



Hazard Analysis Critical Control Point (HACCP)

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Introduction

- Safety of food supply is key to consumer confidence. In the past, periodic plant inspections and sample testing were used to ensure quality and safety of food products.
- HACCP was introduced as a system to control safety as product is manufactured, rather than trying to detect problems by testing the finished product.
- This new system is based on assessing inherent hazards or risks in a particular product or process and designing a system to control them.
- This is a tool to assess hazards and establish control systems that focus on preventive measures rather than relying mainly on end product testing.
- It is now widely embraced by food industries and by the government regularity agencies around world as a most cost-effective means of minimizing occurrence of identifiable food biological, chemical and physical hazards and maximizing product safety.
- It is a system, which targets critical areas of processing and in doing so, reduces risk of manufacturing and selling unsafe products.

Objective

- i. The objective is to introduce the trainees to the history and

background of the Hazard Analysis and Critical Control Point (HACCP) system and its importance as a food safety management system in identifying and controlling food safety hazards.

- ii. The HACCP system for managing food safety concerns grew from two major developments. The first breakthrough was associated with W.E. Deming, whose theories of quality management are widely regarded as a major factor in turning around the quality of Japanese products in the 1950s.
- iii. Dr Deming and others developed Total Quality Management (TQM) systems, which emphasized a total systems approach to manufacturing that could improve quality, while lowering costs.
- iv. The second major breakthrough was the development of the HACCP concept itself. The HACCP concept was pioneered in the 1960s by the Pillsbury Company, the United States Army, the US National Aeronautics and NASA, as a collaborative development for the production of safe food for the US space programs.
- v. Pillsbury introduced and adopted the HACCP as the system that could provide the greatest safety, while reducing dependence on end-product inspection and testing.
- vi. Recognizing the importance of the HACCP to food control, the 20th Session of the Codex Alimentarius Commission held in Geneva, Switzerland, adopted the 'Guidelines for the application of Hazard Analysis Critical Control Point'

ADVANTAGES OF THE HACCP

- i. The HACCP system, as it applies to food safety management, uses the approach of controlling critical points in food handling to prevent food safety problems.
- ii. The system is science-based and systematic and identifies specific



- hazards and measures for their control to ensure the safety of food.
- iii. The HACCP is based on prevention and reduces the reliance on end-product inspection and testing.
- iv. The HACCP system can be applied throughout the food chain from the primary producer to the consumer.
- v. Besides enhancing food safety, other benefits of applying the HACCP include a more effective use of resources, savings to the food industry and a more timely response to food safety problems.
- vi. The HACCP enhances the responsibility and degree of control at the level of the food industry.
- vii. A properly implemented HACCP system leads to the greater involvement of food handlers in understanding and ensuring food safety, thus providing them with renewed motivation in their work.
- viii. Implementing the HACCP does not mean undoing quality assurance procedures or good manufacturing practices already established by a company. It does, however, require a revision of these procedures as part of the systematic approach and for their appropriate integration into the HACCP plan.
- ix. The application of the HACCP system can aid inspection by food control regulatory authorities and promote international trade by increasing the buyer's confidence.
- x. Any HACCP system should be capable of accommodating change, such as advances in equipment design, changes in processing procedures or technological developments.

TRAINING

- Food industries and food control regulatory agencies worldwide have shown an interest in implementing the HACCP system.
- A common understanding about the terminology and approaches for

application will greatly enhance its adoption and will lead to a harmonized approach to food safety among countries all over the world.

- Many countries have integrated, or are in the process of integrating, the HACCP system into their regulatory mechanisms.
- In many countries, the application of the HACCP system to food may become mandatory.
- As a result, there is a tremendous demand, particularly in developing countries, for training in the HACCP system and for the development and assembly of reference materials to support this training

Principles of HACCP

The HACCP system consists of seven principles. It is a system, which identifies specific hazards(s) and preventive measures for their control. These principles outline how to establish, implement and maintain a HACCP system.

First Principle (Hazard Analysis):

Identify potential hazard(s) associated with food production at all stages, from growth, processing, manufacture and distribution, occurrence of hazard(s) and identify preventative measures for their control.

Second Principle (Identify Critical Control Points):

Determine points/ procedures/ operational steps that can be controlled to eliminate hazard(s) or minimise its likelihood of occurrence (Critical Control Point [CCP]). A "step" means any stage in food production and / or manufacture including raw materials, their receipt, harvesting, transport, formulation, processing, storage, etc.

Third Principle (Establish Critical Limits):

All CCP's must have preventive measures which are measurable. Critical limits are the operational boundaries of CCP's which control food safety hazard(s).

Fourth Principle (Monitor CCP's):

Establish a system to monitor control of CCP by scheduled testing or observations.

Fifth Principle: (Establish Corrective Action):

HACCP is intended to prevent product or process deviation. However, should loss of control occur, there must be definite steps in place for disposition of product and for correction of process.

Sixth Principle (Verification):

Establish procedures for verification, including supplementary test and procedures to confirm that HACCP system is working effectively.

Seventh Principle (Record keeping):

Establish documentation concerning all procedures and records appropriate to these and their application.

Application of principles of HACCP

- i. In the process of hazard analysis, consideration must be given to impact of raw materials, ingredients, manufacturing practices, role of manufacturing processes to control hazards, likely end-use of product, consumer populations at risk and food safety.
- ii. Aim of HACCP system is to focus control at CCPs. HACCP should be applied to each specific operation independently.
- iii. For identification of CCPs, all aspects of food chain need to be examined. The HACCP application should be reviewed and necessary changes has to be made, when any variation is made in product, process or any step.
- iv. A flow diagram for the typical application of HACCP is shown in figure 14.1.

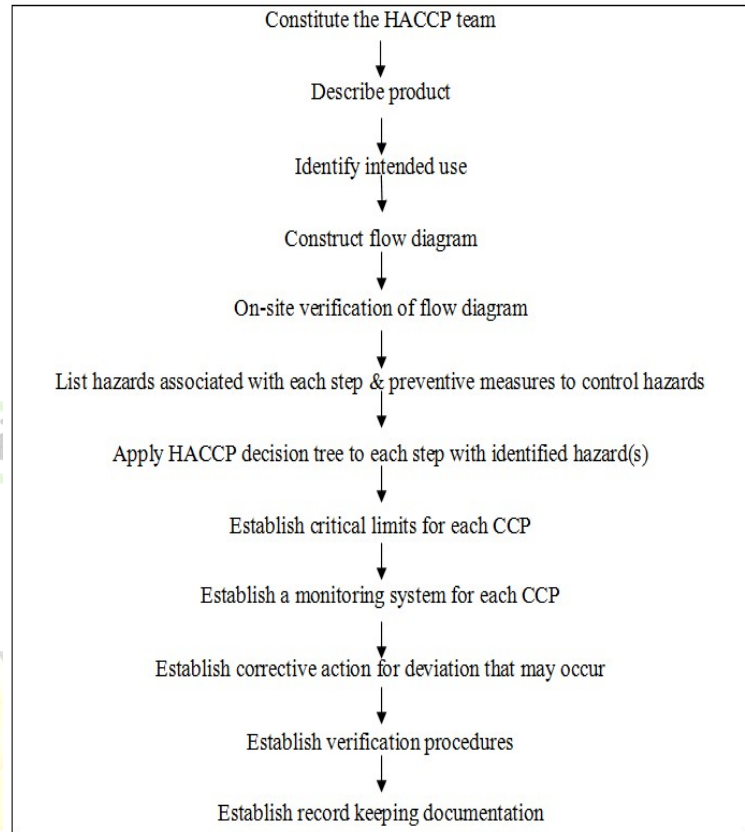


Figure 14.1. Flow diagram for the application of HACCP

Implementation of HACCP

Implementation of HACCP is made through following tasks. HACCP is implemented by people. If they are not properly trained and experienced, then the HACCP system is likely to be ineffective.

There should be a multidisciplinary team that has specific knowledge and expertise appropriate to product for example; Food engineers, production personnel, biochemists, microbiologists, medical experts, Food technologists, chemical engineers, agronomists and veterinarians according to particular study.

If the expertise is not available in process plant, expert advice should be obtained from other sources.

Description of the product and its use

It should be noted what the product actually is and how/by whom it will be used.

A full description of product should be drawn up, including information on composition and method of distribution.

Intended use should be based on expected uses of product by end user or consumer. In specific cases, vulnerable groups of



population, for example; institutional feeding may have to be considered.

Preparation of process flow diagram

- Process flow diagram is used as basis of hazard analysis and should, therefore, contain sufficient technical detail for study to progress.
- It should be constructed by the HACCP team. Each step within specified area of operation should be analysed for the particular part of operation under consideration to produce flow diagram.
- When applying HACCP to a given operation, consideration should be given to steps preceding and following the specified operation.
- When the process flow diagram is complete, it should be verified by HACCP team.
- It should confirm processing operation against flow diagram during all stages and hours of operation and amend flow diagram where appropriate.

Identification of all hazards

- When process flow diagram is completed and verified, HACCP team should list all biological, chemical and physical hazards (First principle) that may be reasonably expected to occur at each step and describe preventive measures that can be used to control these hazards.
- For inclusion in list, hazards must be a nature that their elimination or reduction to acceptable levels is essentials to production of a safe food.
- The team must then consider what preventive measures, if any, exist that can be applied for each hazard.
- Preventive measures are those actions and activities that are required to eliminate hazards or reduce their impact occurrence to acceptable levels.
- More than one preventive measure may be required to control a specific

hazard(s) and more than one hazard may be controlled by a specified preventive measure.

Identification of the CCP's

- A critical control point is a point/step/procedure where a food safety hazard can be prevented, eliminated or reduced to acceptable levels. Identification of (2nd principle) all hazards that may be reasonably expected to occur, or be introduced at each step, should be considered.
- Training in the application of decision tree may be required. If a hazard has been identified at a step where control is necessary for safety, and no preventive measure exists that step, or any other, then the product or process should be modified at that step, or any other, then the product or process should be modified at that step, or at any earlier or later stage, to include a preventive measure.
- Application of the decision tree determines whether the step is a CCP for the identified hazard. Application of the decision tree should be flexible, whether operation is for production, processing, storage, distribution or other.

Establishment of critical limits FOR EACH CCP

- Since critical control point defines boundaries between safe and unsafe products, it is vital that they are set at correct level for each criterion (3rd principle).
- The HACCP team should, therefore, fully understand criteria governing safety at each CCP to set appropriate critical limits.
- Critical limits must be specified for each preventive measure. In some cases, more than one critical limit will be elaborated at a particular step.
- Criteria often used include measurements of temperature, time, moisture level, pH, and available chlorine, and sensory parameters such as visual appearance and texture.



ESTABLISH MONITORING SYSTEM FOR CCP

- Monitoring is one of the most important aspects of any HACCP system. It is the scheduled measurement or observation of a CCP relative to its critical limits.
- Monitoring procedures must be able to detect loss of control at the CCP (4th principle).
- Further, monitoring should ideally provide this information in item for corrective action to be taken to regain control of process, if there is a need to reject product.
- Data derived from monitoring must be evaluated by a designated person with knowledge and authority to carry out corrective actions when indicated.
- If monitoring is not continuous, then amount or frequency of monitoring must be sufficient to guarantee that CCP is in control.
- Most monitoring procedure for CCPs will need to be done rapidly because they relate to online process and there will not time for lengthy analytical testing.
- Physical and chemical measurements are often preferred to microbiological testing because they may be done rapidly and can often indicate microbiological control of product.
- All records and documents associated with monitoring CCPs must be signed by person(s) doing monitoring and by a responsible reviewing official(s) of company.

Corrective actions

- Explicit corrective actions (5th principle) must be developed for each CCP in HACCP system to deal with deviations, when they occur.
- Actions must ensure that CCP has been brought under control.
- Actions taken must also include proper disposition of affected product.

- Deviation and product disposition procedures must be documented in the HACCP record keeping.
- Corrective action should also be taken, when monitoring results indicate a trend towards loss of control at a CCP.
- Action should be taken to bring process back into control before deviation leads to a safety hazard.

Verification Procedures

- The HACCP system should include verification procedures (6th principle) to provide assurance that HACCP system is being complied with on day-today basis.
- This can be done most effectively by using audit method. Establish procedures for verification that the HACCP system is working correctly.
- Monitoring and auditing methods, procedures and tests, including random sampling and analysis can be used to determine if the HACCP system is working correctly.
- Frequency of verification should be efficient to validate HACCP system. Examples of verification activities include; review of the HACCP system and its records, review of deviations and product dispositions, and validation of established critical limits.

Record keeping and documentation

- Well-organized and precise record keeping (7th principle) is essential to application of HACCP system.
- Records need to be kept of all areas, which are critical to product safety as written evidence that HACCP system is in compliance with documented system.
- Documentation of HACCP procedures at all step should be included and assembled in a manual.
- Records are useful in providing a basis for analysis of trends as well as for internal investigation of any food safety incidents, which may occur.



- It is extremely useful to allocate a unique reference number to each HACCP record.

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