

PhD Thesis

**THE QUALITY MANAGEMENT AND FOOD SAFETY PREPAREDNESS OF
THE SMALL AND MEDIUM-SIZED FOOD INDUSTRY ENTERPRISES IN
SERBIA, BEFORE THE EU ACCESSION**

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INTRODUCTION

In the midst of the disintegration of Yugoslavia, the ongoing border changes, the economic embargo and inflation the food safety monitoring authority was unable to fully enforce the Serbian law. Accordingly, the whole law compliance concerning food industry was played down. Food industry products oftentimes came from plants lacking the appropriate license, and black market trading was also flourishing during this period.

Though, the rapprochement of the situation began rather slowly, the food industry law regulations in the country started to get in line with those being in force in the European Union.

At the same time, food companies along with other enterprises aimed to extend their global reach by exporting their products.

The fact that a food processing company operates a HACCP food safety system becomes a matter of course to the customers and as the focus is more on ensuring the guarantee of food safety and pre-defined product quality, food industry companies have to prove that they are able to fulfill the required condition system. In most cases this could be transparently demonstrated by the initiation and operation of one of the food safety (management) systems specified by the customers. The successful application of the required standard could be reported during a customer or certified audit.

Food processing industry in Serbia has been facing huge challenges. Food processing plants are expected to conform to the changing operational conditions, even if they do not have the intention to export their products.

In order to meet the previously mentioned requirements, the companies are supposed to observe the laws regarding food security being in force both in the European Union and in Serbia, and as well as to meet the expectations of their customers.

This is not an easy task, since the country has not been yet recovered from the political storms raised by the disintegration of Yugoslavia and the consequences of the economic embargo taken place a decade ago. In addition, there is a lack of appropriate machines and equipment in the Serbian (food) industry, the adult educational system does not exist, and the legal and food safety infrastructure are still in the phase of transition.

Meanwhile, the customers understandably require the same condition system from the Serbian food processing plants, as from any other competitors from the developed countries.

In this operational environment the extent of the competitiveness of the Serbian companies largely depends on the level of their knowledge.

I have selected this topic because I have been dealing with consulting in the field of food safety and quality management since 2004 in Serbia mainly in Vojvodina (Vajdaság).The most of my clients are from micro, small and medium enterprises. In the beginning of my career the HACCP food safety systems – what did not required that time – mean the achievable highest criterion system in the field of food safety for food industry companies. This is already just a base in the case of multinational companies' supplier food processors, these companies operate certifiable standards.

As I have roughly one decade of professional experience I had the chance of getting insight into the food safety and quality management attitude of hundreds of companies; I have been fighting along with them in order to accomplish the challenges. In my opinion, the importance of the present topic is outstanding because the level of the know-how in case of companies is of high importance when facing the challenges of the latest and changed requirements. Food processors have to be familiar with the actual law regulations and the set of conditions required from them by their customers. Food safety assurance, compliance of law regulations and the operation of the quality management system(s) became a default.

In my dissertation I analyze the food industry law regulation system in Serbia, and highlight its deficiencies by juxtaposing it with both the Hungarian and the European Union law regulations. I also explore the most widely applied food safety management standards and their practice (in 2013) in the Serbian agriculture and food industry including small and medium enterprises. All of the analyses were done by considering the educational structure in Serbia, because in my view the real assets in every company are the employees, thus, it can be claimed that every huge development is due to the intellectual capital.

MAIN OBJECTIVES AND HYPOTHESES OF THE DISSERTATION

The main objectives of the dissertation is a synthetic analysis and the presentation of the status of food security affecting the Serbian food sector pointing on useful recommendations to a qualitative food security enhancement of the preparedness of the Serbian micro and medium size companies by making a proposal, among others, for the remedy of the deficiency of the ensuring measures. Moreover, my further aim is to present a usable proposal related to necessary change(s) within the educational system to develop the sector's human resource logistics.

The paper has been prepared on the basis of available data collected by the end of September 2013.

Hypothesis:

1. I consider the existing legal system of the Serbian food security not to be entirely clear but to contain flaws due to unclarified jurisdiction of the official control.
2. In the course of my advisory role, I encountered that food production industries lack appropriately qualified personnel for the operation of the HACCP food safety systems.
3. My supposition is that it is not required for agricultural producers to hold any professional qualifications to continue their activities.
4. Despite the fact that the HACCP system has already been introduced in food production industries, its operation is theoretical.
5. Food production industries apply other food safety or quality management systems along with the HACCP food safety system only in case of an explicit customer demand.
6. I assume that the knowledge of the Heads of Food Safety Units regarding specific food safety and food safety control is not up-to-date.

RESEARCH METHODOLOGY

The audit of the research has been set implicitly to a well-known group; namely, the micro and medium size companies carrying out business in the food production sector.

According to the European Committee, a company employing less than 10 people and attaining the revenue of less than 2 million euros is to be categorized as a micro enterprise, while the one with more than 50 employees and less than 10 million euros of revenue belongs to the category of small ventures/enterprises. Finally the employment of 250 people with less than 50 million of revenue places a business initiative into the category of a medium size company (Commission, 2003).

The lack of an updated and appropriate database on the number of companies and business related to food production by the Ministry for Agriculture, Forestry, and Water Management prevent the official listing of their exact number. According to estimations, the number of enterprises may be around 25 000, though these include pubs, retailers and wholesale dealers, food processing plants, restaurants, and other enterprises in food industry.

Stages of Research:

- I.** In the course of my dissertation, I intend to apply a methodology of secondary analysis using international literature along with a certain amount of historical overview. I have revised not only the Hungarian but also the Serbian, English, and Croatian technical literature.
- II.** A secondary methodology of analysis is applied in connection with the structure of the Serbian secondary, higher, and adult educational systems; additionally, the structure of the school attendance of the country is also to be considered.
- III.** Furthermore, I intend to present the differences in the accomplishment of the food safety systems by the Hungarian and the Serbian political institutions.
- IV.** Within the framework of the analysis of the food safety regulations, the following points will be touched upon:
 - 4.1. The extent to which the levels of integration of the Serbian regulations are implemented set by the European Union in the field of food production.
 - 4.2 Employment qualification requirements in certain food production sectors, i.e. the instances which demand the existence of an adequate technical knowledge based on the operative legal rules.

4.3. In the scope of the analysis, I studied the properties of the standards.

V. A theoretical, secondary research was followed by a primary investigation in this matter.

A standardised and a structured questionnaire during my research in some food production companies revealed the following discoveries:

5.1. To what extent the HACCP food safety system has been introduced and how it is put to functioning, furthermore

5.2. which other food safety command structures are utilized.

Except for a few open questions, the questionnaire contains closed questions in the topics of:

- general information of the company,
- information on the HACCP system,
- information obtained from laboratory and other examinations,
- regulatory information,
- information on standards.

The questionnaires were devised electronically (in Hungarian and Serbian), using the Google's spreadsheet application. The applicability and clarity of the questionnaire, and the functioning of the program were all tested, after which on my demand, they were filled in by a company's food safety manager. The testing helped me to carry out necessary adjustments. This step was necessary to ensure that the questions were properly interpreted among the answerers and the answers would be assessable. Some questions of the questionnaire were intended to filter out the level of truth of some previous questions.

I reached the companies in question using the methods of: finding and sending the link of the questionnaire to more than 650 email addresses from various Internet databases using the SendBlaster 2 messenger system. 146 emails were found to be faulty out of the total of 650 addresses. As the result of the on-line inquiry, a total of 59 answers were returned from the 504 existing addresses.

Given answers were further filtered with Microsoft Excel, non-valid ones were deleted, leaving me with 52 emails that could be finally assessed. It suggested a 10,31 % of willingness to respond.

The second mean of my inquiry involved direct phone contacts, during which given responses were recorded and fixed as if Google questionnaires had been

registered by the companies. This procedure was carried out in 72 cases. Companies had been previously and randomly chosen from my existing contact list.

The results of the two methods allowed for altogether 124 companies to be fed into the questionnaire. Responses from the questionnaire were automatically loaded into Google's Microsoft Excel table. In the course of data processing, I used SPSS Statistics 20 and Microsoft Excel spreadsheet programs. The method of descriptive statistics of the SPSS allowed for the analysis of the frequency of application of the standards; moreover, I adopted the method of cross tabulation. The spreadsheet application of Microsoft Excel was primarily used to edit diagrams.

VI. In the scope of my primary investigation, I accomplished a detailed interview with the head of food safety units of some food processing companies.

A detailed interview involved open and close questions through which light was shed on their knowledge in connection with food safety systems. Furthermore, I got acquainted with their opinion on current situations in the field of food safety and food safety control systems. I also inquired on the nature of the previously given answers to the questionnaire. Pre-designed questionnaires were used in the course of each interview.

Within the scope of the analysis, I attempted to review expert opinion with substantial experience in this field in connection with the obtained results.

The here presented data collection with the use of detailed interviews were accomplished in micro and medium size companies from November 2012 to June 2013 with 24 food safety experts primarily on the territory of Vojvodina and Belgrade.

Major question categorise of the detailed interview covered:

1. the knowledge of a given measure,
2. the interpretation of microbiology regulations,
3. the practice of functioning the HACCP system,
4. general knowledge of potential customer requirements, and
5. expected changes after the acquisition to the European Union.

In the course of the questionnaire based interview, I took notes of the remarks that arose along a particular question.

Questionnaires were also recorded in a digital way, while open questions were saved in a cumulative table. The latter were categorized after the completion of the research. SPSS Statistics 20 and Microsoft Excel spreadsheet programs were of great help during data processing that facilitated data management.

THE MAIN FINDINGS OF THE RESEARCH

The main findings of the analysis of the Serbian education system

In Serbia higher education institutions accept students, when finishing a four-year secondary school. There are three types of higher education institutions in Serbia: universities, colleges of applied sciences and colleges of academic studies. Colleges of applied sciences and colleges of academic studies provide a first and some sort of second cycle of higher education. This second cycle is limited to 60 credits of applied specialisation which is not the same as a Master of Applied Sciences, hence students who wish to gain a masters degree need to pass some additional exams. In Serbia there are several universities with Food Science departments offering food engineering education. Although Law about Adult Education, regulating field of adult education in a light of lifelong learning and non-formal education, has been approved recently in Serbia, its efficacy is still questionable.

The main findings related to the differences between the institution system of food safety in Hungary and Serbia

Interestingly enough, while in Hungary the field of food security is controlled by one ministry and one of its departments, in Serbia there are two different ministries in charge, dividing the supervision among three different departments, in addition the practice of cooperation among them is poor or does not function. Authority are parallel controlling food processors.

The main findings of the law analysis

The Serbian food safety law regulation system – following of the European Union law – could be considered relatively young. Despite theoretically being in line with the EU food safety model, a number of institutional deficiencies could be recognized, such as the lack of a Serbian Food Safety Risk Assessment Expert Council, the inaccurate definition of power of the authority, or the problems with the interpretation of the issue of food chain approach.

The analysis concerning the application of the HACCP food safety system revealed that neither the interpretation of its law regulation is complete, nor the application guidelines are clear enough to the users.

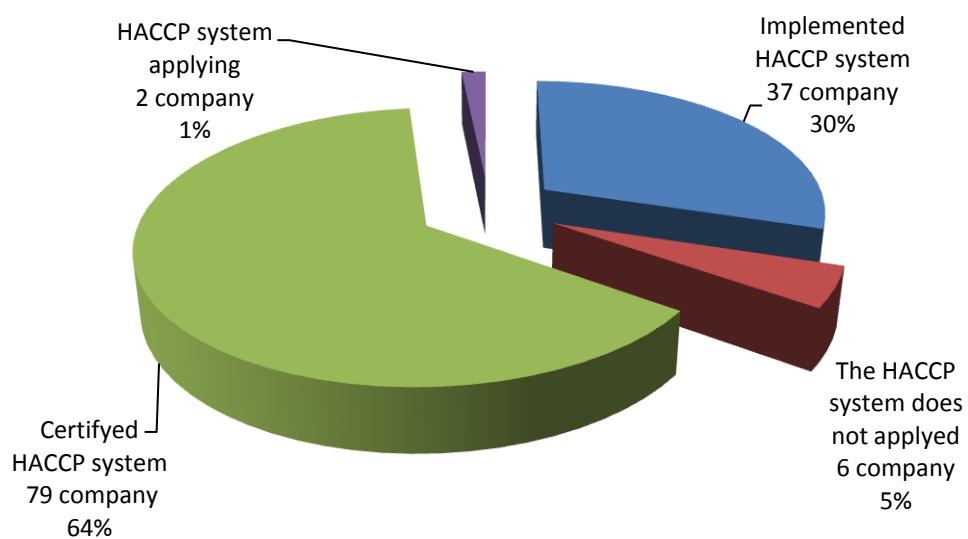
Food safety managers' educational or other qualifications related to the requirement system are not relevant, namely, the statement "appropriate qualification required" is not specified in legislation. This is especially worthy of note because until

recently no adult education law existed in Serbia. In other words, there was a lack of any accredited regulation concerning adult education, courses or trainings.

In my research I emphasized that the animal protein processing plants are not supposed to employ workers with food industry qualifications, furthermore the agricultural growers are neither required to take part in any education or training regarding the most applied pesticides, nor they are required to keep any records of their application.

The main findings of primary research

Despite the fact that the HACCP system - except for primary production - is mandatory for the whole food processing industry, one part of the analysed companies do not use it. These companies neither transport for multinational food trading companies, nor export their products.



1. Figure: The application distribution of the HACCP food safety system in case of the analyzed companies (Source: Own editing).

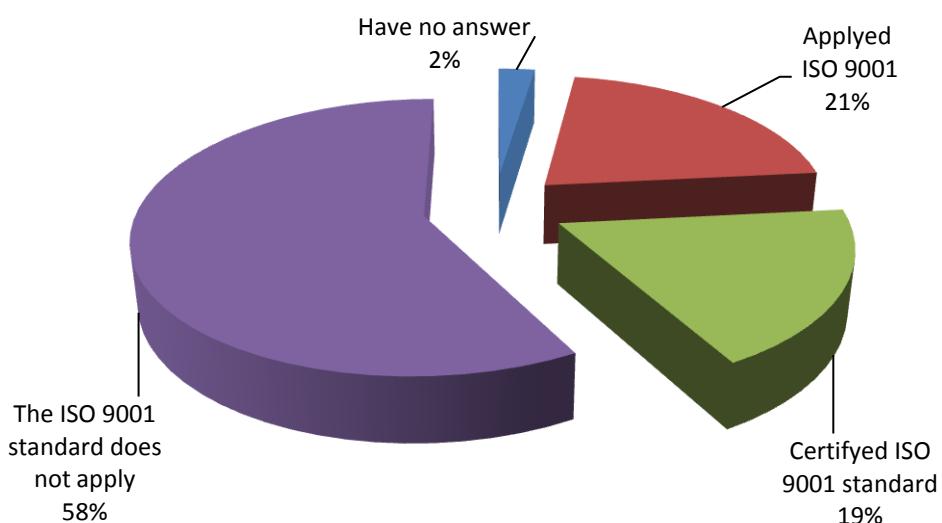
Half of the companies who do not apply the HACCP system are those whose main profile is that of mixed material processing (both plant-based and animal protein). Yet, this particular industry sector is the most likely to be inspected by both the animal health and agricultural inspectors.

Based on the information obtained from the responding food safety leaders during the in-depth interviews, it is revealed that out of the twelve exclusively plant

material processing firms and mixed material processing companies nine companies (75%) have never been monitored by the authorities on their HACCP system.

Within the frame of their self monitoring procedure the companies are due to monitor the food producing flow chart at least on yearly basis. Interestingly enough, though machine procurements have been taken place since the initiation of the HACCP system, the supervision of the monitoring frequency of the flow charts on the spot has not increased at companies. On the one hand, this suggests that the installation of machines and equipment was not followed by any review of the tenability of the flow chart on behalf of the HACCP food safety team at all, which means that the application of the HACCP system can be considered formal.

On the other hand, the data shows that the application of the ISO 9001:2008 quality management system and also its certification is rather high, which shows next figure.



2. Figure. Percentage distribution of the application and certification of the ISO 9001:2008 standard (Source: own editing).

40% of the analyzed companies operate the ISO 9001 quality management system, and 19% of them also certify it.

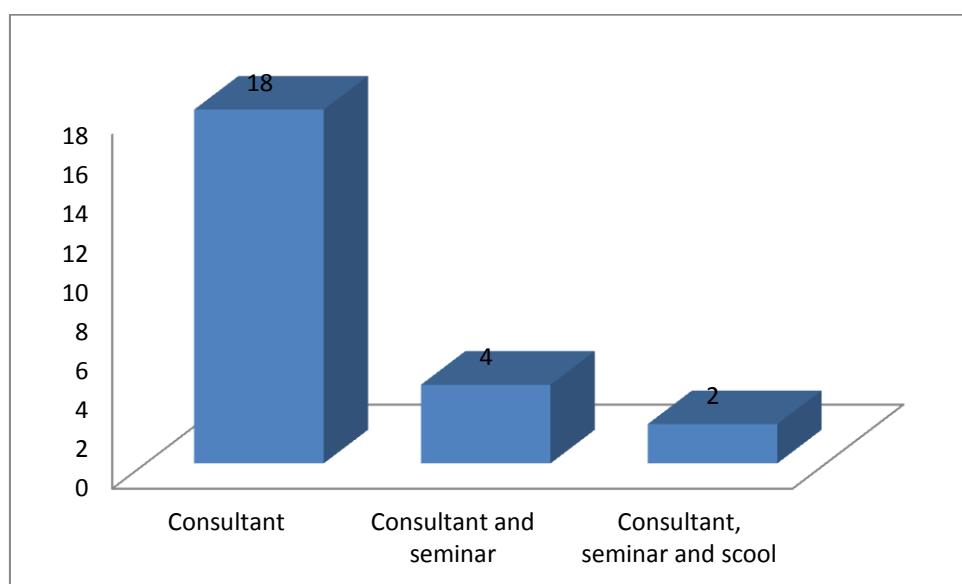
It turned out during the in-depth interviews that this high application rate is owing to the call for proposals issued by the Ministry of Agriculture, Forestry and Water Management, where the companies could apply for the initiation and certification of - among others - the HACCP food safety system and the ISO 9001 quality

management system. In my view, this provides a really good base for the initiation and operation of the food safety standards.

According to the findings of the questionnaire data, altogether six companies operate both IFS Food and ISO 22 000:2005 standard at the same time.

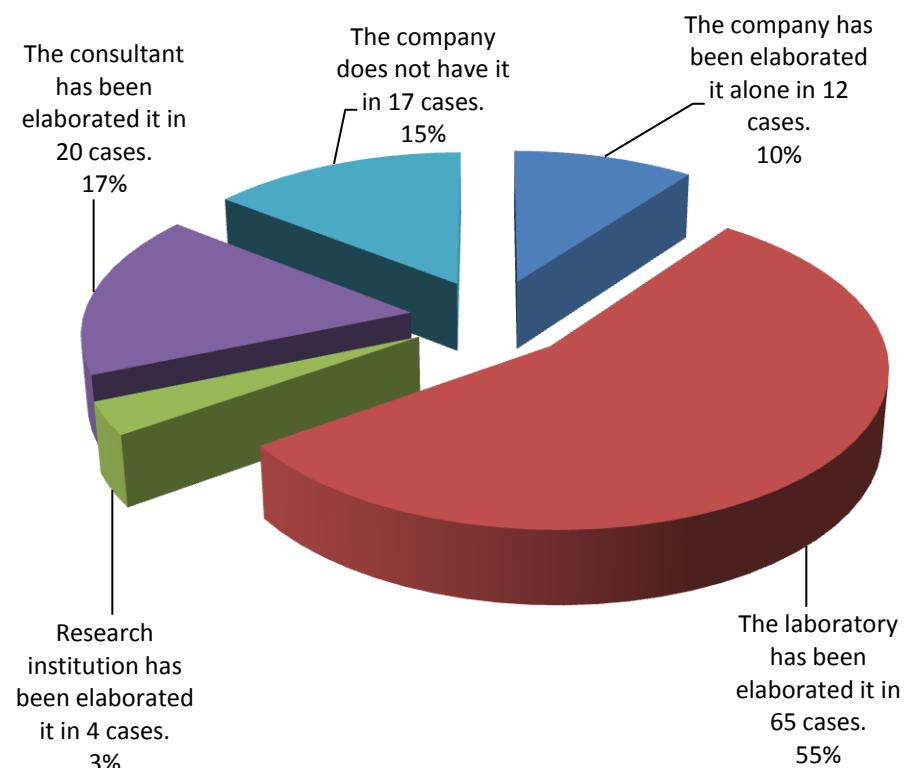
The analyses of the in-depth interviews also made it clear that the representatives of the participating companies considered their knowledge of other standards used in food industry moderate. The responses to the questions related to the difference between the ISO 22 000 and the IFS Food, as well as the difference between the ISO 22 000 and the FSSC 22 000 revealed only five participants who could give acceptable answers. This takes 20,83% of the companies. In my opinion, this level of knowledge is far from eligible.

Nevertheless, the expressed role of consulting companies has become more significant. The findings also highlight that during the initiation process of the HACCP system 115 companies – 92,74% of the investigated sample – took advantage of the services of professional consultants. For instance, team leaders of 90 companies (72,6%) have stated that the necessary knowledge background for the initiation of their HACCP food safety system was obtained exclusively from experts of a consulting company. The responses given during the in-depth interviews also indicate the same picture. Namely, 18 from 24 respondents have declared that they had acquired their knowledge related to the HACCP system from the experts of a consulting company, which shows next 3. figure.



3. Figure The analysis of HACCP system knowledge of the leaders' being responsible for the food safety (Source: own editing).

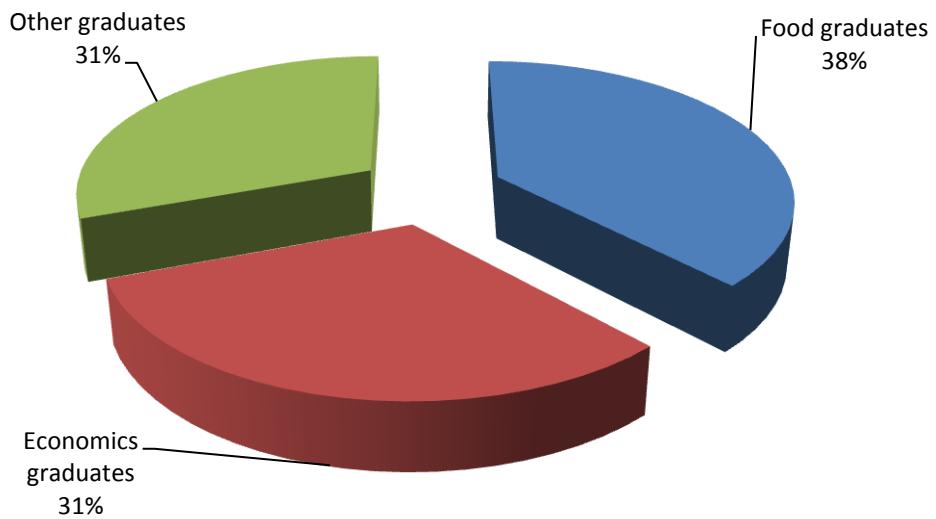
The poor practice and elaboration of microbiological monitoring plans refer to the lack of knowledge related to the food safety. The numbers show that 72% of the microbiological monitoring plan has been developed by the testing laboratory and consulting companies. It is illustrated in next, 4. figure.



4. Figure The distribution data concerning the elaboration of the microbiological monitoring plan (Source: own editing)

All this may be explained by the improper professional specialization and educational qualification of the food safety leaders.

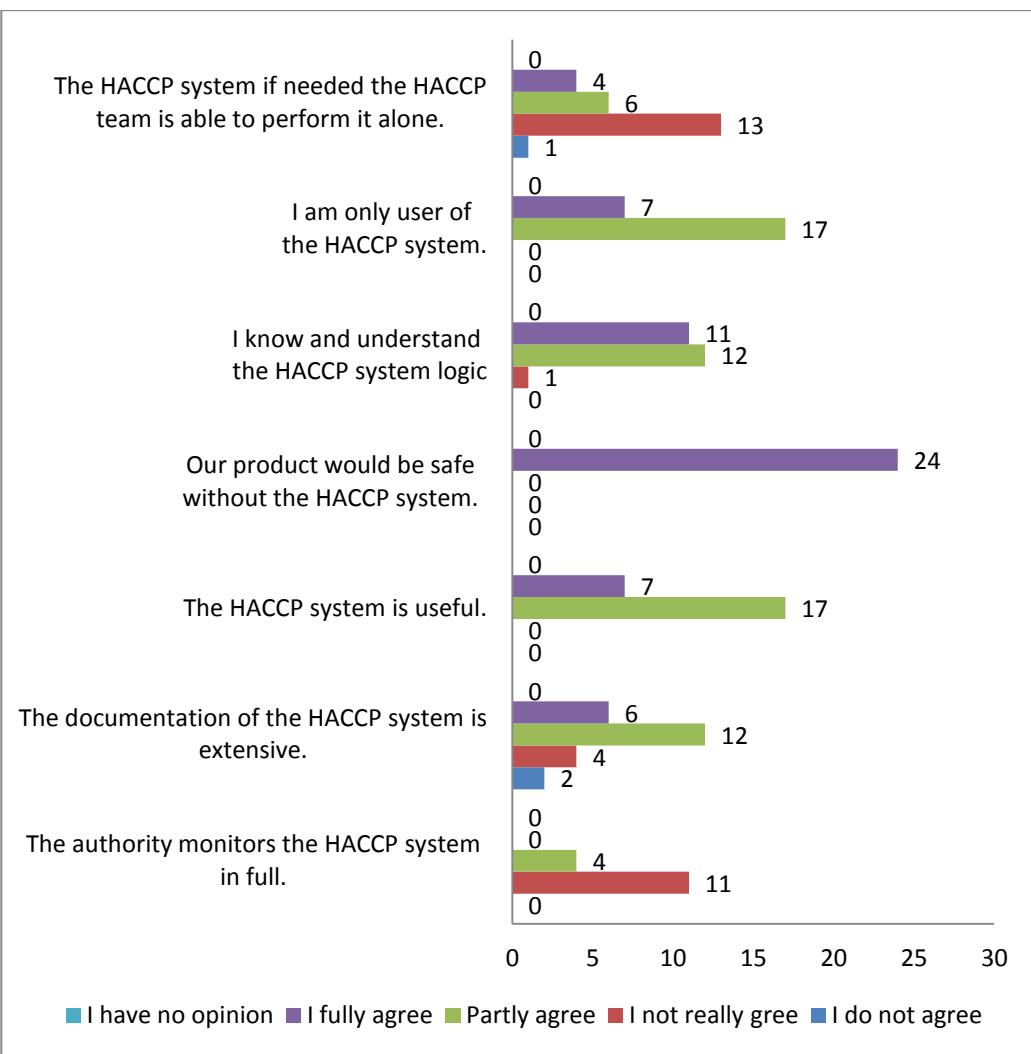
When having a look at the proportion data concerning the qualification of the food safety team leaders', it is obvious that the number of team leaders with food industry education and that of economics education almost equals, as it is shown in Figure 5. What is more, it should be also emphasized that 14 people (11,29%) have just primary school education.



5. Figure. The distribution of educational qualification and professional specialization concerning food safety team leaders (Source: own editing)

Although, the respondents have been concerned that it is the product safety which is the most important factor when considering the advantages of the HACCP food safety system and other food safety systems, it turned out during the in-depth interviews that the company representatives - without exception - were also convinced, that their product would be safe even without the application of the HACCP food safety system.

Along with this, in case of need the HACCP system could not be changed or modified without the involvement and professional assistance of consultants by the HACCP team of its own. This is also supported by the fact that 70% of the food safety leaders in the companies are only users of the system, not active developers. Nevertheless, all the respondents are aware of the basic twelve steps of the HACCP food safety system development. Their attitude shows in next 6. figure.



6. Figure. The presentation of the opinions related to the HACCP food safety system (Source: own editing)

Everything considered, I think that neither the legal requirement system nor the power of the monitoring authority is well-defined, what is more the educational level or the professional specialization of the leaders responsible for food safety is in many cases inadequate. Nevertheless, since many companies operate the ISO 9001:2008 quality management standard, the responsible leaders do possess the appropriate system and process approach which could serve as a proper basis for the initiation of the food safety management systems required by the customers.

NEW SCIENTIFIC RESULTS

I have formulated five new and novel scientific results on the base of secondary and primary research results performed during my work and on the conclusions from:

1. Beside customer demands, the success in different tender operations are also an important issue to the food industry companies when they are about to decide on the initiation of other food safety management systems along with the HACCP. Thus, the state can have a guiding role by providing opportunity for the participants in food industry to apply to specific tenders and by this to become familiar with the possible future expectations and tender requirements.

The government's role/support is of great importance to the development of new approaches and practices.

2. The qualification of the management (and HACCP) leaders is not appropriate, the role and contribution of food safety consultants is significant when it comes to the operation of food safety systems in companies.

In order to meet the required food safety standards in the whole food chain, well-prepared and up-to-date personnel is needed.

3. Despite the fact that the HACCP system is implemented in great majority of food processing plants, its application is mostly formal. The reasons to this are numerous, among which are the lack of expertise in system operation and the well-defined legal framework, and also the confusing nature of the official supervisory roles in the monitoring process.

Not only a well-defined legal framework concerning the issues of food safety is essential, but the quality of communication between the authority and food processors is highly important.

4. The legal regulation is not sufficiently clarified, thus there are a number of shortcomings in the field of food safety. For the improvement of the field of food security and risk management in Serbia it would be necessary to establish a Food Safety Risk Assessment Expert Council, as soon as possible. Similarly, an official Serbian translation of the General Principles of Food Hygiene, CAC / RCP 1-1969 is seen essential, and also there is a need for the development sector-specific guides that can be integrated into the Serbian legal regulations.

The legislative processing and law practice in Serbia should be supervised by experts who are also familiar with the context of the European Union.

5. *As food safety is quite complex, made up by many components, only an integrated authority – being responsible for the whole food chain - would be able to control it properly. However, the requirements of proper functioning could be only reached within a framework of a well-defined and specified statute basis. The previously mentioned legal framework would provide means for controlling and guaranteeing the monitoring process by the authorities in case of food processing companies of mixed - including both animal protein and plant material - profiles.*

PRACTICAL USE OF RESULTS

Results of my research are practically applicable in several respects:

1. I point to the need of an adequate approach to food chain and to the importance of the establishment of an office structure. Good examples, in this respect, are the Serbian and Hungarian Food Chain Safety Offices.

2. They highlights that the regulations, appropriateness, transparency and accessibility to food safety legal conditions are all of primary importance for parties concerned in this issues in order to put through appropriate food safety measures. For the promotion of the Serbian micro and medium size quality and food safety preparedness, a more precise and intelligible legal regulations are needed. Legislation and its application should involve experts who are entirely accustomed to the legal body and practice of the European Union. Obtained results could be well utilised by the Government or its relevant body to refine legal regulations and to form an expert group.

3. It aims to focus the attention to the fact that the adaptation of legal regulations in the food production industry would be only possible in its total extent if the measures of guidelines were developed appropriately; furthermore, if they took into account the food production sectors and the size of an industry. Beyond that it is of crucial importance to apply severe authority monitoring in order to ensure that the HACCP food safety system regulating mechanism is not only a formal one. The results of this research could be utilized by the appropriate administration to complete current guidelines.

4. Bodies that announce tenders in the subject of the introduction of food production standards and certification would be also of good use of the research results. They could justify the entitlement to the announcement of tenders, since such acts could greatly expand competition among food production companies; moreover, they would also ensure that food production companies easier become and remain potential suppliers of the customers.

5. I have defined the nature of the necessary qualifications for the heads of food safety units. In my view, training is to be achieved in the system of adult education or in the framework of a specialisation to obtain the best results. This fact could be considered during the construction of an educational program of individual training institutions.

6. The owners and the managers of the micro and medium size food production companies would be able to utilize the obtained pieces of information, as well. Through a careful study of the research results, they would be able to gain insight into their own shortcomings in a given field of operation. By correcting flaws in the system, they could enhance the preparedness of their own company.

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List of publications related to the dissertation

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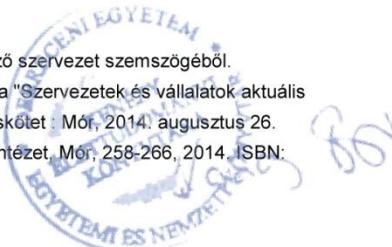
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