

Food Safety Management Systems Implementation And Certification: Survey Results

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Abstract

The worldwide food safety management systems implementation and certification had significantly increased during the last few years, thus reflecting the importance that those standards assumed for some activity sectors. Based on the literature review carried out, there is a large number of research projects conducted in this area. However, as Portugal is concern, the nationwide research projects related to ISO 22000 are scarce. Therefore, this paper reflects what we believe to be a pioneering contribution in order to characterize the food safety management systems adoption by the Portuguese companies. In more detail, our aim is to provide fact-based insights, among other, to the following issues: Which are ISO 22000 certification motivations and benefits? Which are ISO 22000 main obstacles, difficulties and drawbacks? What are the benefits and costs directly related to the food management system implementation, certification and maintenance? Which are the food management systems market evolution perspectives? In order to answer to the previous issues our research methodology was based on a survey that was e-mailed to the ISO 22000 Portuguese certified companies.

Keywords

ISO 22000, food safety management systems, survey

1. Introduction

The food products safety was affected in the previous years by successive crises in the alimentary chain. As a way to re-establish the confidence of the consumers, it is necessary that food organizations prevent this kind of situations. The increasing concerns among the consumers related to food safety have been addressed by the competent authorities, through the publication of communitarian legislation and the ISO 22000:2005.

In September 2005, the International Organization for Standardization (ISO) had published the ISO 22000:2005 standard - Food safety management systems – Requirements, that is applicable to any organization in the food chain". This standard integrates the requirements defined by ISO 9001 and the methodology used by HACCP (Hazard analysis and critical control points management system).

Based on the literature review carried out we were able to find out that there are a lot of studies related to food safety management systems implementation and certification, mainly related to HACCP. However, as Portugal is concern, the research projects conducted concerning this issue are scarce. Thus, our aim was to conduct a research project in order to study the ISO 22000 adoption by the Portuguese food companies.

The main goals of this work had been the following ones:

- To identify the ISO 22000 implementation and certification motivations;
- To identify the ISO 22000 implementation benefits and difficulties;
- To identify ISO 22000 market evolution perspectives;
- To identify the costs and benefits directly related to the implementation and certification of food safety management systems.

In order to address to the previous research issues, we have conducted a large scale survey among all the ISO 22000 Portuguese companies.

2. Literature Review

ISO 22000:2005 standard is based on the Codex Alimentarius HACCP principles and it was developed lined up with the ISO 9001 standard in order to improve the compatibility and integration with the quality management standard.

In the group of enterprises with the HACCP system in full operation, there was advanced voluntary implementation. Also, the prior adoption of ISO 9000 had a direct influence on the implementation of HACCP for these firms. For implementation, it is important that enterprises have the information necessary to evaluate concretely the magnitude of the costs in each type of plant prior to implementation [1].

In practice, HACCP application in regulation has contained elements of process, performance, and information standards. In the European Union, it replaces more prescriptive regulation specifying GMPs (Good Manufacturing Practices), and thus gives firms greater flexibility.

There is a general requirement now for food safety controls based on “HACCP principles” to be applied. However, there are no specifics on what these systems should include, and some flexibility remains with member countries in the implementation [2].

Adoption of HACCP as a regulatory standard has been motivated first by food safety concerns, and only second by a desire to facilitate trade. The process of facilitating trade will require mutual recognition of HACCP regulations across national boundaries. One trend that may influence such recognition is the use of HACCP as a private standard for international trade. The ISO 9000 certification series for food companies is being adapted for certification of private HACCP programmes. Such private developments may facilitate eventual harmonization of HACCP regulation among countries [2].

The identified CCP (Critical Control Points) numbers directly interfere with resources necessary to implement, develop and maintain an HACCP plan. Reduction of the identified CCP number caused a decrease in cumulative cost after the fourth month. Thus, the estimated costs for the implementation and maintenance of HACCP plan considering the previous compliance of industry to the pre-requisites were lower than those spent with the HACCP plan without compliance of the GMP/SSOP (Good Manufacturing Practice” and “Sanitation Standard Operational Procedures) pre-requisites. This fact emphasizes the importance of a solid pre-requisite program to improve economic viability for HACCP implementation [3].

The implementation and maintenance of the HACCP system can be enriched if the company takes in consideration the whole experience of the other implemented managements systems. If the company has other management systems implemented, the HACCP system should be integrated in the companies’ management system. According to the ISO 22000 standard, the food safety management system will be more effective if established, operated and updated within the framework of a structured management system and if integrated in the overall organization management activities. Thus, there will be a maximum benefit for the organization and stakeholders.

An ISO 22000 certified organization demonstrates the ability to provide safe products, in accordance with government requirements and regulations, and consumers needs, promoting the continuous improvement. There is a big confusion between pre-requisite programs and HACCP plan, their relations and how they should be managed. This gets worse because there is a lack of specific hazard analysis. The reasons for this misunderstanding are located on negative guideline factors and lack of understanding, being difficult to say which barrier takes place first. As all this occurs among industry personnel and external consultant, it generates a barrier of negative external factors [5]. According to Vela and Fernandez, there are also interactions between attitude related barriers (lack of agreement and lack of outcome expectancy) which are obstructing the change of behaviour although there is motivation to do so. It should be convenient to plan activities targeted to consultants, managers and owners with the aim of improving knowledge and understanding. There are also interactions between attitude related barriers (lack of agreement and lack of outcome expectancy) which are obstructing the change of behaviour although there is motivation to do so. It should be convenient to plan activities targeted to consultants, managers and owners with the aim of improving knowledge and understanding [5].

The HACCP system is a preventive system in which food safety can be designed into the product and the process by which it is produced. It is a system of product design and process control. The HACCP system is very effective at

controlling identified hazards. Most importantly, it does not rely upon product testing to assure food safety [4]. During the first three decades of existence, the HACCP system spread into the food processing industry of the US, and into other countries. Toward the end of this period, government regulatory agencies began to replace their inspection programs, based upon infrequent plant visits, with audit programs, based upon a review of continuous HACCP records [4]. During the 1990s, the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) and the Codex Alimentarius Commission Committee on Food Hygiene (CACCFH) expanded the early HACCP applications and published documents on HACCP principles and guidelines for its implementation [4].

Based on the literature review that had been carried out and as far as we were able to find out, the ISO 22000 literature is scarce. Thus, this research paper tries to be one of the pioneering contributors to the food safety management system research area, mainly in terms of quantitative and qualitative analyses.

3. Research Methodology

Based on the literature review carried out we have defined our research questions and we have developed the questionnaire first version (draft one). This version was tested during January 2010 with the aim of identifying the issues that needed to be improved. This phase has taken place in a Portuguese consultancy company that implements food safety management systems according to the ISO 22000 standard.

Based on the suggestions and comments that have been collected during the pre-test phase we have improved the questionnaire and the final version was sent by e-mail to 144 ISO 22000 certified companies. The response rate was of 37% (62 valid questionnaires).

The questionnaire was composed by 6 groups of questions. In the first group our aim was to collect general information related to the respondent company (companies' dimension and activity sector, if the company had integrated the ISO 22000 standard with other management standards, etc). The second group had intended to identify the motivations that lead the Portuguese organizations to implement and certify a food safety management system according to the ISO 22000 standard. In the third group our aim was to identify which had been the most important benefits that have derived from the food safety management system implementation. Group four was related to implementation difficulties and drawbacks. Additionally, companies had to identify which of the standard clauses and sub-clauses had been more difficult to implement. Group five was related to implementation and certification costs and to evaluate the ISO 22000 certification impact in the final consumer. Finally, in group six we have tried to evaluate the evolution perspectives concerning ISO 22000 certification. The scale adopted in the questionnaire was a five-point Likert scale.

4. Results Obtained

The SPSS package version 18.0 was used to analyze the data. In this section we present the main results obtained with this research.

4.1. General characterization of the organizations

The majority of the surveyed companies were of medium dimension (51.6%) – number of employees between 50 and 249. Concerning the companies activity sector, the majority of the respondents companies belong to the “Manufacture of other food products” (25.8%). Furthermore we have surveyed the companies in order to find out if they have an additional certification to the ISO 22000. Sixty eight per cent (68%) of the companies were certified according to other standard, and 36% did present a certified quality management system.

As is illustrated in Table 1, the majority of the companies became ISO 22000 certified in 2008 (27.4%) and 2009 (26.8%).

Table 1: Year of Certification

Year	# organization	(%)
2005	4	6,5
2006	5	8,1
2007	9	14,5
2008	17	27,4

2009	16	25,8
2010	5	8,1

4.2. Motivations for ISO 22000 certification

As is illustrated in Figure 1 the surveyed companies ISO 22000 most important motivation was “To guarantee the confidence of the consumers” with a score of 50%, followed by “Customers requirement” (33.8%). “Market differentiation” and “Involvement and commitment of the food chain in the product safety” were also appointed as important motivations for those companies that implement a food safety management system according ISO 22000 with scores of, respectively, 32.3% and 32.2%. According to the results obtained one could conclude that the most important ISO 22000 motivation among the Portuguese certified companies is of internal nature.

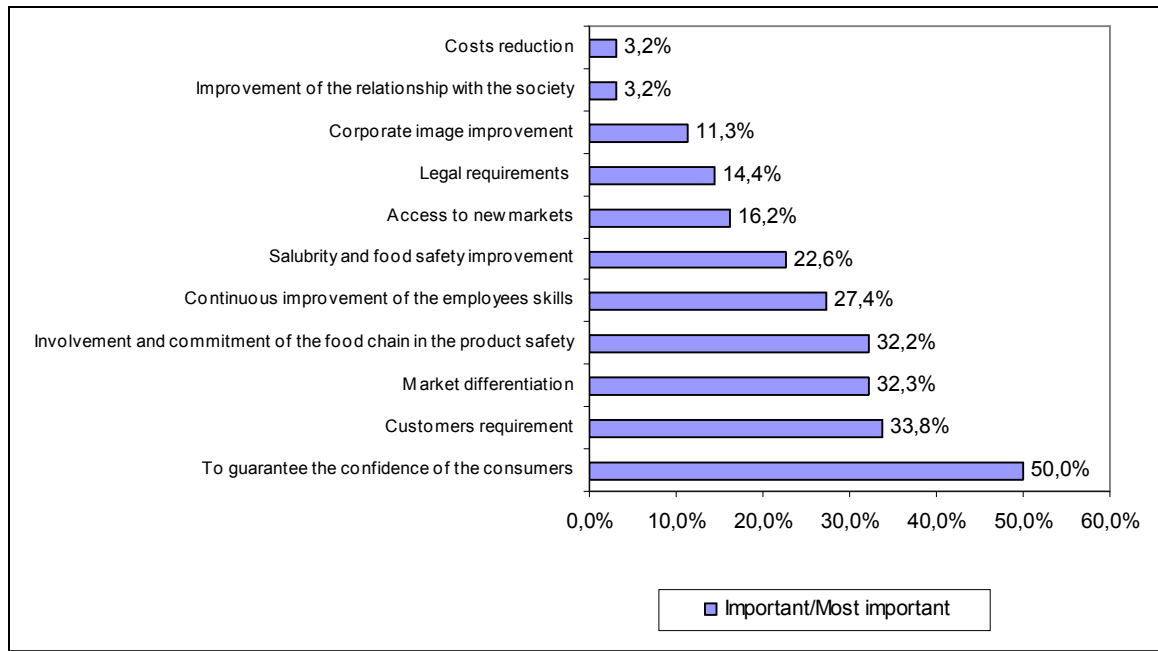


Figure 1: ISO 22000 certification motivations.

4.3. Benefits for certification ISO 22000

In Figure 2 is presented the ISO 22000 benefits analysis. As is illustrated in the figure, the most common ISO 22000 benefit cited by the inquired companies was “Improvement of food safety methodologies and practices, and management system related documentation” (50%), followed by “Improvement of customers and other interested parts satisfaction” with a score of 32.2%. As it was verified for the ISO 22000 certification motivations, the most important benefit stated by the respondents companies was of internal nature.

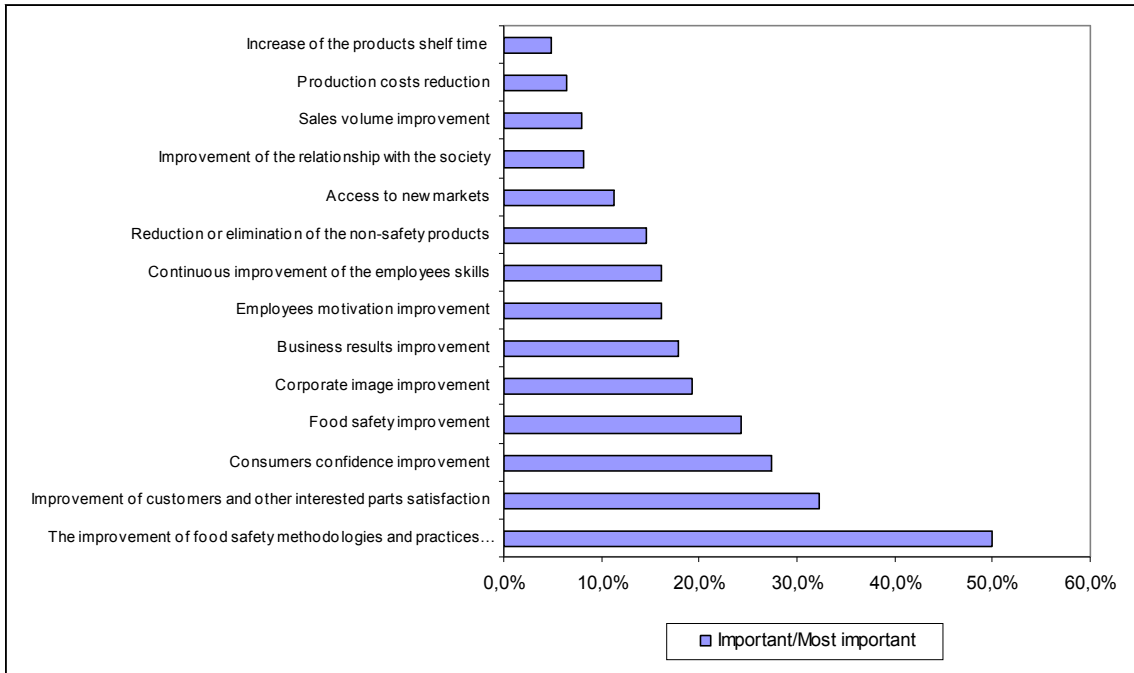


Figure 2: ISO 22000 certification benefits.

Table 2, 3 and 4 illustrates the areas where the food safety management system implementation had more impact. After the system implementation the company workers had become more food safety oriented (4.50). Additionally, the product became safer (3.87), it was verified a decrease of the food risks (3.77) and the company workers became more motivated (3.69). According to the respondents companies, the food safety management system implementation had no significant impact over the products shelf time (2.00).

Table 2: Food safety management system impact.

Benefits	Average	Standard deviation
The food safety management system implementation and certification allow the access to new markets.	3.02	1.408
It was verified an increase of the sales volume.	2.52	1.264
It was verified a reduction of the costs.	2.35	1.294
It was verified an increase of the shelf time of the products.	2.00	1.255

Table 3: Food safety product impact.

Benefits	Average	Standard deviation
The product became safer.	3.87	0.877
It was verified a decrease of the food risks.	3.77	1.015
The number of non-conforming products has decreased.	3.39	1.178

Table 4: Food safety human resources impact.

Benefits	Average	Standard deviation
The workers are more food safety oriented.	4.50	0.594
It was verified an increase of the workers motivation.	3.69	0.934

4.4. Difficulties for certification ISO 22000

In this section we will analyze the food safety management system most important difficulties and drawbacks. As is illustrated in Figure 3 the most cited difficulty by the surveyed companies was the “Internal resistance to change”, with a score of 38.7%, followed by “Food safety management system implementation costs” (33.8%) and “Employees qualification”.

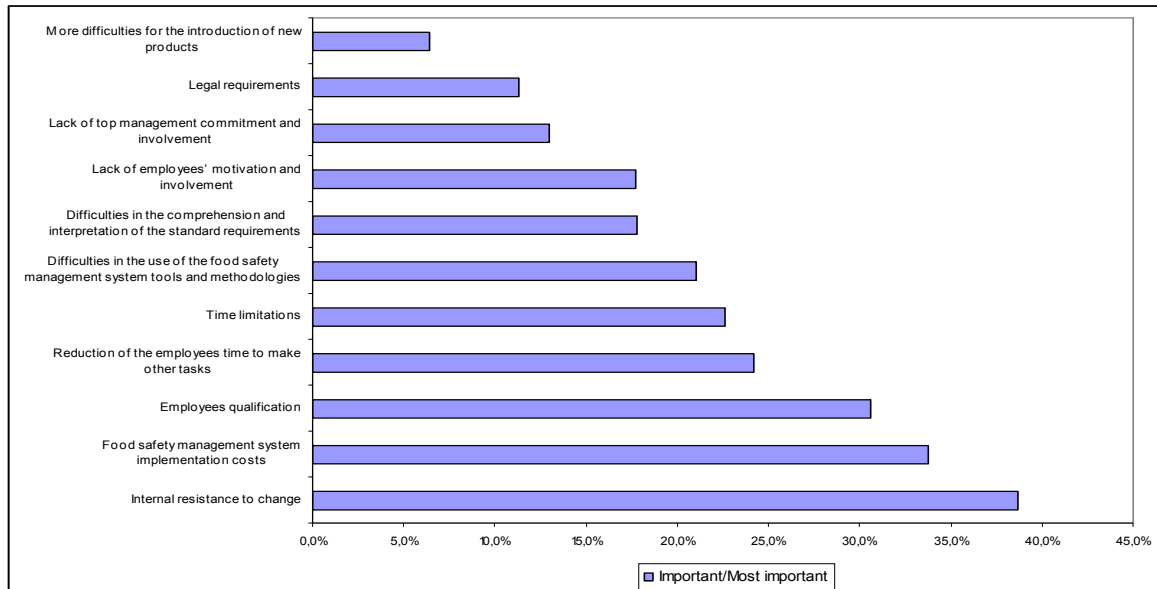


Figure 3: Food safety management system implementation difficulties

4.5. ISO 22000 Clauses Implementation Difficulties

Concerning the ISO 22000 clauses difficulty level of implementation we were able to find out the following top 5: “Verification plan” (37.1%), “Hazard Analysis” (33.9%), “Human resources competence, awareness and qualification” (30.6%), “Implementation of a HACCP plan” (25.8%) and “Monitoring and measurement control” (22.6%).

4.6. Food safety management system benefits and companies' dimension

In this section we analyze if the food safety management system benefits are related to the company dimension, in terms of the number of employees, for a significance level of 5%. We only present in this paper the significant relationships that had been found.

We have verified that there were significant statistical differences between Micro and Large companies concerning the access to new markets after the system implementation and certification (p-value of 0.043). The average score is higher for the medium-size companies (2.97) than for the large ones (2.45), allowing us to conclude that this is a more important benefit for a medium company.

For a p-value of 0.023 and of 0.019, respectively, significant statistical differences were found between Micro (2.67) a Small (3.81) companies and between Micro (2.67) and Medium (3.81) companies concerning the reduction of the food risks. According to the average values, the importance of this benefit increases with the company dimension.

There were also significant statistical differences concerning the commitment and involvement of the employees in the hygiene and food safety issues between the Micro and Medium companies (p-value of 0.013) and between the Micro and Large ones (p-value of 0.06). The employees' commitment is higher in the Medium (4.56) and Large (4.73) companies than in the Micro (3.67) ones.

4.7. Direct costs and financial benefits related to the food safety management system implementation and certification

The direct costs related to the food safety management system implementation and certification include the employees' qualification and training, technical support, ISO 22000 certification and equipments calibration. Forty two per cent (41.9%) of the surveyed organizations did present implementation and certification costs less than 15.000€. Concerning the maintenance costs (equipment and technology, employees qualification and training, consultancy, certification and equipments calibration), 62.9% of the companies had stated costs less than 15.000€.

Additionally we have also analyzed if the companies had needed to perform any technological or equipment change as a result of the food safety management system implementation. Thirty six per cent (35.5%) of the surveyed companies had indicated that had performed technological changes with a total cost less than 15.000€.

Concerning the financial benefits that have directly derived from the food safety management system implementation and certification, 75.81% of the companies have stated that they were not able to quantify those improvements. Concerning the firms that were able to do it, the majority of them had reported financial benefits below 15.000€ (11.3%).

It is important to point out that 64.5% of the companies had reached the expected benefits as a result of the food safety management system implementation. The organizations that did not reach the expected benefits had pointed out the following reasons: "The market does not recognise the importance of ISO 22000 certification" (9.7%), the "The implementation and maintenance cost are higher than the benefits obtained" (6.5%), and finally the "Increase of the bureaucracy as a result of the food safety management system implementation" (3.2%). Fifty three per cent (53.2%) of the companies had stated that the benefits derived from the ISO 22000 implementation are higher than the cost associated, and 40.3% had stated that ISO 22000 in the final consumer perspective.

4.8. The future of the food safety management systems certification in Portugal

In the last section of the questionnaire we have analyzed the ISO 22000 certified companies perception concerning the future of food safety management systems. Thus, we were able to verify that, on average, for all the proposed scenarios the companies feeling is more oriented for the positive scenario (right side of Figure 4). With the exception of "Application of the food safety management systems current verification and improvement tools / Development of new tools and methodologies" scenario, the remaining ones do present average scores higher than 5.00. The scenario with the highest average score (8.40) was "Stagnation of the importance of food safety aspects / Increase of the importance of food safety aspects".

Figure 4: Food safety evolution scenarios.

Diffusion of food safety standards					Convergence for global and integrated food safety standards				
1	2	3	4	5	6.92	7	8	9	10
Application of the food safety management systems current verification and improvement tools					Development of new tools and methodologies				
1	2	3	4	5.34	6	7	8	9	10
Stagnation of the importance of food safety aspects					Increase of the importance of food safety aspects				
1	2	3	4	5	6	7	8.40	9	10
Stagnation of importance of the ASAE/ANESA in the diffusion of the food safety theme in Portugal					Increase of importance of the ASAE/ANESA in the promotion of the food safety theme in Portugal				
1	2	3	4	5	6.32	7	8	9	10
Food safety professionals with low skills					Food safety professionals with high competence and efficient				
1	2	3	4	5	6	7.44	8	9	10
Decreasing of the importance of					Increase of the importance of				

food safety aspects in the Portuguese political agenda					food safety aspects in the Portuguese political agenda				
1	2	3	4	5	6.63	7	8	9	10
Decrease of the credibility of food safety aspects					Increase of the credibility of food safety aspects				
1	2	3	4	5	6	7.60	8	9	10

Additionally, we have performed a set of statistical tests in order to verify if the companies' perception concerning the future of food safety depends of their dimension. We have used a significance level of 5%. Significant statistical differences were reported between Small and Medium companies for the scenario "Decreasing of the importance of food safety aspects in the Portuguese political agenda / Increase of the importance of food safety aspects in the Portuguese political agenda" (p-value of 0.033). For the Medium companies (6.97) the involvement of the Portuguese Government in food safety issues is more important than for the Small ones (5.81), concerning the future of this area in Portugal. Additionally, significant statistical differences were found for the scenario "Food safety professionals with low skills / Food safety professionals with high competence and efficient" between the Small and Medium companies (p-value of 0.020). The Medium companies (7.78) require more competent and skilled employees than the Small firms (6.44).

5. Conclusions

As far we were able to find out, this research is a pioneering contribute for the food safety research area. Our aim was to produce of statistical analyses, qualitative and quantitative ones, in order to characterize the ISO 22000 certification among the Portuguese companies.

Concerning the ISO 22000 main motivations, we were able to find out that the Portuguese companies become ISO 22000 certified mainly to improve the consumers confidence and because this kind of registration is a customers and other interested parts requirement. Regarding the benefits obtained, the surveyed companies had pointed out the improvement of food safety methodologies and practices. As it was verified for the ISO 22000 certification motivations, the most important benefit stated by the respondents companies was of internal nature. Regarding the implementation barriers, two main difficulties are highlighted: "Internal resistance to change" and "Food safety management system implementation costs".

Some of the issues raised here will continue to deserve additional research and are at the core of the authors' future work, related with a global data based analysis of the ISO 22000 certification worldwide phenomenon.

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