Designing Food Safety Management System

Laly S.J.
Quality Assurance & Management Division
ICAR-Central Institute of Fisheries Technology, Cochin

Introduction

The safety of food is of critical importance as food is the basic requirement for growth and sustenance of life. Food safety has become vital issue due to major credibility crisis and overwhelming public opinion about the food sector. The International Organization for Standardization (ISO) defined 'food safety' as the concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (CAC, 2017). Codex, General Principles of Food Hygiene defines Food Hygiene as, "All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain; Properly applied prerequisite programmes, including Good Hygiene Practices (GHPs), Good Agricultural Practices (GAPs) and Good Manufacturing Practices (GMPs), along with training and traceability, should provide the foundations for an effective HACCP system. Food safety is also referring to the absence of hazards entering the system at any stage of processing and causing food borne illness. Widespread food safety issues related to microbiological hazards (e.g., *Salmonella, E. coli*), contaminants (e.g., dioxins) and animal disease (e.g., BSE)results increased demand for food safety legislative. Increased consumer expectations and their concern about quality and food safety; requirement of diversified food chains; and profit-oriented food enterprises development has forced the manufactures to improve the quality and food safety standards of their products by implementing management systems. Increased demand for safe food act as pushing force on development of new, improved standards along with regulations to achieve more and more safe food. Food safety systems are focused on safety, quality, efficiency, reliability, interchangeability, and environmental friendliness along with economic factors (Wentholt et al., 2009). Through the robust implementation of various risk-based food safety management systems, food organizations are progressively mitigating and managing food safety hazards.

The Food Safety and Management Systems (FSMS) is a set of standards established to direct and control food safety aspects. It is a a set of written procedures which define the range of actions taken by the food business operator to ensure that the food produce is safe to eat, of the required quality, and legally compliant. it examines food safety management from the perspective of the entire food chain from "farm to fork." A food business organization that beholds certification for FSMS depicts assurance that the organization has taken care of appropriate Food Safety and Management System. There are public-based FSMSs by International Organization for Standardization (ISO 22000:2018), and industry-based FSMSs (Global GAP, British Retail Consortium (BRC), Safe Quality Food (SQF), International Food Standard (IFS) and Food Safety System Certification (FSSC 22000).

ISO 22000:2018

ISO 22000 is the food safety management system that can be easily applicable to any organization in the food chain. ISO 22000 was initially developed on September 1st 2005 by the ISO/TC 34/SC 17 as the first truly international FSMS standard. Food safety hazards can occur at any stage in the food chain making adequate control throughout the food chain essential. By combining PDCA and risk-based thinking to manage business risk with HACCP to identify, prevent and control food safety hazards, ISO 22000 helps organizations to reduce exposure to risk and improve safety. ISO 22000 is aligned with the requirements of ISO 9001 in order to enhance the compatibility of the two standards and to ease their joint or integrated implementation.

ISO 22000:2018 is the latest global food safety management system (FSMS). This standard replaces the old ISO 22000:2005. ISO 22000:2018 was published in 19 June 2018. The aim of the standard is to harmonize the requirements for food safety management on a global level. The ISO 22000:2018 international standard enables organizations to control food safety hazards along the food chain in order to ensure that food is safe at the time of consumption. ISO 22000:2018 applies to all organizations participating in the food chain, regardless of type, size and complexity. The standard contributes to ensure food safety throughout the whole food chain farm-to-table.

The potential benefits to an organization of implementing a FSMS are:
•   ability to consistently provide safe foods and products and services that meet customer and applicable statutory and regulatory requirements;
•   addressing risks associated with its objectives;
•   the ability to demonstrate conformity to specified FSMS requirements.

ISO 22000 combines generally recognized key elements to ensure food safety along the food chain:
•   Interactive communication
•   HACCP principles
•   System management
•   Prerequisite programmes

Covers the principles that are common to ISO management system standards. The management principles are customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, relationship management.

An ISO 22000 food safety management system (FSMS) can be implemented in small, medium and large-sized food organizations from all aspects of the food chain:
•   Food and ingredient manufacturers
•   Retailers
•   Wholesalers
•   Agricultural producers

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- Transport, logistics and storage providers
- Packers
- Equipment and packaging manufacturers
- Caterers

Key requirements of ISO 22000: 2018
Clause 1: Scope
This clause details the scope of the international standard. This includes requirements about planning, implementation, maintaining and updating an FSMS as well as effective communications.

Clause 2: Normative references
There are no normative references within the standard.

Clause 3: Terms and definitions - 45 definitions have been elucidated for proper understanding and implementation.

Clause 4: Context of the organization
4.1   Understanding the organization and its context - determine external and internal issues that are relevant
4.2   Understanding the needs and expectations of interested parties – as per statutory, regulatory and customer requirements
4.3   Determining the scope of the food safety management system – determine scope based on product, services and processes as per external and internal issues & requirements
4.4   Food safety management system - establish, implement, maintain and continually improve the FSMS in accordance with the requirements of the standard.

Clause 5: Leadership
5.1 Leadership and commitment - Top management shall demonstrate leadership and commitment with respect to the FSMS. Ensure a food safety policy and objectives, integration of FSMS requirements with business
5.2 Policy - establish, implement and maintain a food safety policy appropriate to the purpose and context of organization which satisfy the requirements, communicate the policy
5.3 Organizational roles, responsibilities and authorities –
5.3.1 Top management shall ensure that the responsibilities and authorities for relevant roles are assigned, communicated and understood within the organization.
5.3.2 The food safety team leader shall be responsible for ensuring the FSMS is established, implemented, maintained and updated, ensure relevant training and competencies for food safety team

Clause 6: Planning
Organization plans actions to address both the risks and opportunities identified in Clause 4. It focuses on the development and use of a planning process, rather than a procedure to address both a range of factors and the risk associated with such factors.

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The objectives of the FSMS shall:
a) be consistent with the food safety policy;
b) be measurable (if practicable);
c) take into account applicable food safety requirements, including statutory, regulatory and customer requirements;
d) be monitored and verified;
e) be communicated;
f) be maintained and updated as appropriate

Clause 7: Support

This clause is all about the execution of the plans and processes that will enable your organization to successfully complete their FSMS responsibilities. This is a very powerful requirement covering all management system resource needs.

Clause 8: Operation

8.1 Operational planning and control - The organization shall plan, implement, control, maintain and update the processes needed to meet requirements for the realization of safe products, and to implement the actions determined.

8.2 Prerequisite programmes (PRPs) - to facilitate the prevention and/or reduction of contaminants (including food safety hazards) in the products, product processing and work environment – appropriate to the size, type and nature of the products handled

8.3 Traceability system - uniquely identify incoming material from the suppliers and the first stage of the distribution route of the end product as per requirements

8.4 Emergency preparedness and response - ensure procedures are in place to respond to potential emergency situations or incidents

8.5 Hazard control

Clause 9: Performance evaluation

This is all about measuring and evaluating your food safety management system to ensure that it's effective and helps you to continually improve.

Clause 10: Improvement

This clause requires organizations to determine and identify opportunities for continual improvement of the management system.

Annex A: cross references between the CODEX HACCP and this document

Annex B: cross references between this document and ISO 22000:2005

Hazard Analysis and Critical Control Point (HACCP)

The HACCP system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on control measures for significant hazards along the food chain, rather than relying mainly on end-product testing. Development of a HACCP system may identify the need for changes in processing parameters, in processing steps, in manufacturing technology, in end product characteristics, in method of distribution, in the

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intended use or in the GHPs applied. Any HACCP system should be capable of accommodating change, such as advances in equipment design, processing procedures or technological developments. HACCP principles can be considered throughout the food chain from primary production to final consumption, and their implementation should be guided by scientific evidence of risks to human health. Although it is not always feasible to apply HACCP at primary production, some of the principles can be applied and may be incorporated into good practices programmes (e.g. Good Agricultural Practices (GAPs), etc.

Principles of the HACCP System

The HACCP system is designed, validated and implemented in accordance with the following seven principles

1.   Conduct a hazard analysis and identify control measures.
2.   Determine the Critical Control Points (CCPs).
3.   Establish validated critical limits.
4.   Establish a system to monitor control of CCPs.
5.   Establish the corrective actions to be taken when monitoring indicates a deviation from a critical limit at a CCP has occurred.
6.   Validate the HACCP plan and then establish procedures for verification to confirm that the HACCP system is working as intended.
7.   Establish documentation concerning all procedures and records appropriate to these principles and their application.

General Guidelines for the Application of the HACCP System

Prerequisite programmes should be well-established, fully operational and verified, where possible, in order to facilitate the successful application and implementation of the HACCP system. HACCP application will not be effective without prior implementation of prerequisite programmes including GHPs. Management awareness and commitment to food safety are necessary for implementation of an effective HACCP system. Appropriate HACCP training and competency is essential. The intent of the HACCP system is to focus control at Critical Control Points (CCPs). HACCP provides consistent and verifiable control beyond that achieved by GHPs. A HACCP approach should be customized to each food business. The HACCP system should be reviewed periodically and whenever there is a significant change that could impact the potential hazards and/or the control measures.

Private food safety standards

Private food safety standards are generally set by private firms and standard setting coalitions and aim to facility supply chain management within an increasingly globalised and competitive international food market. The main drivers for the proliferation of these private food safety schemes have been: the clear assignment of legal responsibility to food chain operators for ensuring food safety; increasingly global and complex supply chains; and, increasing consumer awareness of food and food systems and their impact on health and, in particular, on food safety.

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Driving forces for the establishment of private food safety standards
- Demonstration of due diligence
- Global sourcing and the need for improved supply chain management
- Heightened consumer interest in food safety

Private Food Safety Standards in operation

BRC (British Retail Consortium)

BRC (British Retail Consortium) Global Standard was originally developed and published in 1998, the British Retail Consortium (BRC) Global Standards specify safety, quality and operational criteria for food producers and suppliers. BRC standards are accepted by many of the world's largest retail groups, manufacturers and food service organisations - providing an international mark of excellence for the certificate holder. The BRC standard has a focus on quality, food safety and legality. The BRC standard has descriptive requirements for process and hygienic control which provide clear guidelines as to how food safety should be addressed. The BRC has a simple certification process which only requires an onsite audit. For the BRC standard all NC's root cause analysis and objective evidence must be submitted within 28 days. The certificate is valid for 1 year.

FSSC 22000

The FSSC 22000 standard was developed by the Foundation for Food Safety Systems Certification (FSSC) as a response to the need of the international food sector to have an independent ISO-based food safety scheme for third party auditing and certification for their Food Safety Management System. FSSC 22000 is designed to promote international harmonization and transparency in food safety standards. The FSSC 22000 it's recognized by the Global Food Safety Initiative (GFSI). It contains a comprehensive certification program for food safety systems that incorporates the standards ISO 22000, ISO 22003, and technical specifications for sector prerequisite programs (PRPs), like ISO 22002-1 and PAS 223. The FSSC 22000 targets its focus on food safety and legal compliance. FSSC 22000 provides a good framework against which an organization can develop its food safety management system, as it is not too descriptive and has the flexibility to allow the organization to choose the best way to control its own system. The FSSC 22000 standard requires a stage 1 and 2 audit, both to be done on site. FSSC 22000 requires that critical or major NC detected in stage 1 audit have to be closed during stage 2 audit, and for minor NC the action plan should be submitted. The FSSC 22000 certificate is valid for 3 years.

Safe Quality Food (SQF)

The SQF is a food safety program that also covers product quality and process. It is recognized by the Global Food Safety Initiative (GFSI) and links primary production certification to food manufacturing, distribution and agent/broker management certification. This program comprises two codes:

SQF1000 is a Hazard Analysis Critical Control Point (HACCP), quality-based supplier assurance code designed for producers of primary food products.

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SQF2000 is a rigorous and internationally-credible food safety management system for manufacturers, distributors and agents of food and beverages, and may be used by all sectors of the food industry.

IFS (International Featured Standards)

IFS comprise eight different food and non-food standards, covering the processes along the supply chain. It is developed by collaboration of 3 retail federations from Germany, France and Italy. The IFS Food Standard is a GFSI (Global Food Safety Initiative) recognized standard for auditing food manufacturers. The focus is on food safety and the quality of processes and products. It concerns food processing companies and companies that pack loose food products.

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