
The importance of implementing a HACCP plan in food service operations and restaurants

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Abstract

The European Union has shown that the post-industrial market economy has led to the production of food products above the level of consumer needs in the member states. This development has generated new types of issues, due to the production of food at industrial scale. In order to cope with food and nutrition illnesses and to restore consumer confidence in food safety, the European Commission has launched a series of new legislative amendments on food safety (Marin V. et al, 2007). The Good Hygiene Practices Guide in restaurants establishes, according to the legislation in force, a set of rules referring to the part of food hygiene, which must be followed and applied in restaurants. Potential risks of contamination of food and/or beverages are identified in these plans and a series of measures are developed to prevent these risks. The plan also includes the hygiene rules that must be observed by the employees and the kitchen staff. Operators operating in the field of food must guarantee for its products, comply with the legislative requirements and permanently implement these requirements, in order to release for consumption safe products for the final consumer. The purpose of this paper is to keep in mind the scope of this study focusing on the storage, handling, processing and distribution of all products, including the cooked product to be consumed. Thus, all biological, chemical or physical hazards that may occur during the cooking process of the product are taken into account. The HACCP team will ensure that all foodstuffs used in the preparation of cooked products comply with food safety legislation.

Keywords: hazard, food safety, HACCP, restaurants

Material and method

The culinary products (semi-preparations and culinary preparations), are obtained from raw materials of animal origin and of vegetable origin

HACCP involves a systematic analysis of the ingredients, the food product, the conditions of processing, handling, storage, packaging, distribution and consumption. The complete analysis allows to identify "sensitive" areas of the technological flow that could contribute to the occurrence of a danger. From the information obtained, "critical control points" (CCP) can be determined and thus the measures to be taken to reduce the physical, chemical and biological hazards to a limit allowed by the legislation can be established. Areas identified as CCP are monitored and boundaries are determined to control potential hazards. When the hygiene rules of a restaurant and the steps of obtaining the food are complied with, the HACCP system can be used to control any area or point in the food system that could contribute to the occurrence of a hazard, whether we refer to contaminants, microorganisms that can cause food poisoning, chemicals, raw materials.

The implementation of the HACCP system in food-related units has the following benefits:

It is a system that prevents and greatly reduces food risks. In this way the confidence of the consumers and the operator delivering the respective products is greatly increased:

- Has a systematic approach;
- Improves communication with authorities;
- Provides a very good image
- Is accepted internationally;

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- Strengthens food quality management systems;
 - Ensures the product's market credibility;
 - Reduces testing costs;
 - Facilitates external inspection / audits;
 - It is a very well developed management system.

The food safety system has been subject to regulations, through the Order of the Minister of Health, since 1995, referring to the general hygiene rules of foodstuffs and GD 955/2005, regarding the approval of the specific hygiene rules for food of animal origin. Also during this period were developed the Romanian Agri-Food Hygiene Standards referring to the hazard analysis system and the CCP, to the food safety management systems and requirements for any organization in the food system. The implementation of such a system requires resources, commitment and trained personnel. The HACCP system is dependent on conventional techniques that include setting goals and a "step by step" approach, the main feature of this approach being the total involvement of the organization's staff (V.Floriștean, 2014).

According to the provisions of Codex Alimentarius, the implementation of the HACCP system is based on the 7 fundamental principles:

- ✓ Principle 1 - Carrying out the analysis of potential dangers
- ✓ Principle 2 - Determination of the CCP;
- ✓ Principle 3 - Establishing critical boundaries;
- ✓ Principle 4 - Establish a monitoring system for the CCP;
- ✓ Principle 5 - Establish corrective measures for situations where monitoring indicates that a CCP is not under control;
- ✓ Principle 6 - Establish verification procedures, from which it can be seen that the HACCP system works effectively;
- ✓ Principle 7 - Establish a system of specific documents for all procedures and records, which must be in accordance with the previous principles and their application.

In addition to the 7 principles, Codex Alimentarius, has also adopted an essential element in determining the CCP, namely the use of the decision tree, which is in fact a set of questions that apply to each product (raw material, ingredient) or to each stage of process and for each type of hazard identified. The answers to these questions can lead to the identification of the CCP.

During this stage, the HACCP team must produce a documentation about the product or finished products that are the subject of the actions of design and implementation of the food safety system.

The stage is divided into two phases:

- ✓ Description of the characteristics of the finished products;
- ✓ Description of the characteristics of the raw materials and auxiliaries;

Regarding the products for which the food safety system is to be designed, an individual plan will be drawn up for each product to be prepared and which will include:

- ✓ Brief description of the product, the products;
- ✓ Raw materials from which the products are made;
- ✓ Brief description of the technological process for obtaining the product (s) and the presentation mode.
- ✓ Product characteristics (weight per portion, composition per portion, organoleptic, physico-chemical properties)
- ✓ Quality and food safety legal requirements: composition, microbiological specifications, additives, impurities.

The HACCP team will focus on microbiological contamination, chemical, physical and biological contamination), which can be produced through the process of handling, storage and distribution of the finished product (**Table 1, Table 2, Table 3**) (Marin Viorel,et.al., 2007).

The control of the processes during the preparation of the preparations and semi-preparations but also of the culinary preparations consists in keeping under control the dangers of biological physical and chemical nature. It can be considered a safe product for the consumer when any source of contamination is removed by sorting, cleaning, washing, when the subsequent growth of the microbial load is prevented by cooling, refrigeration, freezing, acidity increase, preservation, packaging and when contamination is prevented (Marin V. et al, 2007).

During each technological flow to obtain cooked products, the potential dangers should be immediately identified taking into account the following aspects:

- Characteristics of raw materials, ingredients, packaging and finished products;
- The stages of the processes and the conditions of development of these stages;
- How to distribute the finished products.

Potential risk factors that may occur during processing may be contamination of the raw materials, ingredients and semi-preparations that are processed, the number of microorganisms that may increase considerably during the technological process, contamination with chemical compounds and / or foreign bodies, including overdoses of additives (V.Floriștean, 2014).

Table 1

COMMON HAZARDS IN FOODSERVICE AND FOOD RETAIL OPERATIONS		
<p style="text-align: center;">BIOLOGICAL</p> <p>Pathogens who produce thermostable toxins and infectious pathogens that cause digestive disorders</p>	Phatogenic bacteria for humans	<i>Salmonella spp., Staphylococcus aureus Clostridium botulinum, Bacillus cereus, Bacillus mezentericus, Campylobacter, Leuconostoc, E.coli, Listeria monocitogenes, Shigella, etc</i>
	Virus	<i>Hepatitis A, Rotavirus, Astrovirus</i>
	Parasites Molds	<i>Trichinella spiralis, Giardia, Criptosporidium, Fusarium roseum, Botrytis cinerea, Trichothecium</i>
<p style="text-align: center;">CHEMICAL AND BIOCHEMICAL</p>	Compounds of natural origin	<i>Mycotoxins and toxins</i>
	Chemicals	<i>Cleaning chemicals, disinfectants, pesticides, fertilizers, etc</i>
	Medium pollutants	Heavy metals, smoke, dust, radioactive substances
	Additives	Overdose of preservatives, colorants, antioxidants, binding agents, loosening agents
	Allergens Packing materials	Milk, gluten, eggs, dried fruit, food additives Polymers, plasticizers, solvents, adhesives, inks, etc. Mercury, arsenic
	Sabotage acts	

PHYSICAL	<i>The origin of raw materials</i>	<i>Fragments of bone, nutshells, eggshells, etc.</i>
	<i>The origin of auxiliary aterials</i>	<i>Fragments of glass, metal, wood, plastic, etc.</i>

Table 2

RAW MATERIALMICROBIOLOGICAL CONTAMINATION		
MICROORGANISM	SOURCE	CONTAMINATED (%)
<i>Salmonella spp.</i>	Raw poultry	10 – 15 %
	Raw pork	3 –20 %
	Raw shellfish	16 %
<i>Staphylococcus aureus</i>	Raw chicken	73 %
	Raw pork	13 –33 %
	Raw beef	16 %
<i>Clostridium perfringens</i>	Raw pork and chicken	39 –45 %
<i>Campylobacter jejuni</i>	Raw chicken and turkey	45 –100 %
<i>Escherichia coli</i> <i>O157:H7</i>	Raw beef/pork/poultry	1.5 –3.7 %
	Raw ground beef	43 –63 %
<i>Bacillus cereus</i>	Raw rice	100 %
<i>Listeria monocytogenes</i>	Fresh potatoes	26 %
	Fresh radishes	30 %
<i>Vibrio spp.</i>	Raw seafood	33 –46 %

Table 3

HUMAN MICROBIOLOGICAL CONTAMINATION		
MICROORGANISM	SOURCE	CONTAMINATED
<i>Shigella spp., Hepatitis A, Norwalk virus, E. coli, Salmonella spp., Giardia lamblia</i>	<i>Feces</i> <i>Vomit</i>	One in 2% of the employees who come to work each day are highly infective. Half have no symptoms of illness
<i>Norwalk virus</i> <i>Staphylococcus aureus</i>	<i>Skin, nose, boils and skin infections</i>	
<i>Streptococcus Group</i>	<i>Throat and skin</i>	

For the implementation of the HACCP plan, the team will take into account the guidelines on good hygiene practices, but also the legislative regulations on food, more specifically, will focus on the European Regulations on food hygiene, personnel hygiene, Codex Alimentarius and the regulations. refers to the analysis of risks and critical control points (Table 4).

Preliminary programs have the role of keeping under control the hazards of low risk or those that cannot be monitored through the HACCP plan and which could affect the safety of the food produced or prepared. These preliminary programs underpin the implementation and effectiveness of the HACCP system and represent a "code of good conduct" of the company that wants to offer the final consumer safe and quality products (Regulation (EC) No 854/2004).

The economic operator must take into account the following elements:

- ✓ Compliance with the conditions imposed for the interior and exterior arrangements of the unit to ensure a proper hygiene and maintenance of the production spaces, from the access of raw materials and personnel to the unit, to the serving or marketing of the culinary products;
- ✓ Selection of raw and auxiliary materials, quality and safety ingredients;
- ✓ Establish a correct composition of products addressed to consumers;
- ✓ Equipment selection;
- ✓ Proper maintenance of equipment and machinery;
- ✓ Selecting the methods of serving, presentation and packaging, for the protection of both the product and the consumer, against the possible dangers;
- ✓ Correctly performing the product preparation operations;
- ✓ Applying correct procedures for the storage of raw materials, semi-preparations, finished products, as well as waste and disinfection and hygiene materials;
- ✓ Verification of the transport and storage procedures;
- ✓ Avoid crossings of flows of raw materials, semi-prepared with the finished product,
- ✓ Acceptance of healthy personnel, who must be trained and who must have appropriate behavior in the workplace;
- ✓ Respecting the environmental conditions: the evacuation of the flue gases, the waste water, the waste;
- ✓ Use of methods to prevent the growth of microbial load;
- ✓ Ensuring the hygiene conditions of the spaces, equipment and utensils as well as the enclosures and the sanitary annexes;

All these aspects will be taken into account in the development of specific and operational procedures.

Table 4

Product Identification, Intended Use and Process Product Description	
Product name(s)	
Important product characteristics	Product meeting specifications for water activity, sensory and microbiological quality, foreign objects and packaging
How is it to be used: a. By a further processor or retailer b. By the consumer	a. Not applicable b. Ready to eat
Intended consumer	General public ("high-risk" groups not specified for this plan)
Packaging	Company/regulatory specification

Shelf life and storage requirements	Company/regulatory specification
Where it will be sold: a. Export market b. Local market	List countries, if applicable
Labelling instructions	Company/regulatory specification
Special distribution controls required	Handle with care

Results and discussions

The study regarding the implementation of the HACCP plan in a restaurant must also take into account the compulsory programs that the economic operator must respect and must take into account, namely: good manufacturing practices, storage conditions, temperature and transport, product traceability, staff hygiene and periodic training, operational and preoperative control of the unit, physical, chemical and biological hazards that may occur during product processing and measures to be taken to reduce risk, suppliers from which they purchase their auxiliary products and raw materials, the way of packing the goods, and the finished products, pest control.

All information regarding the products used to obtain the cooked products must be stored in registers or databases from the receipt of the raw material goods. At the reception there will be an inspection of the packages, of the products of plant and animal origin, and the obtained information referring to them are stored in a register, thus being able to keep under control the identification and traceability of the products, if they will appear consumer complaints if the final product is not compliant.

HACCP Team verified the HACCP process flow diagram by walking all the processes to ensure that the diagram was accurate. It has been determined by the HACCP team during this study that there are 9 Critical Control Points (*Figure 1*)

The flow chart has been designed, so that each step has been allocated a number. All steps that are repeated throughout the process have been allocated the same number, to save repetition in the Risk Analysis Table.

The method used to establish CCP's within this HACCP Plan has been based on the significance of each hazard as determined by the Risk Analysis Table. Hazards which can be controlled, prevented or eliminated by the application of Good Hygiene Practices are not included in the HACCP Table. Therefore, these hazards have been identified in the Risk Analysis Table and have not been carried forward to the HACCP Table as CCP's.

All other hazards not controlled by GHP and defined as highly significant within the Risk Analysis Table have been carried over to the HACCP Table as a CCP. These hazards are all monitored and a record of that activity maintained. Hazards defined as less than significant within the Risk Analysis Table are not carried over to the HACCP Table and may not be monitored or a record maintained (Table 5).

Table 5

Total assessed risk = Likelihood x Severity	
1 = Improbable event: Once every five years	1 = Negligible: no impact or not detectable
2 = Remote possibility: Once per year	2 = Marginal impact: only internal company targetlevels effected
3 = Occasional event: Once per month	3 = Significant: impact on critical limits

4 = Probable even: Once per week	4 = Major: impact on customers (not necessarily the public)
5 = Frequent event: Once per day	5 = Critical: public health risk, public product recall.

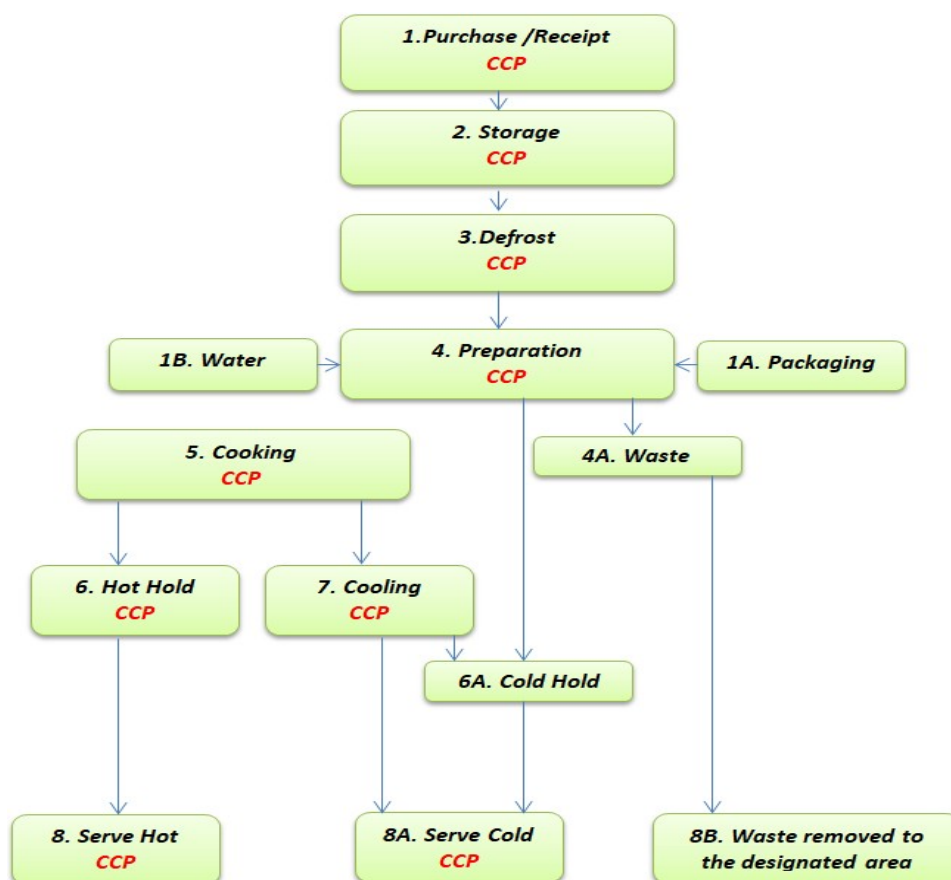


Figure 1. Process flow diagram (original)

Conclusions

The implementation of the HACCP system in restaurants is proving to be a "tool" necessary to improve the quality of the cooked products and to offer the final consumer a safe product without danger.

The establishment of the CCP on the flow of obtaining cooked food was made following the analysis of the dangers starting with receipt, storage, defrost, preparation, cooking, cooling, until the final customer service.

The application of the HACCP system is not a stand-alone system, but should be regarded as a basic element of the food safety management system. It thus complements the good hygiene practices, which are the basis of the HACCP plan, thus targeting the specific dangers of the product,

thus elaborating control measures necessary for their management and the corrective measures that must be applied to reduce the risk.

References

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