. 2011
	Job maintenance security, despite the combination of activities and probable misalignments of operational targets.	Beckmerhagen et al. 2003
	Employee resistance to change.	Abad et al. 2016, Rebelo et al. 2015, Zeng et al. 2007
Resource Availability	Resources provision for integration.	Rebelo et al. 2015, Olaru et al. 2014, Simon et al. 2012
	Higher costs to deploy simultaneously than individually; long implementation time.	Santos et al. 2011
Standards Issues	Importance of knowledge about implementation and certification standards.	Oliveira 2013, Simon et al. 2012, Santos et al. 2011, Salomone 2008, Zeng et al. 2007
	Support from certification bodies.	Salomone 2008, Zeng et al. 2007
	Perception that management systems are revolutionary and bureaucratic.	Olaru et al. 2014
	Need for an international standard for integrated systems.	Rebelo et al. 2015
Standards Integration	Importance of finding common denominators for many business functions.	Rebelo et al. 2015, Olaru et al. 2014, Oliveira 2013, Simon et al. 2012, Zeng et al. 2007, Beckmerhagen et al. 2003
	Perception that there is identity loss of specific function systems.	Beckmerhagen et al. 2003
	Importance of making it clear that systems integration is an objective.	Rebelo et al. 2015
	Importance of integrated audits.	Zeng et al. 2007
	Relevance of assigning importance levels to each system.	Salomone 2008
	Need to organize the integrated system.	Santos et al. 2011, Salomone 2008
	Changes in management system due to operational changes.	Santos et al. 2011

Rebelo et al. (2015) and Zeng et al. (2007) indicate the need for a model to guide integration and technical guidance. The other factors are mentioned by more authors in the researched literature.

The factors identified in the literature review are described below:

- **Implantation model:** refers to the importance of companies having a model that guides management systems integration (Rebelo et al. 2015). The existence of technical guidance and material adapted to the different management systems of large and small companies is seen as a relevant factor (Zeng et al. 2007).
- **Human resources:** the existence of internal competence to deal with integrated management systems can be a facilitating aspect during the process (Rebelo et al. 2015, and Simon et al. 2012); resistance to change occurs because it is common for people not to want to change the way they do things. Changing requires extra work and new procedures (Zeng et al. 2007).
- **Resource availability:** the adequate availability of resources for the process of integrating management systems is reported by many authors as a relevant factor (Rebelo et al. 2015, Olaru et al. 2014, and Simon et al. 2012).
- **Standards issues:** the aspect most reported by the authors was the importance of knowledge about the standards (Oliveira 2013, Simon et al. 2012, Santos et al. 2011, Salomone 2008, and Zeng et al. 2007); the need for support from certification bodies was also evidenced (Salomone 2008, and Zeng et al. 2007).
- **Standards integration:** it refers to the effective accomplishment of the necessary tasks for the management systems integration, such as the identification of common denominators for many business functions (Rebelo et al. 2015, Olaru et al. 2014, Oliveira 2013, Simon et al. 2012, Zeng et al. 2007, and Beckmerhagen et al. 2003).

3. Methods

This research used three stages: the first stage is the proposal of the work model that concerns the literature review and the result generated after the fieldwork; the second stage deals with the design of the fieldwork with the questionnaire elaboration; finally, the third stage refers to the realization of the field work, that is, the application of the questionnaire elaborated.

The literature review aimed to identify the factors that influence the integration of the information security management system (ISO 27001) with the quality management system (ISO 9001).

Articles from Scopus and Web of Science (2003-2019) were used, using search keys (strings) "ISO 9001" and "ISO 27001", "challenges ISO 27001", "barriers ISO 27001", "critical factors ISO 27001", "challenges ISO 9001", "integrated systems" and "implementing ISO 27001 after ISO 9001". 72 articles were identified and read for critical analysis of the literature and 38 articles were selected, 1 report issued by ISO and 2 ISO standards, considering that they dealt directly with the issue of implementing ISO 27001 or indirectly dealing with the implementation of other ISO standards, as well as the integration between the implemented standards (ISO 27001 and ISO 9001).

In parallel with the literature review, the design of the fieldwork took place through the elaboration of a structured questionnaire, directed to , aiming at the identification of factors that influence the integration of the ISO 27001 and ISO 9001 standards.

The questions were elaborated according to factors identified in literature (Table 2), following Forza (2002) research method, which states that the connection with the theoretical level should guide the questionnaire elaboration. The questions about the integration of the ISO 27001 standard with the ISO 9001 standard are listed in Table 3.

The fieldwork was carried out through a qualitative research. The use of a qualitative approach is justified, because "the subjective reality of the individuals involved in the research is considered relevant and contributes to the development of the research." (Martins 2012). In this case, the researcher needs to assimilate the individual interpretations to understand the researched complexity. The qualitative research started with the selection of respondents: professionals were searched in renowned certification bodies and in consulting companies with experience in implementing ISO 27001 and ISO 9001 standards.

Table 3. Structured questionnaire on the integration of ISO 27001 and ISO 9001 standards

Question	Objective
1. Of the companies in which you have consulted, what percentage of those who preferred to keep quality management and information security systems separate?	Identify the percentage of systems integration.
2. Did the decision to integrate the systems come from top management or was it the advice of the consultancy?	Identify top management involvement.
3. How did the employees involved react to the integration process?	Identify the role of the employees involved; identify whether there was resistance to change and the influence of local culture.
4. How do you describe human and financial resources allocation made by companies in relation to the need for the systems integration project?	Identify whether the resources were sufficient.
5. What were the main difficulties faced during the process of integrating standards in companies?	Identify the factors that influence system integration.
6. What could have been done to avoid or reduce the difficulties mentioned?	Identify activities that can contribute to process effectiveness.
7. What are the benefits perceived by companies with systems integration?	Identify the benefits brought by integration.

Table 4. Profile of the consultants who responded to the qualitative research

Consultant	Functions performed	Standards covered	Experience
1	Lead auditor, consultant, and teacher	ISO 27001; ISO 9001; Project management	More than 30 years of experience in Electronics and Information Technology areas More than 15 years of experience in management systems implementation.
2	Lead auditor and consultant	ISO 27001; ISO 9001; ISO 20000	More than 12 years of experience in the Telecommunications and Information Technology markets, in startups, participation in strategic planning and development of markets and new products and services.
3	Lead auditor, consultant, and teacher	ISO 27001; ISO 9001 ISO 14001; ISO 45001 GEOC 3; OEA	More than 10 years of experience in management systems and 30 years of experience working in Brazil and Portugal and having already audited in Colombia, Peru, Ecuador, Panama and Costa Rica.
4	Lead auditor and consultant	ISO 27001; ISO 20000-1; ISO 29110-4-1	Experience of 30 years in implementation and operation of management systems. 14 years of experience in coordinating the certification area for certification programs.
5	Lead auditor and consultant	ISO 27001; ISO 20000-1; ITIL Manager; COBIT	More than 13 years as a consultant in service management and information technology governance projects.
6	Lead auditor and consultant	ISO 27001; ISO 9001; ISO 14001; ISO 45001; ISO 20000-1; TL 9000; Good Privacy OHSAS 18001	16 years as a consultant. 30 years of experience in the telecommunications area.
7	Lead auditor and consultant	ISO 27001; ISO 9001; ISO 14001; ISO 13485; ISO 20000-1	More than 25 years of experience in Information Technology and Telecommunications and, working in strategic planning and development of management systems and controls.
8	Lead auditor and consultant	ISO 27001; ISO 9001; ISO 14001; ISO 20000-1; ISO 29110-4-1	Experience in the development of Information Technology solutions and services in the government and private areas. 15 years' experience with implementation and operationalization of management systems.
9	Lead auditor, consultant, and teacher	ISO 27001; ISO 9001; ISO 14001; ISO 20000-1; ISO 16001; OHSAS 18001; IQNETSR; Good Privacy	Experience of 30 years in management area and 22 years of experience in consulting and training in the mentioned standards.
10	Lead auditor, consultant, and teacher	ISO 27001; ISO 9001; ISO 20000-1; PROBARE	More than 29 years of experience working in Telecommunications and Information Technology. Lecturer for 40 years at universities in Software Engineering, participation in strategic planning and development of markets and new products and services.
11	Auditor and consultant	ISO 27001; ICP-Brasil; WebTrust	More than 6 years of experience in Governance, Risks and Compliance, Digital Certification, working on the implementation of standards and risk elimination in decision-making processes.

Regarding the number of respondents, a convenience sampling approach was adopted (Rea and Parker 2014). This sampling option provides significant support in collecting data and useful information that would not be possible using

probabilistic sampling techniques. In this case, the data found in the survey were used as a knowledge base and not generalized beyond the sample itself.

According to Forza (2002), in the planning phase, an appropriate adjustment must be made between rigor and feasibility. Considering the restrictions on time and access to consultants, it was decided to send the questionnaire to them by e-mail.

Then, a pilot was carried out with 2 expert consultants in ISO 27001 and ISO 9001 (profiles numbers 1 and 2 detailed in Table 4). The pilot made it possible to adjust question number 5 in Table 3 (the questions presented are in their final format).

After the pilot and the questionnaire adjustment, the qualitative research continued by sending the questionnaires by e-mail to 15 consultants (profiles number 3 onwards, detailed in Table 4). Nine returns were obtained, a quantity considered satisfactory, as the responses began to become similar.

The literature review, added to the application of the structured questionnaire, made it possible to identify the factors that influence the integration of ISO 27001 with ISO 9001. The answers can be seen in section 4.

4. Data Collection

Table 5 was prepared with the consultants' answers to the questions in Table 3, associated with each factor identified in literature.

Table 5. Answers about ISO 27001 and ISO 9001 standards integration

Factor	Description
Implantation Model	Factor not reported by respondents.
Human Resources	Information Technology employees felt that they lost strength and power in the integration process. Problems with staff training and understanding of how works the integrated systems. At the beginning of the process, some resistance was perceived in relation to loss of access to information. Resistance of information security personnel. Resistance due to the understanding that standards should be kept separate.
Resource Availability	In the beginning, the resources allocation was made inappropriately due to lack of knowledge, but with the maturity and tools of the management system, the allocation became more predictable.
Standards issues	An attention point was the need to plan the implementation of the system by creating rules and methods that met the standards while respecting the organization's culture and guidelines.
Standards Integration	Integration is not an easy process, as it involves all areas of the company.

5. Results and Discussion

To analyze the responses of section 4, the content analysis method was used. According to Stemler (2001), this is a systematic and replicable technique for compressing many words of text into fewer content categories based on explicit coding rules. The responses obtained were compared with the categories identified in literature, in order to identify their impact and relevance in the view of the consultants who were dealing with the implementation of the standards.

According to the responses to the questionnaires, it was possible to analyze that despite Rebelo et al. (2015), Abad et al. (2014) and Heston and Phifer (2011), agree that organizations that have a structured model of flexibility and systematization of integration, with clear guidelines to support the development of alignment and integration of management system requirements and that are faster and more efficient in the integration process will have an advantage competitive, the interviewees did not report the need for a model to guide the implementation of integrated management systems, when they were asked about the main difficulties faced during the integration process or what could have been done to reduce the difficulties.

Regarding employee involvement, the authors mention problems with competence (Rebelo et al. 2015, and Simon et al. 2012) and resistance to change (Abad et al. 2016, Rebelo et al. 2015, and Zeng et al. 2007). When implementing an integrated management system, companies must manage employee motivation, as the greater the motivation, the

better the result in reducing conflicts, providing an improvement in the reaction to changes brought about by integration (Simon et al. 2012). Similar factors were reported by consultants when they cited problems with staff training and resistance to changes due to loss of access to information or the understanding that standards should be kept separate.

The availability of resources for integration is relevant in the integration planning stage and must be outlined through careful work, in order to effectively respond to all regulatory requirements. The lack of resources can lead to inefficiencies and deviations (Rebelo et al. 2015). One of the benefits perceived after the completion of the process is cost reduction, however, Santos et al. (2011) showed higher costs to implement the management systems simultaneously than individually.

In the survey conducted with the consultants, the difficulty with the availability of resources was reported by one consultant, who described the inappropriate allocation at the beginning of the process, but which was improved with the maturity of the integrated system. The other interviewees did not report such difficulties.

Knowledge about certification standards has become increasingly important, not only for implementation, but also for the operation and maintenance of an integrated management system (Zeng et al. 2007). This foundation of knowledge is relevant to minimize the point of attention highlighted by one consultant, which refers to the need to plan integration so that the standard is met, while respecting the organization's culture and guidelines.

Regarding the integration of the ISO 27001 and ISO 9001 standards, difficulties in finding common denominators for various business functions (Rebelo et al. 2015, Olaru et al. 2014, Oliveira 2013, Simon et al. 2012, Zeng et al. 2007, and Beckmerhagen et al. 2003) and the disappearance of unique identities of specific function systems (Beckmerhagen et al. 2003), are some obstacles on the way to management systems integration. These barriers were also pointed out by one consultant when he reported his understanding that integration is not simple, as it impacts all areas of the company, showing the need for commitment in pursuit of the goal and efficient communication.

In this survey, of the nine consultants interviewed, seven worked with the integrated certification of ISO 27001 with ISO 9001 and two implemented the two management systems separately.

6. Conclusion

On theoretical side, this study contributes to the existing literature, enriching the content about integration of information security and quality management systems.

On management side, the research findings will help to improve the integration process between ISO 27001 and ISO 9001. The factors identified and confirmed by the consultants are relevant for successful implementation.

As measures to minimize the factors perceived in the integration of the certified management systems, the suggestion of the consultants would be to guide and make employees aware of the phases of the integration process and to train the personnel involved in the process.

As benefits of the integration of the ISO 27001 and ISO 9001 standards, the interviewees perceived: use of the resources of the existing management system, objectives alignment, lower cost, less resources allocation, time optimization, single basis of management control, allowing the risks reduction in making strategic decisions, better synergy and internal communication, less difficulty in employee participation and reduction of the impact of information leakage.

A future version of this work could prioritize the factors, using a Multiple Criteria Decision Making (MCDM) such as Analytic Hierarchy Process (AHP).

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