Application of Knowledge Management in HACCP performance: A Systematic Review

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Abstract

Hazard Analysis and Critical Control Points (HACCP) is a preventive and protective system that assures the safe manufacturing of food products. It helps in preventing, reducing, or eliminating food hazards. These food safety hazards could be physical, chemical or biological. HACCP performance is measured against the development of budget, staffing decisions, pricing, costing, and packaging in the food manufacturing industry. Therefore, this paper reviews the management of various knowledge areas in the HACCP performance method. The literature will be collected using research databases like EBSCOhost Online Research Databases, FSTA (Food Science and Technology Abstracts), Nutrition and Food Sciences database, Food & Beverage Industry Databases, Databases for Food Science and Human Nutrition, The EFSA Comprehensive European Consumption Database, Hospitality & Tourism Complete (EBSCO), IBIDS, International Bibliographic Information on Dietary Supplements, Annual Reviews Nutrition, ABI/INFORM Collection (ProQuest), etc. The primary areas of knowledge management in HACCP areHACCP methods; performance measures which include both internal and external measures; verification; relationship among HACCP, ISO9000; and regulation of this relationship. Nevertheless, the effective implementation of HACCP in the organizations has several challenges like lack of knowledge about cost of HACCP, management support in terms of knowledge dissemination, people as resource for successful implementation. This paper would systematically review the primary areas of knowledge management in HACCP and the challenges and barriers in effective implementation of HACCP in the food industry. The research gap thus recognized from the review is expected to provide directions for future research on knowledge management in HACCP performance methods.

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Introduction

Foodborne diseases are a serious threat to the mankind and the numbers of victims across the globe are on the rise, despite the substantial advances in the food handling technology. Millions of people are affected by these diseases in developing countries every year, and the people in developed countries are also not immune to it (FAO and WHO, 2006). Awareness about the health risk caused by the food borne diseases has increased among the consumers, and consumer voice for the proper food safety measures has become louder. Such unified voices have awakened the food safety authorities and force them to implement proper food safety measures. Among the various food and safety measures which are in use, Hazard Analysis Critical Control Program (HACCP) stands out as the most effective and most acclaimed method, which has been adopted by various both developed and developing countries across the world. Initially, HACCP was developed by US Army Natik laboratories and the National Aeronautics and Space Administration for the purpose of ensuring the safety of food used in the space program in 1960s (Soliman, 2000). Later, it was recognized as an effective alternative to conventional end-point-testing by the World Health Organization (WHO) and the United States Food and Agriculture Organization (FAO) among others, and recommended for use in commercial food production. HACCP covers the biological, chemical, and physical production process and provides a framework for establishments to conduct scientific process controls that can be validated as effective in eliminating, preventing, or reducing the food safety hazards to an acceptable level that are reasonably likely to occur in an official establishment's particular production process. HACCP follows a seven point working principle that includes Conduct a Hazard Analysis, Determine Critical Control Points, Establish Critical Limits, Establish Monitoring Procedures, Establish Corrective Actions, Establish Record Keeping and Documentation Procedures and Establish Verification and the proper implementation needs the effective functioning in each step.

HACCP has been implemented in diary industries of various countries across the globe, including the US, UK, Australia, Lituania, South Africa, Brazil and Turkey. On the other hand, India, although the largest producer of milk and milk products, is still lagging behind in the study and proper implementation of HACCP. Out of the few studies, the study of Yadav & Boroude (2016) highlighted the challenges faced by the dairy industry in implementing HACCP. The major challenges in implementation include the need of awareness and responsiveness of HACCP, lack of apparent reimbursement, lack of industrial personnel training, lack of management commitment, unevenness of production lines and individuality of each product, lack of government support and lack of technical expertise. However, many of these challenges can be dealt with the application of knowledge management, a process which includes the efficient handling of resources and information within an organization. Studies by Davenport and Prusak, (1998), Nonaka and Takeuchi, (1995) throw some insight into this area.

This motivates the current study which has the objectives that include to conduct the systemic review of the studies regarding the performance of HACCP in food industry with specifically focused on dairy industry, to analyse the studies in order to understand the challenges in the path of implementation and effective performance of HACCP in diary industry in general and in India particular, to conduct the extensive review of the studies to analyse how the proper application of knowledge management helps to overcome these challenges.

Review

This section conducts the extensive review of the studies related to implementation and performance of HACCP in the food industry with specific focus on dairy industry. The reviews of the studies regarding the various challenges for the successful implementation and effective working is also conducted. Further, the studies regarding the application of knowledge management in HACCP in diary industryand its impacts are being reviewed.

HACCP in Food and Dairy Industry

Mayes (1992) studied about the factors influencing the HACCP implementation in the food industry. This study stated that the HACCP implementation is team process and in most cases the individual who are part of the implementation team need not have the entire knowledge regarding practical, technical, theoretical and managerial aspects of implementation. Rather the selected HACCP team

must be trained to achieve the necessary range of expertise to identify all hazards, CCPs and critical limits associated with the product and/or process under consideration.

Collar (1997) studied the risks and implications of food and waterborne pathogens that were uppermost among public health concerns, and reported that the agriculture sector was under pressure for immediate adoption of on-farm controls. He observed that the FDA was looking into HACCP as a basis for revising the US Food Safety Assurance Program as HACCP is a scientific, step-wise approach to ensure food safety. Additionally, he reported that the implementation of HACCP allows the government to oversee better due to its requirements for SOPs and systems for keeping records, assign responsibility for ensuring food safety on the manufacturer or distributor, and enable US companies to compete with more effectiveness in the world market. The HACCP-based program would enable a government investigator to locate and analyse both present and past conditions critical to enabling food safety of the food produced.

Casani and Knøchel (2002) studied the reuse of water in the food industry, which is important due to the rising cost of water and its discharge. The frequent reuse has a potential hazard for microbiological infection of food and the workplace. A HACCP-based generic model was described for the establishment and study of mechanisms for the reuse of water in these industries, which covered data on food and waterborne pathogens and their response to different water treatment methods. It was seen that planning, establishment, and control required expertise in food and water microbiology, processes, control options, and hygienic design. Also, information from case studies was found to be inadequate. McAloon(2003) invites our attention to one of the important factor that influences the successful implementation of the HACCP, i.e., the cost of the HACCP functioning. According to the study, the total relative costs of HACCP involve the sum of all resources made available at the different stages with the technological level of the plant and the non-compliance with prerequisite programs contribute to greater costs in the implementation of the system.

Maldonado et al. (2005) examined the levels of HACCP implementation, the cost of HACCP implementation and the benefits of implementation in Mexican meat industry. The survey was conducted among 160 Federal Inspection type enterprises with a response rate of 58%. Among the respondents, only 18% of the enterprises have completely adopted HACCP while 20% reported that they were not interested in implementing HACCP.

biological, chemical, and physical production process and provides a framework for establishments to conduct scientific process controls that can be validated as effective in eliminating, preventing, or reducing the food safety hazards to an acceptable level that are reasonably likely to occur in an official establishment's particular production process. HACCP follows a seven point working principle that includes Conduct a Hazard Analysis, Determine Critical Control Points, Establish Critical Limits, Establish Monitoring Procedures, Establish Corrective Actions, Establish Record Keeping and Documentation Procedures and Establish Verification and the proper implementation needs the effective functioning in each step.

Recently HACCP has become popular and has been used in different areas of the food manufacturing industry to assure the safety of the food. The implementation of HACCP in meat industry was studied by Tompkin (1994) and concluded that HACCP is capable of eliminating the food hygienic problems to a great extent as it has a dynamic implementation plan. The application of HACCP has also been extended for implementation and evaluation of systems for the reuse of water in the food industry (Casani & Knøchel, 2001). HACCP has been used in several industries and one of the prominent industries where the demand and usage of HACCP is at high is the dairy industry. Milk and milk products are highly prone to contamination and can be agents of various food borne diseases. Unhealthy practices in dairy farm units at milk reception centres, processing lines and post-processing handling are linked to the potential health risk to consumers, due to the presence of pathogens and environmental contaminants in the milk. This necessities the implementation of HACCP, the program which is appreciated across the globe as the one of the best food safety program available to deal with food contaminants.

HACCP and Knowledge Management

This section reviews the studies which examined the the impact of the application of knowledge management in overcoming the challenges that creates the blockade on the successful functioning of HACCP in food and dairy industry.

A study by Nonaka and Takeuchi, (1995) stated that the proper communication and management of the explicit knowledge is one of the best tools to overcome the challenges Associated with the HACCP performance. Davenport and Pruzak (1998) studied about the components of knowledge management and its impact on the performance of HACCP in the dairies of NewSouth Wales. The

study indicates six primary areas of knowledge that is important in the performance of HACCP. This includes performance measures, HACCP method, verification, internal performance measures, external performance measures and relationships among ISO9000, HACCPand the NSW dairy industry and its regulation. The study stated that proper management of this knowledge will enhance the HACCP performance and in turn will give the competitive advantage.

Findings

From the in-depth analysis of the selected papers, the study has drawn the following findings. The studies related to the implementation and performance of HACCP in food and dairy industry analyses the necessity of the implementation of the HACCP in the respective industry and the result showed that almost all studies except the one by Sperber (2005) favours the ongoing practices of HACCP implementation. Meanwhile the studies by Sperber (2005) pointed some reservations on the practices and suggest the alternatives. The analysis of the studies regarding the application of the knowledge management in HACCP functioning does not give the conclusive results mainly because of the lack of availability of comprehensive studies. Most of the studies are in the nature of general studies and the specific results are lacking. Even though the study by (Soliman, 2000) in dairy industry and favours the application of knowledge management to tackle the various problems, the lack of empirical proof and further studies leaves it as a standalone case.

Conclusion

The study conducted an extensive and systematic review of the studies aimed to understand the challenges that cause the road block to the successful functioning of HACCP in food and dairy industry and also to assess to what extent the application of knowledge management will help to solve the problems and challenges. In the first section of review reveals the analysis of the various studies regarding the performance of HACCP in food and dairy industry. This section reveals some of the major challenges that needed to be tackled for the successful functioning of HACCP. This is followed by the review of the studies related to the impact of knowledge management in solving the problems mentioned in the previous section. In the following section the findings of these reviews are listed. These Findings shows the lack of comprehensive studies that assesses the performance of HACCP in the dairy industry in

general and in India in particular. The findings also reveal that the number of studies that describes about the application of knowledge management and its impact on HACCP performance in dairy industry is very nominal and in general also the results of the studies are not enough to lead to a solid conclusion.

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