

EFFECT OF THE INTRODUCTION OF THE HACCP INTERNATIONAL STANDARD ON AN EXAMPLE IN THE FOOD INDUSTRY IN CROATIA

ABSTRACT

Major demographic change and the globalisation of the market bring with them changes in our eating habits. A string of public health measures in Croatia is increasingly gaining in importance, particularly the ecological surveillance of various sectors of the environment, of which food is inevitably an element. The main objective of the various industries is to produce, process and distribute food which will meet the requirements of health and safety, through the joint efforts of all parties in the food chain. ISO and HACCP enable the continual, documented surveillance of food safety management. The most efficient systems of food safety are introduced, implemented and modernized within a structured management system, becoming incorporated into the overall management of the manufacturing organisation. This paper describes verification procedures for the HACCP system. The analytical reports given here are individual cases in the introduction and implementation of this international system on examples in the food industry and the benefits deriving from it. From the results of this research, the author draws conclusions on the need to synchronise standards in order to meet both legal obligations and European Union norms.

JEL: L66, I12, I18, Q11, K32

Key words: international standards, food safety, HACCP system, quality.

1. INTRODUCTION

This paper wishes to show that the implementation of the HACCP norm establishes a process of continued and documented monitoring, and that the process as such is inevitable and necessary. The author justifies her main hypothesis on the grounds of analytical reports and laboratory research for the purpose of establishing CCT (Critical Control Points), whose identification and subsequent monitoring is connected to the nature of the production process and achieving at a sound and healthy product.

Large, well-organised and pro-development trading companies are increasingly taking on monitoring of the production, safety and quality of the food they manufacture. Company strategy in product development, its sale on new, foreign markets, and a focus on activities that will increase product value, are important elements in expanding export, and especially in maximising the value of the export itself, which certainly contributes to making it competitive on the international market. (cf. Tipurić, D.: 1999).

* Mr.sc., dipl.sanit.ing., Zavod za javno zdravstvo istarske županije, E-mail: majapesic@net.hr
Članak primljen u uredništvo: 22.03.2009.

Being in possession of the standards of the International Organization for Standardization - Requirements for any organisation in the food chain (ISO 22000:2005; EN ISO 22000:2005), which, through the implementation of the Hazard Analysis and Critical Control Point (HACCP) system and ISO 9001 provide conditions for assessment and certification, is a great advantage in the huge global competition to corner the food market. Various trade groups, especially retailers, have developed an expanded sanitation control programme in order to promote the requirements of the HACCP system. (cf. Raspor, P.: 2002). Market demands and delivery of a safe and healthy product have been ensured in the interests of increasing business efficiency in a widely diversified food industry. Research carried out in a pasta manufacturing plant in Istria resulted in the introduction of the HACCP system, a preventive standard and key to success for all who work in the food business in today's whirlwind of competition on international and local markets.

Industrialisation and more recent developments in the technology of food production have completely changed the situation existing hitherto. Demographic, social and cultural change, the employment of women and the subsidized preparation of food have brought additional changes to our consumption. While aware of the importance of a proper, healthy diet, we are left with less time to prepare meals and enjoy food.

The new Food Act in Croatia, NN 46/2007¹, Article 50, states as follows: "All persons dealing with food whether in primary production or affiliated activities must fulfil the general hygiene regulations and special requirements for hygiene with food of animal origin as set out in the regulations for implementation, Article 51 of the Food Act"². This contains seven fundamental principles and twenty steps for application, and is directed at the product, in accordance with the recommendations of the Codex Alimentarius and the joint commission of the United Nations World Health Organisation (WHO) and Food and Agriculture Organisation (FAO). The WHO is a special organisation of the United Nations with headquarters in Geneva (Switzerland), founded on 7 April, 1948, and currently numbering 102 member countries; its role is to coordinate international health services.

With the expansion of major trade chains came the greatest change in giving prominence to care for food quality and safety, and a corresponding tendency by local and international trade to follow suit. Large, well-organised, pro-development trading companies in Croatia are increasingly taking on monitoring of the production, safety and quality of the food they place on the market. It is clear that the quality and safety of food cannot be viewed as an isolated issue (only at point of origin, sale or consumption), but throughout all phases of the chain of production, processing, distribution and delivery to the final consumer. The HACCP system is integrated into the *Quality Management* system and as a standard, represents a recognized point of reference (national, European, or international) (cf. Avelini Holjevac, I.: 2002). It is thus a response to market assessment, enables the reduction of costs, product pricing and the dissemination of knowledge in construction, technology, manufacture and marketing. The HACCP system is essentially an approach of prevention and continual monitoring which ensures food safety. The system includes identification and removal of existing and anticipated hazards and draws on the knowledge and ability of each individual in the chain of production, processing or distribution of food, as the research has shown. Through the implementation of ISO and HACCP standards, a continual, documented monitoring procedure is established in the food safety management system. (cf. Veldić, D.: 1997).

¹ Food Act (NN 46/07), p. 17.

² Ibid. p. 18.

2. RESEARCH OBJECTIVES

The aim of this article is to establish a preventive approach based on the identification and analysis of specific hazards and the establishment of preventive measures to remove the risk of producing potentially hazardous food, or to reduce it to an acceptable level. The basis for research was the study of numerous scientific and expert papers by local and foreign authors, their critical analysis and use in further work. (Dillton: 2001, Duraković, S. i dr.: 2002). The subject, problems and objectives of the research called for methods of general scientific knowledge, which also represent significant instruments of scientific achievement. The experimental method is supported by laboratory research. The methods used in the paper are analysis, synthesis and description.

The methods, laws and theories given are a basis for the implementation of a system in which control can be applied, important for the prevention or removal of hazards to food safety, or for reducing them to an acceptable level. In this case, the scientific contribution is the introduction of a new system into the food industry, represented by a pasta manufacturing plant in Pula, Istria, Croatia. Built in 1986 and inaugurated the same year, the building has an area of 168 square meters and a staff of ten. For the research purposes of this paper, analysis began in September 2008 and was completed in 2009, ending with the verification of the system's activity. Implementation of the HACCP system includes the identification and removal of existing and anticipated hazards and calls on the knowledge and abilities of each individual in the chain of food production, processing or distribution. The result of this concept of the HACCP system is a working hypothesis which reads as follows: "The implementation of ISO and HACCP standards establishes a process of continual and documented monitoring in the system of food safety management"³.

The samples taken and the results as interpreted in this research were according to the Rules on Norms of Microbiological Purity and How to Establish it, NN 46/94. Microbiological swab processing was carried out according to internationally recognized norms and professional criteria.

The intention here is consistently to satisfy and in fact exceed customer expectations. This is enabled by incorporating the HACCP system as the basis for producing a healthy and, above all, safe product, through the implementation of good manufacturing and hygiene practice.⁴

3. IMPLEMENTATION OF THE INTERNATIONAL STANDARD (HACCP) SYSTEM

The HACCP plan defines the scope of the present study and explains all the concepts linked to each individual process. It describes all the actions necessary for correct procedure in pasta manufacture in order to ensure a safe and healthy product. Implementation of the HACCP system includes the introduction of appropriate documentation. Documentation is divided into three levels: documented procedures, records and forms.

Documented procedures are statements on the policy, objectives and plan for implementing the system and include: the decision to implement the HACCP system; a

³ The International Organisation for Standardisation – ISO – is a world-wide federation of national standards bodies from about 140 countries, with one representative from each country.

⁴ ISO 22000:2005, *Systems of Food Safety Management – Requirements for any Organisation in the Food Chain* (ISO 22000:2005; EN ISO 22000:2005). Agricultural and food products, Croatian Standards Institute, September 2005, p. 5.

contract with a consultancy company; a decision appointing a HACCP team; the duties of the internal HACCP team and other personnel; an agreement between the personnel and the employer; the HACCP plan; the plan of activities to introduce the HACCP system; a plan of personnel education; working instructions; a plan for internal and external auditing; a plan for calibrating and servicing equipment, appliances and instruments; a plan for microbial sampling of finished products and drinking water, a plan for cleaning, washing and disinfection (SSOP – Sanitation Standard Operating Procedures); a verification plan for the HACCP system; a contract with the relevant services for laundering of uniforms and footwear; a contract with the suppliers; document management and management of incongruent products.

Records are written documents which record every procedure and action taken in the course of implementing the HACCP system; they contain the date, and the names and surnames of the persons present. The records comprise: Record of the situation analysis; Record of presentation of the situation analysis and proposal of measures for correction of deviations; Record of education and checks on employee education; Record of hazard analysis; Record of practical education of the personnel; Record of any deviations corrected; Record of verification of the progress diagram; Record of deviation at critical control points (CCP) and corrective action taken; Record of identifying and removing faulty equipment, appliances and instruments; Record of suppliers; Record of internal and external audit; Record of HACCP system verification; Record of audit of the HACCP system; Record of the operators responsible; Record of incongruent products; Record of the traceability and delivery of products. Records describing all the actions carried out during the implementation of the HACCP system will be given below. In the Record of inspection and situation analysis and its presentation, the situation described is as found at the production plant at the time of visit. Inspection included the dry storage areas, the packing area, the production plant, the area housing the cooling equipment, the sales area, the sanitary facilities and personnel changing rooms. Inspection and analysis of the situation at this plant was carried out by consultants from the Istria County Public Health Institute and members of the internal HACCP team. Part of the establishment of the HACCP system was education of the employees.

Classes were held in accordance with a defined education plan, and the owner of the factory also attended. There followed a written knowledge test and a record of the procedure for noting the results. The written evidence (exam papers) was placed in the owner's archives. A hazard analysis and verification of the progress diagram took place in the manufacturing plant. In the factory, a record was made of the production process, hazards (physical, chemical, biological) were identified at each individual segment of production and critical control points and critical boundaries defined. Practical staff education was carried out according to the plan of activities for introducing the HACCP system and took place over several consecutive months. It included familiarization with the monitoring of critical points, recognising the importance of these, filling out records of temperature values in the cooling equipment, records of humidity percentages, the behaviour and responsibilities of personnel in case of deviations at critical control points, pest control, filling out records on the discarding of incongruent products, filling out records of cleaning, washing and disinfection according to the plan for these procedures, education on the behaviour of personnel and all those responsible in the event of the appearance of incongruent products.

A record is made of the appearance of any deviations in the monitoring of a critical control point (CCP) and the corrective action taken. The person responsible is requested to fill in the necessary data, which might be the temperature of the cooling equipment, to show the critical boundaries such as a significant rise in temperature, the corrective action with description, date and time (e.g., moving the product into another cooling appliance of adequate temperature and the like). The date and signature of the person who carried out the

procedure is also required. After filling out a form on the occurrence of a deviation during the monitoring of a critical control point, the operator must: fill out a form with date and time of the deviation, point out the control indicators (e.g. the analytical equipment via which the deviation was noticed) and the name and surname of the person responsible for checking. Additionally, the product must be identified (name, date of production) and the date, time and signature of the person/s/ responsible stated.

A record confirming faulty equipment, appliances and instruments must be filled out in the event of a recorded malfunction. This contains the date of occurrence, the person who noticed it (the hour), the time (the hour) and the person who informed those responsible (citing the name of such person/s/), when (date and hour) and who was notified (leader of the internal HACCP team, technical service, service company etc), with the signature of the person responsible and the date. After removing the malfunction, a Record of removal is filled out. The form contains the following information: type of equipment, appliance or instrument, date of removal of malfunction and the name of the person who removed it. The form is then signed by the person in charge and the person who removed the malfunction. The Record of individual job descriptions and the Record of the persons in charge and their replacements contain the full names of the personnel carrying out the various work processes and of those who inspected the records.⁵ The record names those in charge of receiving raw materials, of washing, cleaning and disinfection procedure (in the raw material warehouse, the production plant, the finished product warehouse with the cooling equipment, the sales area, the hallway, the intervening areas, the staff sanitary facilities, the administration area and the areas in front of and behind the building), of taking the temperature in the supply vehicles and cooling equipment, discarding food that has been written off, pest control, informing of any deviation at critical control points, reporting faulty equipment, appliances and instruments and carrying out the internal audit. Work at the production plant is in two shifts. The full names are given of the employees responsible for the various jobs and their job descriptions kept in the factory owner's archive. For a complete and prompt withdrawal of final products which have been established as unsafe, the management must appoint persons responsible for writing off or withdrawing them. The Record of write-off or recall contains an inventory of such products, together with procedure to be observed with others which have to be guarded or kept under supervision pending destruction, are used for a purpose other than their original one, or which are to be dealt with in a way that will render them safe. The reason, scale and result of withdrawal must be stated in the record. The record also contains the date, time and signature of the person in charge.

The record of suppliers gives the names of existing suppliers who are responsible for supplying the factory. A record of audit is attached to the entire HACCP documentation, and was carried out by the firm of *SGS Adriatica d.o.o.*⁶ This organisation is certified in conformity with ISO 9901, ISO 14001, ISO 27001, ISO 22000, HACCP, OHSAS 18001, SA 8000 and is also accredited by the Croatian Food Agency (HAH). A record of audits of the HACCP system is attached once this has been carried out. The record includes any modifications inside the plant, changes to the work processes, construction of new departments, the introduction of new personnel in the production process, or any procedure carried out for the purposes of modernization and contributing to the manufacture of a safe product.

⁵ Camden Food and Drink Research Association. HACCP: A Practical Guide. CCFRA., 1997, pg. 51.

⁶ www.hr.sgs.com/hr/systems_and_services_certification_hr?lobId=18315 - 15k -29.06./07. Based in Geneva, this group is the world's largest organisation for testing, certification and independent logistical support of international trade in all kinds of products, as well as providing monitoring services for governments and international institutions. Founded in 1878.

The Record of internal audit is attached to the documentation once this has been done. If we leaf through the forms prepared for this purpose, the following data is provided: the date of the audit, persons present, names of the persons in charge, remarks (deviations observed, recommended corrective measures, persons in charge and the deadlines for correction). The Record of verification of the HACCP system states that the verification was carried out by the consultants and leader of the internal HACCP team, and describes how it took place.

Verification of the HACCP system covers the following activities: a check of the entire documentation (record of receiving raw materials, records of monitoring critical control points, records of corrective action taken, records of sanitation measures, records of pest control, records of DDD [deratization, disinfestation and disinfection], records of hygiene observance by personnel, records of personnel health, records of personnel training, records of servicing and calibrating equipment, appliances and instruments, records of reporting and correcting malfunctioning equipment, appliances and instruments, records of sampling and laboratory analysis of drinking water, finished products and swabs of the microbial cleanliness of surfaces, equipment, appliances and the hands of the personnel and records of discarding or recalling products), monitoring the appearance of rodents, cockroaches and other vermin, monitoring the management of inadequate products, monitoring of suppliers, work checks according to the working instructions, and an assessment of the general appearance of the personnel.

The Record of product delivery contains the date of delivery, user, name, quantity, date of manufacture and the signature of the person responsible. The traceability system for products manufactured at the plant consists of the manufacturing date, expiry date (marked on the product declaration) and records of delivery (user, date and quantities delivered).

Forms are documents which are necessary if the organisation is to ensure effective development, implementation and modernization of the system. Forms comprise the following: records of cleaning, washing and disinfection; records of receiving raw materials; temperature lists; record of calibrating and servicing equipment, appliances and instruments; permission to enter the production plant; hygienic observance by personnel; individual reports by staff members on any signs of illness; control inventory for the internal audit; control of the presence of rodents, cockroaches and other vermin.⁷ These forms describe activities carried out during the implementation of the HACCP system.

The form recording cleaning, washing and disinfection according to the SSOP plan was made by the suppliers of the cleaning, washing and disinfection materials. Forms for each individual area in the building are drawn up in the same manner (daily, weekly and monthly records), and include work surfaces, tools and equipment. The suppliers of washing, cleaning and disinfection materials must draft an SSOP plan. The paper omits the name of the company that drafted the SSOP for this particular facility, it has not been attached and the lists have been stored in the factory owner's archive.

The record form contains a list of materials necessary for washing, cleaning and disinfecting, the date of the procedure, the signature of the operator carrying it out, the signature of the person who then inspected it, with the relevant comments. It is for the management to define and ensure individual authorisations and responsibilities which will be designated and known to everyone, for the sake of the efficient functioning and maintenance of the food safety management system. Staff members must bear responsibility for reporting problems in this system. Appointed persons have to have defined responsibilities and the power to initiate and write up records of activities.

⁷ ISO 22000:2005, *Systems of Food Safety Management – Requirements for any Organisation in the Food Chain* (ISO 22000:2005; EN ISO 22000:2005), Agricultural and food products, Croatian Standards Institute, September 2005, p. 13.

In order to control probability in recognising food safety hazards, it is the duty of the leader of the internal HACCP team on his/her own estimate to fill in a form pertaining to the general appearance of the personnel, with coordinated questions. Objections to or long-term failure to adhere to implementation of established practice as contained in the agreement signed between the personnel and employer, gives the employer the possibility of taking appropriate procedures and measures.

In compliance with the system of managing the safety of the final product, staff members undertake to inform the leader of the internal HACCP team of any health problems. The form which they must fill in contains the requisite details (date of occurrence of individual signs of illness, description of symptoms, full name of the staff member, address and position). In signing, the staff member confirms this information in the interests of ensuring a sound product from the health point of view.

4. RESEARCH METHODOLOGY AND RESULTS

Following that which has previously been theoretically described according to the Rules on the Norms for Microbiological Purity and How to Establish it, NN 46/94, the author went on to process samples. These, together with the results as interpreted in this study, were guided according to the same Rules (NN 46/94). Microbiological swab processing was carried out according to internationally recognized norms and professional criteria.

Introducing the international HACCP standard has meant both a contribution to scientific knowledge and another step towards a new world view. This is a new systematic preventive approach to achieving food safety and which will soon simply eliminate rivalry between manufacturers, as all who working in the food industry and the manufacture of sound, healthy products will have to meet the same conditions and apply the required standards.

The theoretical and conceptual analysis and experimental methods, confirmed by analytical reports, are intended to present and explain the system of quality management in only one segment (by applying the HACCP system). We also wish to show how the consumer's wishes are intended consistently to be met and exceeded, something enabled through the integration of HACCP, which provides the basis for a healthy and above all safe product, through the implementation of good manufacturing and hygiene practice. We have dealt with key concepts, from the system's purpose and the area in which it has been applied, to competition and the advantages of setting up this system.⁸

Post-production analysis is unprofitable and takes too long. Instead, food safety must be built into the production procedure, which is why there was recourse to laboratory testing at several points while the system was being set up, to ensure the correct scientific hypothesis. The research confirms the rightness of the objectives of the study, while confirming that implementation of the system ensured soundness of the product throughout the entire production process. We are appending the Analytical Reports of the laboratory tests, in order, and with explanations.

4.1. Analytical reports according to the standards of microbial acceptability

In the analytical reports three dots signify inability to trace the result, or that the rights of the beneficiary of the service are protected. It also means that the result is available to the persons who carried out the analysis, the owner/beneficiary and the person authorized to

⁸ www.vijećezakonkurentnost/22. 01. 2009.

inspect and control the system. The report shows microbial swabs taken from seven work surfaces and tools together with the results of analysis, which show that these are microbiologically clean according to the Regulations on standards of microbial acceptability and methods for determining this, NN 46/94.

- **Analytical sample number: 2008/...**

Submitted:

At the request of:

Municipality/City:

Facility:

Owner:

Table 1

TEST RESULTS

No.	Swab – rinse solution – print	Cfu/ml-cm2	+/-	E	SGD
1.	Pan – stainless steel (during work)	15	-	-	-
2.	Clean pan – stainless steel	2	-	-	-
3.	Clean extruder for fusilli	0	-	-	-
4.	Drier for depositing finished pasta	1	-	-	-
5.	Knife for removing foil	0	-	-	-
6.	PVC container	0	-	-	-
7.	Chiller door	0	-	-	-

Source: Author

CALCULATION OF MICROBIAL ACCEPTABILITY OF PLANT:

(according to the Regulations on standards of microbial acceptability and methods for determining this, NN 46/94).

KEY:

- Cfu (colony forming unit)
- E (Enterobacteriaceae)
- SGD (Streptococcus group D)
- (-) (corresponds to standard)
- (+) (does not correspond to standard)

The total number of bacteria shown in Cfu/ml-cm2 (+/-) on stainless steel work surfaces is ten, and 30 on PVC work surfaces. If no pathogenic microorganisms (E and SGD) are present, it can be 50% greater, 15 for stainless steel and 45 for PVC. Canvas and wooden work surfaces must not contain pathogenic microorganisms, and there is no standard total number.

Analytical report shows swabs taken from the hands of operators and the test results. It may be seen these are microbiologically acceptable, according to the Regulations on standards of microbial acceptability and methods for determining this, NN 46/94).

- **Analytical report no. 2008/...**

Submitted:

At the request of:

Municipality/City:

Facility:

Owner:

Analysis begun: 26 May 2008; Analysis completed: 29 May 2008.

Table 2. TEST RESULTS

No.	Swab – rinse solution - print	Cfu/ml-cm2	+/-	E	SGD
01.	Hands – (full name)	3	-	-	-
02.	Hands – (full name)	2	-	-	-
03.	Hands – (full name)	56	-	-	-
04.	Hands – (full name)	42	-	-	-

Hands swabbed for presence of *S. aureus*. Not present in any.

ASSESSMENT OF PLANT MICROBIAL ACCEPTABILITY:

(according to the Regulations on standards of microbial acceptability and methods for determining this, NN 46/94). No assessment due to small number of swabs analysed (Article 2 of the Regulations).

INTERPRETATION OF SIGNS:

- cfu (colony forming unit)
- E (Enterobacteriaceae)
- SGD (Streptococcus group D)
- (-) (corresponds to standard)
- (+) (does not correspond to standard)

The total number of bacteria shown in Cfu/ml-cm2 (+/-) on the hands is 1000. In the absence of pathogenic microorganisms (E and SGD) this may be 50% greater, or 1500.

Analytical sample numbers: 2008/...; 2008/..., show two samples in their original packing (description of samples and exact names stated in the laboratory report). At the request of the owner, these specific samples were taken in order to carry out a detailed check of the production procedure and set the system up in the correct manner. The results are in accordance with the MAV (maximum acceptable value) of the Regulations, which means the absence of salmonella in 25g of the sample, but allows the presence of *Staphylococcus aureus*, *Enterobacteriaceae* and *Aerobic sporogenic bacteria* up to 10 < in one gram of the sample.

- **Analytical sample number: 2008/...**

Class / number:

NAME OF SAMPLE: NOODLES – dried pasta with eggs 500 g.

Use-by date: 16 November 2008.

Analysis begun: 25 November 2008; Analysis completed: 28 November 2008.

ANALYTICAL REPORT

SENSOR TESTING – SAMPLE DESCRIPTION

A 1x500g sample in its original packing – (an airfoil bag) with declaration - was sent to the laboratory for microbiological analysis.

MICROBIOLOGICAL ANALYSIS

Salmonella sp.	25 g	0	(-)
Staphylococcus aureus	1 g	10 <	(-)
Enterobacteriaceae	1 g	10 <	(-)
Aerobic sporogenic bacteria	1 g	20	(-)

LEGEND:

(-) corresponds to standard

(+) does not correspond to standard

- **Analytical sample number: 2008/... 2009/...**

Class / number:

NAME OF SAMPLE: GREEN LASAGNE – dried pasta with eggs and spinach 500g.

Use-by date: 16 November 2008.

Analysis begun: 25 November 2008; Analysis concluded: 28 November 2008.

ANALYTICAL REPORT

SENSOR TESTING – SAMPLE DESCRIPTION

A 1x500g sample in its original packing - (an airfoil bag) with declaration - was sent to the laboratory for microbiological analysis.

MICROBIOLOGICAL ANALYSIS

Salmonella sp.	25 g	0	(-)
Staphylococcus aureus	1 g	10 <	(-)
Enterobacteriaceae	1 g	10 <	(-)
Aerobic sporogenic bacteria	1 g	20	(-)

LEGEND:

(-) corresponds to standard

(+) does not correspond to standard

OPINION

The samples analysed CORRESPOND to Article 26 of the Regulations on microbiological food standards (NN 46/94, 20/01, 40/01, 125/03, 32/04).

From the above research, the author concludes that based on the nature of the production process, hazards have been identified and the CCTs determined which are necessary for monitoring the HACCP system.

5. ESTABLISHMENT OF THE HACCP PREVENTIVE APPROACH

The establishment of the HACCP preventive approach, according to the above presented reports, shows that at this factory has achieved the following:

- hazards and risks are identified and removed prior to the occurrence of an unsafe product,
- education and awareness of a safe and healthy product is promoted and illnesses caused by unsafe products prevented,
- continual monitoring of the critical parameters during production contributes to making products competitive,
- corrective action is taken prior to the appearance of an unsound product, thus avoiding risks to the consumers' health,
- documented evidence of quality control has been established,
- the plant is compatible with product quality systems and with international standards (ISOs),
- facilitates and enables the factory to do business within and outside the EU.

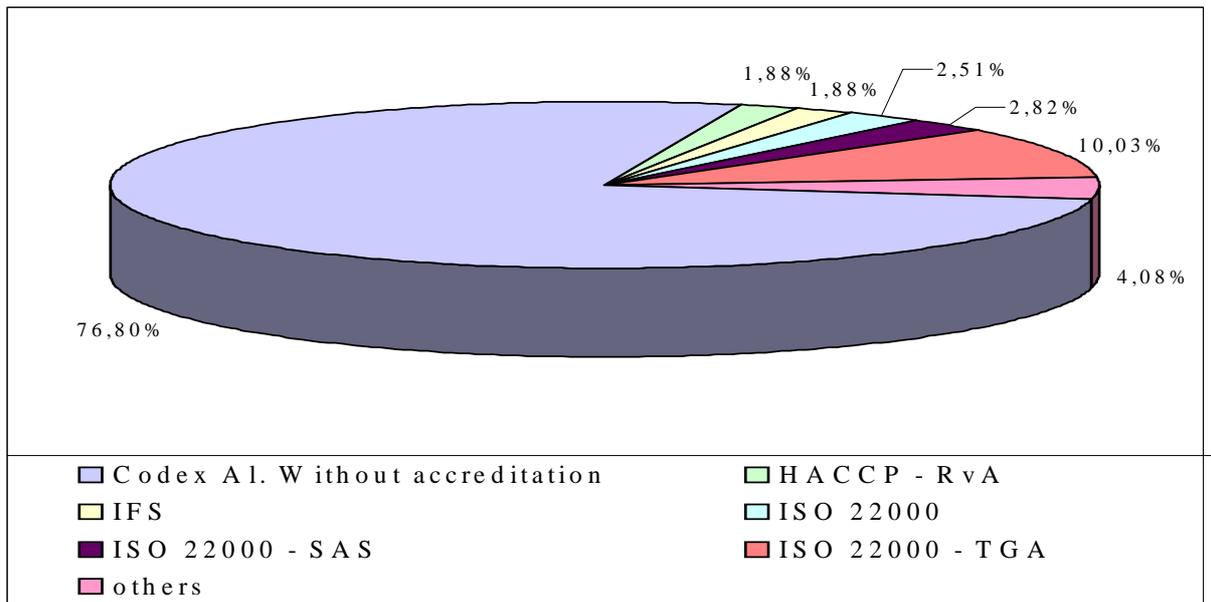
Synchronised standards meeting EU requirements would increase the competitiveness of Croatian industry and resolve a question constantly asked: Are Croatian manufacturers and the range of their products and services ready to take on the international market by implementing these standards? Between 2003 and 2007, a total of 319 companies were certified in the Republic of Croatia. By type of certification, Codex Alimentarius figured largest: 76.80% (Fig.1), the group of others having one company each with a Codex Al. certificate. I ISO 22000 – SAS – Swiss Accreditation Service - Food Safety Management Systems - from the SAS (Swiss Accreditation Service)⁹, Dutch HACCP (Dictionary terms for HACCP in Dutch, Dutch definition for HACCP, ... Dit artikel maakt gebruik van materiaal uit)¹⁰, RvA – HACCP accreditation issued under the Netherlands Rva certification HACCP, and ISO 22000 – UKAS – by this accreditation – the certification of the HACCP system according to Codex Alimentarius without accreditation, followed by 3 facilities with a BRC - British Retail Consortium Standard “BRC Global Standard – Food”¹¹ represents one of the most widespread international instruments through which participants in the food chain evaluate their own suppliers.

⁹ ProCert was accredited in compliance with the new ISO 22000 standard - Food Safety Management Systems - from SAS (Swiss Accreditation Service)

¹⁰ <http://www.babylon.com/definition/HACCP/Dutch,12.12.2007>.

¹¹ www.dnv.hr/certifikacija/sustav_upravljanja/Hrana/BRC/BRC.asp - 58k

Figure 1.

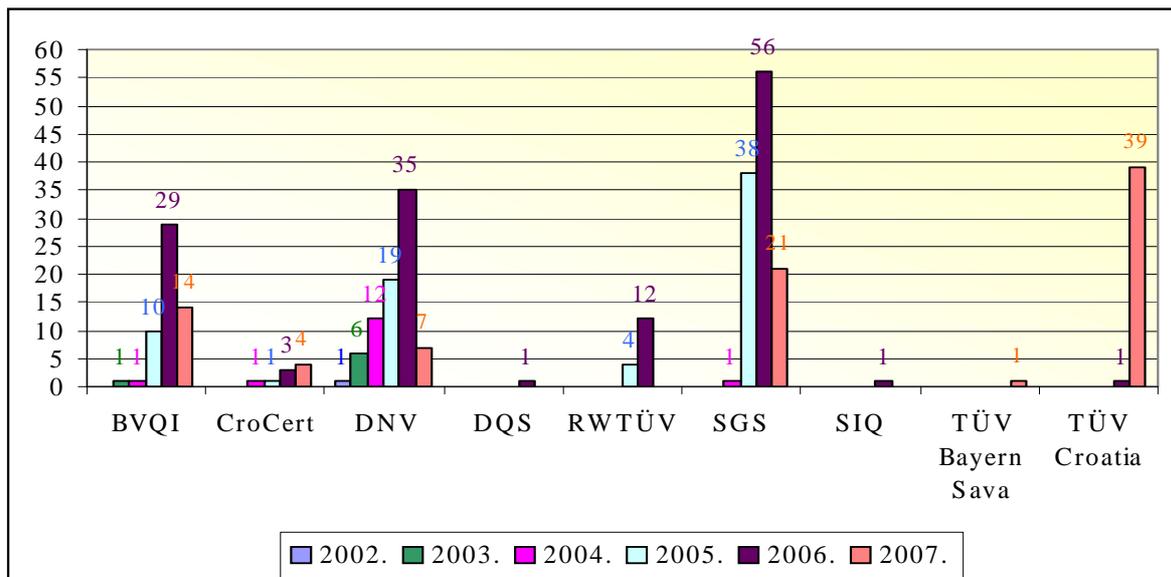


Source: Compiled and processed by the author according to:
www.dnv.hr/certifikacija/sustav_upravljanja/Hrana/BRC/BRC.asp - 58k

Three companies with the ISO 22000 certificate, without accreditation, and 3 with an Rva certificate. Regarding the deadline for implementation of the HACCP system, there has been a change in the certification of companies.

Figure 2

Firms issuing certification between 2003 and 2007.



Source: Ibid

Fig. 2 shows that in 2002 only one company had received certification from the DNV¹², and in 2007 thirty-nine, most of the certificates being issued by TÜV Bayern Sava¹³.

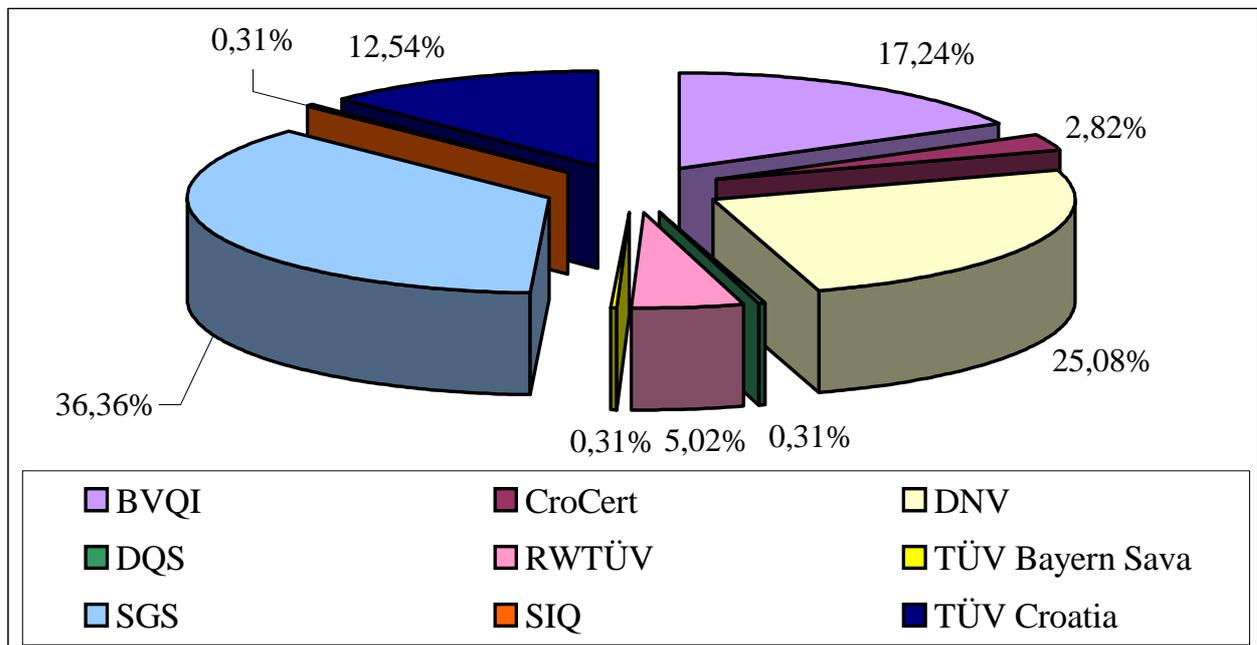
In the 2003-2007 period, the highest percentage of certificates was issued by the SGS certifying firm - 36.3%, and the lowest number by TÜV Bayern Sava, 0.13%, as seen in Fig. 3. Implementation of the HACCP system achieves overall quality management, which means the inclusion of all company employees in activities aimed at improving the quality of products, services, processes and of doing business.

By an objective analysis of one's own attainments by comparison with those of other companies, it is possible to achieve greater motivation and finally, excellent business results. A negative effect on consumer health as a result of consuming an unsafe product, on the other hand, can result in the failure of a business in the food industry. (cf. Ščetarić-Legan, V.: 2004).

With the implementation of the HACCP system, integrated into all the other systems to ensure the safety of food which will meet legislative requirements and all the specifications of the food chain, it is possible to enable consumers to have a high level of confidence in the products they buy.

Figure 3

Percentage of certifying firms in total number of certifications carried out from 2003 to 2007.



Source: Ibid

¹² Det Norske Veritas (DNV), with its experience and professionalism acquired by long-term presence on the market, a leader in the certification sector. www.dnv.hr/ - Det Norske Veritas (DNV) is an independent foundation which acts to protect life, property and the environment. It was founded in 1864 in Norway for the inspection and technical assessment of Norwegian merchant ships.

¹³ TÜV Bayern Sava belongs to the consortium TÜV Süddeutschland AG, Minhen (TÜVSÜDGroup). eicc.org/tenders/TenderDetails_s.php?tender_id=3942&s_institution_company=&s_place=...
- 15k -

One of the challenges for the food industry in recent years has been the issue of numerous certificates by internationally recognised agencies and legislations. It is therefore not difficult to understand that regulations on the global scale bring problems in decision-making within the company.

5. CONCLUDING REMARKS

Competition in Croatia today is very intense. In addition to quality, consumers want faster delivery and lower prices. The establishment of the HACCP system has certainly enabled a better quality of choice for the customer, and an incentive to the manufacturer to work constantly on improving quality and a sustainable development. Through quality, a successful company has to respond first to the needs and expectations of the consumers and users, increase revenues and profits while keeping costs down. From the methodological point of view, quality is necessary to ensure and motivate people towards responsibility, so that the entire organisation is based on care for the customer and his/her wishes. Due to the increasing globalisation of production, large corporations are ever more frequently forced to focus on a basic activity (*Core Business*), leaving everything else to suppliers and partners worldwide.

Through business reorganisation, the application of modern information technologies and systems, a joint remodelling of critical material and non-material processes the nurturing of new approaches and the continual improvement of the basic efficiency indicators of a company, enables achievement of a driving force for competitiveness and employment. Today's interpretation of quality should therefore be much more rounded. A quality product can only be one whose entire life cycle contributes to the satisfaction, health and safety of the consumer. This must be built into its development, production, distribution, use, maintenance and recycling, with minimum expenditure of all resources and an acceptable effect on the user, the environment and society.

With globalisation, the expansion of problems concerning food safety becomes more important than ever. In consequence, food manufacturing companies have recognised the necessity of directing activities throughout the entire food chain.

Therefore, a management approach towards recognising hazards, undertaking activities to prevent them and monitoring production procedures, ensure conditions for the manufacture of food that is healthy and sound. Naturally, it is the aim of every company to be present on the market. To ensure success, it is necessary to ensure a growth in living standards over a longer period. Countries are becoming more competitive by focusing on growth resources in productivity (innovation, education, introduction of foreign technology, founding of new companies).

The application of a preventive approach in the production of a safe and healthy product is certainly the key to success for all who are involved in the food business, in today's whirlwind of competition on global and local markets.

This research was intended as a contribution to the study of the application of norms through the use of international standards in achieving a sound and healthy product. Further research should provide clarification and show their interconnection, while giving impetus to an inter-disciplinary approach to the subject by highlighting the link between soundness of product and customer satisfaction and expectations. What has been said corroborates the need for increased awareness of the importance of consuming safe and healthy food, and of the risks which can arise from consuming food that is unsafe.

REFERENCES

- Agriculture Canada: Food Safety Enhancement Program, *Implementation Manual* 1992., str. 37-59.
- Avelini, Holjevac, I., *Upravljanje kvalitetom u turizmu i hotelskoj industriji*, Fakultet za turistički i hotelski menadžment, Opatija, 2002.
- Bakija, I., *Osiguranje kvalitete po ISO 9000*, Privredni vjesnik, Zagrebačka banka d.d., Zagreb, 1992.
- Case, J., *Open – Book Management: The Coming Business Revolution*, New York: Harper business, 1996.
- Codex Alimentarius Food Hygiene Basic Texts*, Food and Agricultural Organization of the United Nations, World Health Organization, Rome, 2001.
- Crosby, B. P., *Kvaliteta je besplatna, Umijeće osiguravanja kvalitete*, Privredni vjesnik, Binoza Press, Zagreb, 1996.
- Danski standard DS 3027 E: Food safety according to HACCP (Hazard Analysis and Critical Control Points) – Requirements to be.
- Dillton, M. & Griffith, C.; *How to HACCP a management guide*, 3 rd edition, M:D Associates, 2001.
- Duraković, S. i dr., *Moderna mikrobiologija namirnica*, drugo izdanje, Zagreb, 2002.
- FAO/WHO: *Codex Alimentarius. Volume 1B – General Requirements (Food Hygiene); Guidelines for the Application of Hazard Analysis Critical Control (HACCP) System*; CAC/GL 18 – 1993; 1995., str 9-30.
- Galičić, V. i S. Ivanović, *Primjena ekspertnog sustava u poslovanju*, Informatologija, 39, 2006, 3, str. 185-188.
- Hrvatski Zavod za norme, ISO/HZN seminar ISO 22000, *Sustavi upravljanje sigurnošću hrane*, Zagreb, 26. i 27. lipnja 2006., str. 12-18.
- Injac, N., *Sustavi kvalitete 2000, velika revizija normi ISO 9000*, Oscar, Zagreb, 1999.
- Juran, J. M., Gryna, F. M., *Planiranje i analiza kvalitete*, Mate, Zagreb, 1999.
- Kalenić, S., Mlinarić, E.: *Medicinska bakteriologija i mikologija*, Zagreb, 1995.
- Kodeks, Jamstvo neškodljivosti namirnica u ugostiteljstvu HACCP sustavom*, Hrvatska gospodarska komora, 2. izdanje, 1999.
- Koneman, W. E.; Allen, S.D.; Janda, M. W.; Schreckenberger, P.C.; Winn, W. C., *Diagnostic Microbiology*, Lippincott, Philadelphia, New York, 1997.
- Lisac, S.; *HACCP – sustav analize opasnosti i kontrola kritičnih točaka*, QM, 1, 2, 5 – 8, 12, 1997., 5-60.
- Mortimore S. i C. Wallace, *HACCP – A practical approach*. 1 ed. London. Chapman & Hall, 1994.
- National Advisory Committee on Microbiological Criteria for Foods (NACMCF), Hazard analysis and critical control point principles and application guidelines*, 1997.
- Raspor, P. s sodelavci, *Priročnik za postavljanje in vodenje sistema HACCP*, Ljubljana, 2002.
- Requirments for a HACCP based Food Safety System: National Board of Experts – HACCP*, The Netherlands, 2002.
- Ščetarić–Legan, V., *Problemi kod primjene integralnog sustava ISO 9001; 2000 i HACCP u prehrambenoj industriji, DDD i ZUPP 2004*, Rovinj
- The Food Act – Croatia (NN 46/07)
- Tipurić, D.; *Konkurentna sposobnost poduzeća*, Zagreb, 1999.
- Turčić, V., *HACCP i higijena namirnica*, Zagreb, 2000.
- U.S. Department of Agriculture: Food Safety and Inspection Service: Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems, 1996.

Veldić, D., HACCP – jamac zdrave i sigurne hrane, *Časopis za kvalitetu, QM*, vol.1, broj 2, Zagreb, 1997., str. 16-19.

UVODENJE I PRIMJENA MEĐUNARODNOG STANDARDA HACCP NA PRIMJERU SUBJEKATA U POSLOVANJU S HRANOM

SAŽETAK

Velike demografske promjene u društvu i globalizacija tržišta za sobom donose dodatne promjene u našim prehranbenim navikama. Čitav niz javno zdravstvenih mjera sve više dobiva na važnosti, pri čemu treba naglasiti mjere ekološkog nadzora različitih medija okoliša, od kojih je hrana neizostavljiv segment. Glavni je cilj prehranbenih industrija proizvesti, preraditi i distribuirati hranu zajedničkim naporima svih strana koje sudjeluju u lancu hrane, a koja će ujedno udovoljiti zahtjevima zdravstvene ispravnosti iste. Implementacijom ISO i HACCP normi se uspostavlja proces kontinuiranog i dokumentiranog nadzora u sustavu upravljanja sigurnosti hrane. Najdjelotvorniji sustavi sigurnosti hrane uspostavljaju se, provode i moderniziraju u okviru strukturiranog sustava upravljanja, te se ugrađuju u ukupne upravljačke aktivnosti proizvodne organizacije. U radu se opisuje postupak verifikacije HACCP sustava. Nadalje, analitički izvještaji prikazani u radu su pojedinačni slučajevi uvođenja i primjene međunarodnog standarda HACCP na primjeru subjekata u poslovanju sa hranom, kao i rezultata postignutih uspostavom istog. U završnom dijelu rada autorica temeljem dobivenih rezultata istraživanja donosi zaključke o potrebi usklađivanja standarda radi zadovoljavanja zakonskih obveza kao i normativa Europske Unije.

Key words: međunarodni standardi, sigurnost hrane, HACCP sustav, kvaliteta.