

Hazard analysis system and its impact on food product safety and its role in choosing the appropriate packaging for products

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Research Summary:

The food industry around the world faces many challenges regarding food safety due to the lack of understanding of HACCP and other food safety management systems. A HACCP is a system for ensuring food safety by identifying, assessing, and controlling risks to human health or reducing the occurrence of these risks to the extent that they do not cause any danger to the health of consumers. There are seven principles of HACCP that allow packaging companies to review their production through a structured approach to identifying risks. These principles are used as steps for defining a new HACCP program or making changes to an existing HACCP program.

Conclusions were drawn that emphasized the importance of applying the HACCP system for food packaging to determine the potential risks that may be present, how to control them, and how to determine the extent to which the risk is eliminated or reduced to an acceptable level. And the necessity to have a list of raw materials suppliers of all raw materials for packaging and their suitability with different products and treatments. When packaging a specific product, the characteristics of both the product and the material must be studied well, with the necessary tests performed for them together to ensure the safety of food products and thus the safety of the consumer.

Research problem:

Spoilage of products due to lack of good planning to choose the appropriate packaging for the product. Lack of risk analysis in the packaging stages exposes the product to hazards due to ignorance of the critical control points.

Confusion about understanding the difference between product spoilage and the severity of it and the product's lack of quality.

Aims of the research:

Awareness of conducting an analysis of the various risks and their potential sources that affect food safety at the packaging.

Developing a set of steps and models to clarify steps to reduce risks or reduce them to the permissible limit.

Keywords:

Hazard Analysis - Critical Control Point - ISO 22000 – Product description.

HACCP Hazard Analysis and Critical Control Points System:

According to the Codex Alimentarius Commission, it is a Point Control Critical Hazard Analysis system to ensure food safety by identifying, assessing, and controlling risks to human health or reducing the occurrence of these risks to a degree that does not pose any risk to consumers' health.

Definition of HACCP for food and products:

A system to ensure product safety by identifying, assessing, and controlling risks to human health or reducing the occurrence of these risks to a degree that does not cause any danger to consumers' health.

ISO 22000:

ISO 22000 is a globally accepted international standard that specifies requirements for food safety management systems. ISO 22000 was implemented in 2005 and it is applied to all organizations involved in the food chain, and its main objective is to ensure food safety and quality.

The difference between HACCP and ISO 22000

- Whereas HACCP focuses on food safety, ISO goes further. ISO also looks at the quality of business processes and corporate structures. The ISO certification is independent, which means that the organization can decide on its own whether or not it wants to obtain it.
- But obtaining HACCP certification is a legal obligation in order to ensure food safety for consumers. Although achieving ISO 22000 is not mandatory, it is a global standard by which to distinguish with reliability. ISO 22000 is based on HACCP guidelines.
- HACCP and ISO certifications serve different purposes, but they also complement each other. While HACCP is a system for achieving safety, ISO is a method of quality control. Both standards can be implemented individually or simultaneously. However, HACCP certification is a priority for companies operating in the food industry.
- Whereas HACCP focuses primarily on controlling production processes, ISO is of a broader nature and takes into account all supporting processes as well. Both systems require formal, documented processes.

Hazard Analysis System for Packaging Food Products:

The concept of Hazard Analysis Critical Control Point (HACCP) has been used in the food industry to control the risks associated with food processing. Previously, the application of the HACCP system was limited to food processing. packages in direct contact with food are now treated as a food ingredient. Thus, HACCP principles may be applied to programs in the packaging industry to create a series of steps to ensure that food safety is maintained throughout the packaging process. These steps include

creating clear critical control points that risk can be controlled and removed. These steps will allow packaging suppliers to better control risks that may contaminate the food product during packaging, thus better ensuring customer safety.

Principles of HACCP:

There are seven principles of HACCP that allow packaging companies to review their production through a structured approach to identifying risks.

1. Conduct a risk analysis - factories will identify the risks involved in each step of the process and what preventive measures can be applied to control the risks.
2. Defining Critical Control Points - A decision tree is used to define the steps by which control can be applied and as a result, risk can be prevented, eliminated or reduced to an acceptable level. Often times, packaging material suppliers may have very few CCP products in their operations.
3. Setting critical limits for each critical control point - the critical limit is the minimum or maximum value to prevent, eliminate, or reduce this risk to an acceptable level.
4. Establish Control Point Control Requirements - Control activities are necessary to ensure that critical limits are met at each critical control point.
5. Create Corrective Actions - These are the actions to be taken when there is a deviation from the established critical thresholds. Corrective actions are aimed at ensuring that no risky product enters the trade.
6. Establishing recordkeeping procedures - HACCP regulations require that plants maintain some documentation that includes a written HACCP plan, risk analysis, CCPs monitoring documentation records, critical limits, verification activities, and handling of process deviations.
7. Establish a procedure to verify the operation of the HACCP system - plant validation ensures that it does what it is designed to do. Verification ensures that the HACCP plan is adequate.

Benefits of HACCP

- 1- Maintaining food safety and reducing pollution levels.
- 2- It reduces food-borne diseases that may cause food contamination.
- 3- Improving the level of compliance with applicable legal and regulatory food safety requirements.
- 4- Effective communication on food safety issues to its suppliers, customers and relevant stakeholders in the food supply chain.
- 5- Improving the confidence of customers and the end user through confidence in the safety of food products in the country, which leads to confidence in entering into international trade and opening the global market for export, especially to the Western world.
- 6- Reducing the cost of inspection for food and avoiding its loss after production, which reduces the loss.

Apply the basic steps of the HACCP system to choose the appropriate packaging for products:

1- Assemble the HACCP team:

A cross-functional team which may include experts in areas such as microbiology, toxicology, product / process development team, quality, and others as needed.

2- Product Description:

Description of the final products covered by the HACCP plan. See Table 1 for a suggested sample product description.

Table 1 a suggested sample for product description.

Product/Product Category (e.g. Name, type, size)	
Process (e.g. Cold pack, hot fill, aseptic, freeze dried)	
Food Safety Characteristics (e.g. pH, Aw, % salt, pasteurization, cooking, preservatives, refrigeration)	
Intended Market (e.g. General public, age, adult, child, retail, food service, countries, regions, national)	
Customer Use (e.g. Ready to consume, heat and consume, mix and consume)	
Labeling/Label Instructions List only those ingredients containing allergens, sulfites (e.g. Preparation, storage needs, use by, best when used by)	
Packaging (e.g. Foil , plastic, glass, cup, can, hermetically sealed, gas permeable, tamper evident, modified atmosphere packaging)	
Shelf Life (e.g. Days and temperature conditions)	
Storage & Distribution (e.g. Ambient, refrigerated, frozen, relative humidity, high altitude)	

3- Create a process flow diagram:

Graphic representation of all processing steps from receipt of raw materials to storage of finished product.

4- Conduct a risk analysis:

The team must identify all potential biological, physical and chemical hazards that may be present in raw materials and during product

manufacture and packaging. Risk analysis requires assessment of process raw materials, and sensitivity assessment of cross-communication within the process. Risk analysis should be well-documented and scientifically based.

5- Determine the nature of the risk (s) identified:

The negative impact of the risk resulting from exposure to the risk, and is it likely to lead to significant illness or injury in a relatively short period of time (minutes, hours, or days) or does it take longer (months or years)? Is it likely that the hazard is present in the product and poses a public health hazard? The answers to these questions will determine whether to manage the risk as a CCP.

6- Evaluation of packaging components:

A list of raw materials suppliers must be available of all raw materials, and processing operations.

7- Create Critical Control Points:

After completing the risk analysis and risk assessment, the next step is to establish the critical component and control points. The following is Table 2 of the HACCP model, and Table 3 the application of the model to tuna containers.

Table 2 HACCP template. Example of metal tuna packaging:

Classification of potential risks	Critical limits	Critical control point (operations to control)
Physics .. Pieces of metal.	The size of the piece of metal is greater than 0,5 mm	Metal detection.
Chemical.. Presence of histamine or allergens.	The concentration of histamine should not exceed 25 ppm. The card lists the allergens.	Inspection upon receipt, and that the card contains all nutritional information.
Biological .. Lined zinc sealant for product packaging.	The presence of dents on the body of the package increases this risk.	Examination of the product by the importing countries. And do not buy dented packages.

Conclusions and Recommendations:

1- The Hazard Analysis and Critical Control Point (HACCP) system allows for food packaging to determine the potential risks that may exist, how to control them, and how to determine the extent to which the risk is eliminated or reduced to an acceptable level.

2- Although HACCP controls many food packaging suppliers, many of them have not yet developed sufficient CCPs in their packaging operations

so awareness of the importance of identifying hazards and critical points with products should be made.

3- A list of raw materials suppliers of all raw materials for packaging and their suitability with different products and treatments must be available.

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