



## HACCP System and Difficulties in its Implementation in Food Sector

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**ABSTRACT**

Implementation and adoption of Hazard Analysis and Critical Control Points (HACCP) is a global challenge. The HACCP system is an imperative food safety tool that involves a complex mix of managerial, organizational and technical challenges. Several factors act as barriers to the process of operation such as the knowledge level or available resources for the business comprise of the internal factors whereas external factors include the inaccessibility of government or industry support. The challenges vary from one country to another and from different business sectors. The challenges in implementation of HACCP system are also a barrier which big establishments equipped with fundamental resources, technical specialists and management skills ordeal. The present study was focused on evaluation of the implementation of the HACCP system globally and in India.

**KEYWORDS**

Food Safety, HACCP, Food Sector, Quality

### INTRODUCTION

"Tell me what you eat and I will tell you what you are" - the famous words of the gastronome Jean Anthelme Brillat-Savarin very well delineate the significance of food in our lives. For human beings to lead a healthy life, the food one eats plays a vital role and it is thereby essential to ensure that food we consume is safe and hygienic. In recent years, surveillance and monitoring by a number of countries and researchers indicates that food borne illness is increasing around the world. Globally there are various factors that contribute to the increasing rate of food borne illness. The practice of maintaining the food safety standards from farm to fork is very crucial. Testing the food at the end point is not an advisable way to ensure food safety. The HACCP approach is formulated to prevent hazards before they happen [1], [2].

In the last decade, the HACCP system has been recognized as a cost-effective procedure for ensuring food safety. Today, this methodology is internationally accepted as a food safety tool which is applied during full food production process [3]. On the other hand, despite the orchestrated efforts of international institutions upsurge HACCP awareness and compliance, only food industries in more developed countries are currently apposite to immediately implement this food safety tool. Researchers have stated various barriers and complications in implementing the system in food plants. HACCP can be defined as a food safety approach whose enactment is quite demanding [4]. In order to cope with the technical barriers of its implementation, it is important to focus on other factors such managerial, organizational and technical resources required for its effective operation [5]. On the other hand, these factors lead to variations in the implementation HACCP from big businesses to small businesses due to distinctions in size of the operations. With this perspective, we seek to understand implementation barriers of HACCP system and gathered world literature reported on this case [6].

### METHODOLOGY

The barriers in implementation of HACCP in food industry were reviewed by accessing data published in journals, websites and published data from doctoral thesis and dissertations of post graduate level. The database such as Google search, Google Scholar, PubMed, Science Direct were also used to search the researches related to HACCP implementation in food industry focusing on catering industry. Implementation of HACCP is a key to implementation of food hygiene and safety and prevention from food borne diseases. An understanding of barriers in implementation of HACCP helps to understand the areas where the food industry and government should focus.

#### 1. Efforts of international institutions in devaluation of HACCP

The system grew out of a need to provide safe food for National Aeronautics and Space Administration (NASA), including the elimination of pathogens, toxins, and foreign objects from food and beverages. The application of HACCP was pioneered, during the sixties, by the Pillsbury Company with the cooperation of NASA, Natick Laboratories of the US Army, and the US Air Force Space Laboratory Project Group. Robert Muller from Pillsbury Company was the inventor of the HACCP standards used by the food industry. The original Pillsbury HACCP procedure has been built up with three components which includes the identification and assessment of all hazards associated with the final foodstuff, the identification of the steps or stages within food production at which these hazards may be controlled, reduced or eliminated: the Critical Control Points (CCPs) and the implementation of monitoring procedures at these CCPs.

In 1993, the European Union issued Council Directive 43/93, established a general requirement for all food business to adopt a risk based food safety management system with the principles of HACCP. However, each country in the EU interpreted the Directive into their national regulations in different

ways [7]. This led to widely differing levels of interpretation. Because of that Council Regulation 852/2004, with no option for national amendment, came into force across Europe in January 2004 [8]. Under this it was required by all food businesses to implement a system based on HACCP principles. The application of HACCP has been incorporated into Codex guidance texts [9]. Both the United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA) has adopted HACCP as the best program to prevent food borne illnesses [10]. According to the National Advisory Committee on Microbial Criteria for Foods, HACCP is defined as "a systematic approach to identification, evaluation and control of food safety hazards" and a HACCP plan is "the written document which is based upon the principles of HACCP and which delineates the procedures to be followed" [11]. World Health Organization (WHO) has recognized the importance of the HACCP system for the prevention of food borne diseases [12].

India since 1945 has been a member of Food and Agriculture Organization (FAO) and Codex Alimentarius Commission. On the other hand, official ordinance regulations on food laws have been fulfilled according to the EU and by the way Indian food business especially export products were obligated to implement HACCP system in food law just like EU member countries. The use of HACCP, based on the internationally accepted seven principles as promoted by the Codex Alimentarius Commission, helped to India gain some recognition in the international markets [13].

## 2. HACCP implementation barriers

Despite huge benefits of HACCP method, the literature suggests that successful implementation has been limited by many factors. The success in developing, installing, monitoring and verifying a successful HACCP system involves a complex mix of factors to address too. Even the big food companies, may face difficult challenges to implement an HACCP system. Therefore a small or medium-sized enterprise (SMEs) may feel that the difficulties of HACCP are insurmountable [14],[15]. Barriers of time, money and skilled personnel have been reported by researchers as common factors preventing HACCP implementation, especially in SMEs [4], [16], [17], [18]. The difficulties vary from country to country or from business sector to business sector, some may be due to internal factors operations, like the knowledge level or available resources or some may be related to external factors, such as the accessibility of government or industry support.

There are 20 potential barriers for implementation of HACCP. The difficulties were expressed with those statements: "implementation of HACCP impeded by internal budgetary constraints, problems obtaining external funding, current food safety controls considered sufficient, lot of changes to our production processes needed before HACCP could be put in place, the things needing to be done to implement HACCP overwhelmed us, other investments considered more important, lot of changes to our food safety controls needed before HACCP could be, wide-scale upgrading of the plant needed before HACCP could be put in place put in place, scale of operation is too small to have, not sure whether the implementation of HACCP would meet future regulatory requirements, uncertain about the potential benefits of implementing HACCP, HACCP difficult to implement because of internal organization of the company, concerned that HACCP would reduce our flexibility in production, thought it best to wait and see the experiences of other companies before implementing ourselves, did not really see HACCP as suitable for our plant, not sure whether the implementation of HACCP would meet our customer's requirements, considered that costs of implementing HACCP likely to get cheaper over time, greater priority given to other issues than enhancing our food safety controls, food safety issues not considered sufficiently important to warrant the investment, HACCP goes against all of the ways in which we have traditionally done things" [19]

Obstacles regarding HACCP implementation are widespread. Food researchers have thereby concluded numerous ways of

success to adopt the system in various food industries. The conclusions of the studies together were reported through outcome of a meta-analysis. According to the results, around 50% of the hurdles were associated to training, human resources, planning, knowledge and competence, and management commitments. 10 of the 12 studies investigated in the meta-analysis reported barriers related to worker motivation, awareness, interest, and familiarity with food safety controls. Other barriers were related to poor planning of implementation, excessive documentation, knowledge and competence, external support and lack of resources. The other results of the meta-analysis has shown that among 21 elements, we can allocate seven elements (training, human resources, planning, knowledge and competence, management commitment) representing almost 50% of all identified barriers [20].

In the catering, foodservice and retail industries the most common hurdles as presented through various researches have been classified as lack of knowledge, training, high staff turnover, the large variety of products, change in potential demand, variability in workloads, and the large numbers of part-time workers [5], [21], [22], [23], [24]. Studies in hospital food services, catering establishments, hotels, kebab houses, take-aways and restaurants, have determined that the basic reason of not developing food safety applications result from the lack of knowledge about these systems [25]. In a study generic HACCP-PRP implementation was quantitatively assessed in 102 small medium enterprises in UK and it was reported that 88% of SMEs believed that the minimal progress in implementing HACCP was due to the lack of time and expertise [26]. Observations have shown that even a large food company, with its resources of money and expertise face significant hurdles in developing a successful HACCP system [15]. Another study shows that the possible factors influencing HACCP implementation in hospital kitchens in Taiwan include gender, age, and job position differences as well as differences in the confidence staff members feel in receiving support from staff in other departments and financial support from the hospital itself [27]. In countries of Central-Europe, studies have shown limited information about HACCP systems. Surveys conducted in these regions (to understand the situation to introduce HACCP methods) showcased the requirement of two basic conditions for successful implementation of HACCP systems. These conditions include a suitable working environment from the hygienic, technical point of view and motivated, satisfied and qualified personnel [28].

Another important barrier for HACCP implementation is expensiveness of the system. A study evaluated the costs and time for full HACCP implementation. According to their study, in the short term, there is lack of correlation in the market requirements for food safety and price improvement hence the cost effectiveness did not always prove positive to the enterprise implementing HACCP. However, in the long term, this implementation might be the only way to keep plants as suppliers to the food market [29]. It was concluded that for the meat industry, investment in new equipment and microbiological tests of products accounted for most of the implementation and operational costs, respectively [29]. On the other hand, in the seafood industry many companies failed to have a reliable costs and benefits estimation of HACCP implementation beforehand. They concluded that the uncertainty on costs and benefits estimations could be a major restraint for planning HACCP adoption by individual seafood companies [30]. In various studies, time and money were identified as the greatest barriers to improve food safety [5],[18], [24],[31], [32]. Also, lack of financial resources was identified to devote to food safety was the biggest resource barrier [33].

HACCP implementation requires a complex interrelation among governments, industry and consumers but unfortunately, this responsibility is not always accomplished [34]. Lack of awareness among consumers, lack of trust in food safety legislation and enforcement officers are some of the common issues [35]. In a study, foodservice managers identified time to establish a HACCP program, time to run the program, and

labor costs as being the three biggest obstacles. In addition, lack of training funds, time to get used to running the HACCP program, and union problems were the other identified obstacles [17]. There is a big confusion between prerequisite programs and HACCP plan, their relations and how they should be managed [36]. The main barrier to implementing a HACCP based food safety management system was the lack of prerequisite programs.

According to researches, resource management, employee motivation, and employee confidence are the key barriers. Employees are nervous about taking food safety certification examinations and often are not comfortable with the change needed for implementation of a program like HACCP [37]. Various studies have shown socio-psychological factors, other psychological barriers such as lack of agreement and lack of self-efficacy to influence the implementation of HACCP programs [38], [39], [40], [41], [42],[43]. Similarly, attitude barriers due to a lack of educative courses, sessions or meetings, make it more difficult for workers to adhere to this system [44].

In a research work, knowledge of the staff was also found to be important for implementation. 46.6% of respondents claimed to have a good knowledge of HACCP while 6.6% admitted to having a poor knowledge [36]. Another study has demonstrated that an increase in the knowledge of a food handler does not necessarily change their food handling behavior and is dependent upon their attitude [16]. Constant turnover of employees was also identified as a barrier [5].

91% of food business directors agreed employees needed more training to improve food safety practices in a study [31]. HACCP can be hindered by lack of time, expertise, training, motivation, commitment and funding in SMEs [17]. It was also found that the availability of sanitation training had a positive relationship to implementing HACCP.

The employment of experienced, technically qualified food staff as the most important factor influencing the implementation of HACCP system while lack of employee training was the biggest employee barrier. Lack of financial resources to devote to food safety was the biggest resource barrier [33]. The survey conducted in small-and medium-scale food producers underlined the lack of knowledge. Only 65% of producers kept any records. Their further results, based on questioning of managers, indicated that the basic lack of hygiene knowledge and understanding could prove to be a major barrier to the effective implementation. Bryan (1988) suggested that in the future the number of HACCP principles would increase from seven to ten or more. The ninth HACCP principle, according to him, would be education and training.

In India, the barriers were found similar as reported worldwide. In a research study conducted in four star hotels it was observed that illiteracy, lack in knowledge about HACCP practices acted as a barrier. Along with this lack of adequate HACCP training can also form a barrier [45]. In a study done on flight catering units, reported regular training helped in implantation of HACCP [46]. Street food vendors and small food outlets, fresh juice shops lack adequate facilities like clean water, proper storage facilities, etc which acts as barriers in HACCP implementation. Also, majority of these vendors and food operators are illiterate and are unaware about HACCP Government should provide adequate aids and regular training to all the food operators for implementation of HACCP[47], [48] [49].

## CONCLUSIONS

It is accepted and reported that there some common and special barriers of implementing HACCP system for many countries. The difficulties vary from country to country or from business sector to business sector. Especially in India, insufficient funds, illiteracy, and knowledge about HACCP practices are found to be the most encountered barriers to develop HACCP system.

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