Acta Chemica Malaysia (ACMY)

DOI : http://doi.org/10.26480/acmy.02.2018.01.05

ISSN: 2576-6732 (Print)
ISSN: 2576-6724 (Online)

CODEN : ACMCCG

HACCP - ITS NEED AND PRACTICES

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ARTICLE DETAILS

Article History:

Received 12 November 2017
Accepted 12 December 2017
Available online 1 January 2018

ABSTRACT

Food safety is one of the fundamental requirements in food hygiene. How to improve the safety and hygiene of food in catering industry has long been a research topic attracting food practitioners. In recent years, food safety and hygiene has been seen a social problem. How to control the safety and hygiene of food and beverage is a promising area where new challenges occur as the new kind of food is manufactured. This paper proposes to establish need of HACCP (Hazard Analysis and Critical Control Point) control to ensure food safety and hygiene in the food and beverage industry. There are lot of factors and challenges in practical implementation of HACCP. The implementation, control and review ensure food safety and hygiene if all are combined with proper balance.

KEYWORDS

HACCP, HAZOP, Food, Biological Agents, Food Safety.

1. BACKGROUND OF TOPIC SELECTION

HACCP (abbreviation of Hazard Analysis Critical Control Point) was developed by the Natick Army Laboratory of the National Aeronautics and Space Administration of USA in collaboration with a private operating food company Pillsbury for establishing a food producing administration system in order to ensure the food safety of astronauts [1]. The concept was acknowledged and recommended among experts in food safety on its proposal in 1960. Form 1960s, HACCP had become the gold standard in estimating food safeties. HACCP system features strict control from farm to table. There are three advantages in carrying out the HACCP system: (1) To make a precaution that will effectively prevent food from contaminations and other hazards. (2) To realize an effective use of man force, materials so as to reach a more economical production mode. (3) To obtain a proper safety and quality of food to elevate the hygiene managing level of practitioners.

As consumers, we have several expectations of the food supply, including that it must be nutritious, wholesome, pure and safe. We also expect that it should be plentiful, offer wide choices and be a reasonable value. In recent years consumers have placed increased emphasis on food safety and expect that food should not contribute to chronic disease such as cancer and heart diseases. In order to understand what "food safety" means, we must first know the terms SAFE, HAZARD and RISK. Safe means nothing harmful happens when we are consuming a food. But this is not a very satisfactory viewpoint when considering foods. Exposure to certain toxicants can harm us years after the exposure; cancers induced by tobacco are paradigms of this [2]. Food scientists and technologists think of food in terms of hazards and risks. Here, "Hazard" refers to any biological, chemical or physical agent, or condition of food with the potential to cause an adverse health effect.

Some important terms related to food safety are:

Biological agents– bacterial, fungal, viral and parasitic organisms and their toxins.

Chemical agents- Pesticides, insecticides, antibiotics, excess of flavor enhancers and other food additives.

Physical agents– stones, seeds, glass fragments, wood etc.

2. RELATED WORK

Among the important contributions on adapting HACCP for the processing industry are those of Knowlton, Nolan, Kletz, Lees, Wells, EPSC, and Macdonald [3-13]. This surplus of publications illustrates the evolution of Hazard Analysis as a vital technique applied worldwide that is recognized by legislation, and has demonstrated its effectiveness in identifying environmental, safety, and health-hazards. Knowlton focused only on Hazard Analysis applications, giving valuable information on the creative process to generate deviations; Nolan shared his practical experience discussing specific topics both for Hazard Analysis and What If techniques [3,4]. Nolan also introduced tools for Hazard Analysis time and costs estimation. The document was intended as a typical guideline and standard reference to be applied at petroleum, petrochemical and chemical facilities by describing the nature, responsibilities, methods and documentation required in the performance of such reviews. Kletz are considered most influential contributors on several process-safety topics, like Hazard Analysis [5–8].

A group researcher contributed their concepts of Hazard Analysis development, and extended their focus to a wide-range of aspects of hazard identification and loss prevention [9,10]. In 2000, EPSC formulated new Hazard Analysis guidelines adapting the methodology to the emergence of new technologies and sharing their considerable experience in using the technique most effectively [11]. Finally, a British Standard published in 2001, established and defined new requirements for carrying out a HAZOP (Hazard and Operability) study thereby clearly pointing to its continuing importance as the most widely used technique in process plants and other types of facilities [12]. In 2004, Macdonald updated his work with the latest data on the characteristics of HAZOP, documenting how to carry out a Hazard Analysis and connect it with future studies focused on Safety Integrity Level (SIL) assignments [13]. The document concentrates on the application of hazard study methods and the actions that follow from them for providing protection against hazards. Additionally, this work provides guidelines in three basic steps (*i.e.*, identifying hazards, evaluating risks, and specifying risk reduction measures) that form part of the overall risk management framework for process facilities.

3. HACCP

Several testing techniques for food safety have been developed so far. As shown in figure 1, there are various factors on which the success/failure of hazard analysis depends. Right design is the key of success of hazard analysis. Whether the design is good, or poor is decided after testing. If the test results are satisfactory it leads to quality assurance (QA) [13]. Quality is the parameter which requires continuous up-gradation which is paved by quality training of the manpower handling the hazard analysis. Different principles of hazard analysis require well defined operations. A timely maintenance and proper management are the essential factors without those qualities cannot be expected in long run.

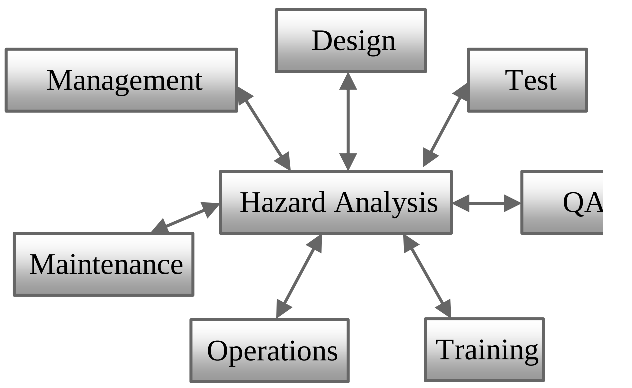

Figure 1: Parameters in Hazard Analysis

Plan Do Check Act (PDCA) is the key for success of HACCP [14]. The schematic process cyclic in nature, is also known as Deming Cycle as shown in figure 2.

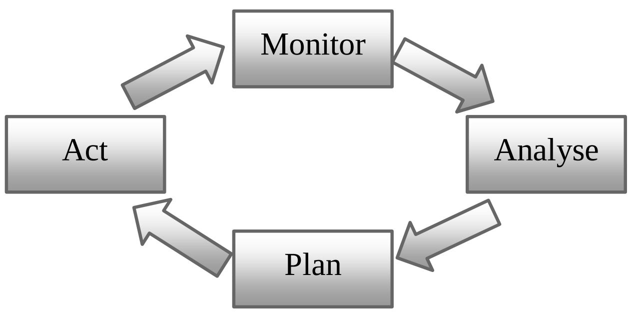

Figure 2: Deming Cycle for Quality Control

Microbial testing of foods is an important tool to ensure safety, such testing has the disadvantages that it normally requires time and it often detects problems only after they occur. Preventing Food-borne disease is more a matter of understanding where food borne diseases originates and how food manufacturing and storage can increase the risk of disease. Once these factors are understood, steps can be taken to ensure that such risks are minimized. Prevention is the preferred way to reduce microbial risks in foods [15].

Precautionary we need to observe what undesirable events can happen with food. It can be ensured by setting suitable scenarios about all possibilities. It is also important to observe how frequently some short of event can happen and what are their consequences and whether these consequences are acceptable operations? If these are not acceptable then what are the corrective actions to eliminate/reduce these risks. If these risks are not acceptable then we need to identify the frequency of such risks and repeat the whole process after reevaluation using mitigation.

The best and most effective method of assuring food safety is to establish a systematic approach to raw material screening, identifying the food manufacturing and handling procedures which result in the lowest possible risk. HACCP is one of the major tool for achieving a high degree reliability and safety. Following are the main points regarding HACCP:

- HACCP is a systematic approach to the identification, evaluation and control of those steps in food manufacturing that is critical to food safety.
- It is an analytical tool that enables management to introduce and maintain a cost-effective, ongoing food safety programmed.
- The basic objective of the HACCP concept is assuring production of safe food products by prevention instead of by quality inspection.
- The basis for the HACCP system originated from the need for safe food supply for the manned space flights by NASA (National Aeronautics and Space Administration). It was conceived in the 1960s when the NASA asked Pillsbury to design and manufacture the first foods for space flights. Since then, HACCP has been recognized internationally as a logical tool for adapting traditional inspection methods to a modern, science-based, food safety system.
- A system that controlled raw materials, the process, the environments, storage and distribution, beginning as early in the system as possible.
- This way of control combined with records keeping had to ensure that the final packaged product did not require any other testing for monitoring purposes.
- It enhances food safety besides better use of resources and timely response to problems.
- The primary objective of a HACCP programme is to produce reliably a safe food *i.e.*, a product which is free of microbiological, chemical or physical hazards.

4. HACCP PRINCIPLES

The HACCP system consists of the following seven principles:

Principle 1: Conduct a hazard analysis.

Principle 2: Identify the Critical Control Points (CCPs)

Principle 3: Establish critical limits.

Principle 4: Establish a system to monitor control of the CCP.

Principle 5: Establish are corrective action to be taken when monitoring indicates that a particular CCP is not under control.

Principle 6: Establish procedures for verifications to confirm that the HACCP system is working efficiently.

Principle 7: Establish documentation concerning all procedures and records appropriate to these principles and their applications.

4.1 Principle 1: Conduct a hazard analysis

Plants determine the food safety hazards and identify the preventive measures the plant can apply to control these hazards. Hazards associated with growing, harvesting, raw materials, ingredients, processing, manufacturing, distribution, and marketing. Preparation and consumption of a given food are each assessed in detail. Areas of potential microbiological, chemical or physical contaminations are determined. This includes both incoming ingredients as well as finished products.

4.2 Principle 2: Identify the Critical Control Points (CCPs)

In critical control points for controlling each hazard identified above are identified. Those steps in the process in which loss of control could result in an unacceptable health risk are considered to be critical control points. Control of these points must be maintained in order to ensure the safety of the product. Careful control of temperature after processing a product might be one such critical control point.

4.3 Principle 3: Establish critical limits

After each critical control point is identified, the limits on that point must be defined. This may be minimum or maximum temperature or the addition of a minimum amount of acid or salt, for example.

4.4 Principle 4: Establish a system to monitor control of the CCP

Specific procedures for monitoring the critical control point(s) must be established next. It is of little value to have a maximum temperature for a control point unless there is specific procedure for collecting data on the critical control point. If a product depends on the addition of acid for safety, then the limits on the pHor the acid content must be defined and monitored.

4.5 Principle 5: Establish corrective actions

The next step is establishing an action plan for taking corrective action when monitoring indicates that the critical control point's limits have been exceeded. Corrective actions are intended to ensure that no product injurious to health or otherwise adulterated as a result of the deviation enters commerce.

4.6 Principle 6: Establish procedures for verifying the HACCP system is working as intended

Validation ensures that the plans do what they were designed to do; that they are successful in ensuring the production of safe product. Plants will be required to validate their own HACCP plans. FSIS will not approve HACCP plans in advance but will review them for conformance with the final rule. It is important that the entire HACCP plans be thoroughly documented. This includes not only the plan itself but also keeping of rewards of measurements for all critical control points.

4.7 Principle 7: Establish record keeping procedures

The HACCP regulation requires that all plants maintain certain documents, including its hazard analysis and written HACCP plan, and records documentation the monitoring of critical control points, critical limits, verification activities. Finally, it is very important to have procedures for verifying that the HACCP plan is being followed and that it is working according the plan.

5. FOOD SAFETY AND STANDARDS

In India, BIS offers two certification schemes in the food industry: (1) HACCP Stand-alone Certification against IS 15000:1998; and (2) HACCP based Quality System Certification provides for two Certification through one audit certification of Quality System against IS/ISO 9000 and Certification of HACCP against IS 15000:1998. Apart from BIS standard another food safety standard is FSSAI (Food Safety and Standard Authority of India). It was established under Ministry of Health and Family Welfare in 2008 under the Food Safety and Standard Act 2006. At international level HACCP standards include ISO 22000 FSMS 2005. This standard is complete food safety standard and MIS incorporating the prerequisite programmes.

Many countries all around the world have adopted the HACCP system and make it legitimated have obtained satisfactory effects in food safety administration. HACCP system had also been introduced into China early in 1990, however mainly found its way in some larger food companies. For catering enterprises side, either the practices were poorly given or its effect is not sufficiently satisfying [16]. There are enormous amount of food industry in China, the majority of them are of smaller-scale and did not very well in the overall hygiene. Based on this reality, endless problems in food hygiene were emerging [17-19]. Hence it is of fundamental importance to get the effective food safety control system HACCP introduce into food industry.

6. CONCLUSION

In this paper we presented food safety and standards and their impact. A higher public standard increases prices set by constrained and unconstrained firms, but the effect on firms' output is generally ambiguous for both types of firms. The most productive firms raise their private standard and enjoy higher profits at the expense of less productive firms. A public standard can increase welfare, especially when there is a high concentration of low productivity domestic firms because of a better allocation of resources. Our paper focussed how to determine barriers for HACCP and food safety programs in food businesses. A lack of understanding of HACCP is identified as one of the main barriers to its implementation As a conclusion, lack of knowledge about HACCP and other food safety programs were identified as the main barriers for food safety in food businesses. Lack of prerequisite programs and inadequate physical condition of the facility were also identified as other barriers.

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