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Food safety and quality control is issues in product development

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Abstract

This paper proposes a model for measuring the effectiveness of quality (ISO 9001) and food safety (HACCP) systems, based on their stated objectives, when these systems are jointly implemented in a food company. In addition, it investigates the critical factors for effective implementation (CFEI) of the ISO 9001 and HACCP systems; and examines the degree to which the combined implementation of ISO 9001 and HACCP influences the overall performance of the certified firms. To achieve these objectives, primary field data was collected through an empirical survey that was conducted among 347 food companies in Greece, which were certified to ISO 9001, HACCP and/or ISO 22000 systems.

Keywords: Food safety and quality control is issues in product development

Introduction

An increasing number of food companies all over the world have been implementing quality and Food Safety Systems (FSS) in order to improve the quality and safety of their products and to witness the related benefits. Nowadays, the main Quality Management Systems (QMS) that are implemented by food companies are those in the International Organization for Standardization (ISO) 9000 series, such as ISO 9001: 2008. The ISO 9000 series of quality management standards provides the framework for organizations to install a QMS following certain guidelines and leads to continually improved processes that satisfy customers' requirements. However, the effectiveness of the ISO 9001 standard in enhancing a firm's competitive performance is highly controversial (Yeung, Lee, and Chan, 2003). The estimated loss due to food poisoning in Indonesia was approximately USD 78 million in 2013, which consists of direct health and non-health care costs and indirect non-health care costs (Rahayu *et al.*, 2016). In addition, the total estimated annual cases of diarrhoea due to food poisoning in Indonesia range from 4,157 to 9,170 cases/100,000 inhabitants, with an estimated loss of USD 4,763,051,067–16,752,046,500. The high cost of losses is a major reason why paying serious attention and devoting efforts to food security in Indonesia is imperative (On and Rahayu, 2017)

Analysis and Interpretation

Clinical Borne Illness

Food safety the food and drugs authority (FDA) is a national regulatory body under the ministry of health with the responsible of implementing food polices and ensuring the safety and wholesomeness of food for consumers (FDA) Roles including food manufacturing and processing site inspection, licensing, product registration and monitoring they also provide good hygiene. Practise training for food handlers. The India standard author develops and promotes international and locally acceptable standards for the industry. Other sporting agencies including the ministry of health, ministry of health agriculture, Indian tourist board and the environment agency. The government of India is also given directives to the local authorities including metropolitan assemblies and their districts to actively control and monitor food safety practise of food vendors. Who are individual or group of people who sellready to eat food at readily accessible areas including caterers, night club, beer bars, chop bars, cold store, hotels and restaurants operations and bagged water processors.

Ready to eat (RTE) food and processed foods with needed control

Selected food for hazards analysis by research revealed varying microbiological contamination levels (Addo *et al.*, 2007). Food from hotels sampled in Delhi showed acceptable levels while street food from the same city had detectable levels of enteric pathogens. Kenkey due to low PH was reported to be a low risk food in terms of microbial load (cooked rice and beans mixed) had a similar report but both could be contaminated with lead above the acceptable levels of 0.2 mg/kg due to usage of informally manufactured pots that could have lead levels as high as 419 mg/kg causing cumulative harm. Fufu due to its method of preparation had *Escherichia coli* and detectable *staphylococcus (bacteria) aureus*. Similar reports were made on high risk street foods in Delhi. Food studies including ice kenkey coca cola, fufu, ready to eat food, red pepper sauces, salad, and pasta. All had plate count level above the acceptable national standard of $5.0 \log_{10}$ cfu/ml (Feglo & Sakyi, 2012). Enteric bacterial were also isolated.

Possible support and interventions for India

The food industry is only as strong as its weakest link in the food chain (Taylor, 2001). The food industry in every nation whether developed or not stand to lose if all stages in the food chain are not motivated and strengthened to use food safety approaches. The benefits of reducing hazards in food include reduced morbidity, mortality and demands on healthcare services, a reduction in absences from education or loss of productivity at work and increased consumer confidence in food safety (Food Standards Agency, 2011).

The India efforts listed below could strengthen the food services and manufacturing sectors to become competitive while ensuring consumer safety.

- Continuous sensitization programmes for food handlers and consumers along the food chain of their roles on compliance with food safety requirements.
- Good Hygiene Practices which are mostly called Prerequisite measures to be available and enforced as the basic requirement for food industries and vendors. These include the establishment of the following; process and facility design to acceptable standards, personal hygiene of food handlers which include effective hand washing, use of protective clothing, reporting and proper handling of infectious diseases including diarrhoea and vomiting, absence of jewellery/ self-adornment during preparation and service etc, cleaning procedures for both equipment and food environment, waste management, pest control, routine training programmes for staff, planned preventive maintenance and transport, supplier and raw material monitoring and control, process control and temperature monitoring (WHO/FAO, 2009). These when available creates a safe and conducive environment for the processing and or preparation of food.
- HACCP which is a more flexible. Industry specific food safety tool could be made a legal requirement for manufacturing and processing industries with a given period within which absence could be a breach of the national law. This will help to raise the standard of operations and practices of the food industry in India to an International level (FAO/WHO, 2009), enabling them to compete in the international market.
- Small and Medium Size Enterprises (SMEs) support systems could be initiated by the Government's appropriate agencies and educational institutions to help

them establish acceptable food safety management systems. Government and local authority's intervention in the form of free or subsidized training, developed food safety standards by (2008) referred to its use as contingent in addressing food safety constraints in the country. (Rheinlander *et al.* 2008) reported of the need to include good hand hygiene and cleanliness of kitchen facilities and environment in training programme as consumers current risk avoidance strategy of looking at appearance of food, food stands and trustworthiness of food vendors were not enough to protect them from food borne diseases.

Food safety knowledge – Some key fundamentals

(Medeiros, L. *et al.*, 2004) ^[1], reported that regardless of the location, to prepare food in the right hygienic standards, there has to be the appropriate knowledge that produces the effective food-handling skills. To achieve this, there has to be the right motivation to act on that knowledge. For emphasis, knowledge entails when factual information employed by a learner is utilised to perform a given task in the desired and specific manner.

Food safety knowledge comprises various components, which could deliver either direct or indirect influence, as depicted in Fig.1. It will be remiss to discuss food safety knowledge without directly involving food handling, food safety systems, good practices, HACCP, food quality/standards, and indirectly involving food culture/traditions, and production/processing. Various studies that investigated food safety knowledge has involved one or more of the above mentioned. Indeed, accepting food safety systems has put employees' training under the critical observations (Collis, B. *et al.*, 2002).

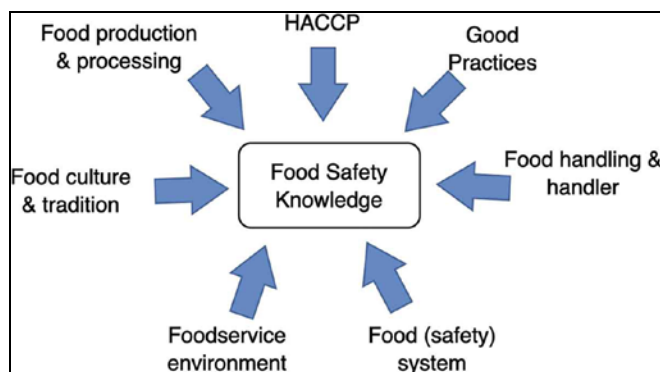


Fig 1: Key direct and indirect components that influence food safety knowledge

Food quality safety standards – a primer

Food safety standard captures a wide range of items, from hygiene standards of food packaging materials, labelling standards of food labels, agricultural production environment, to harmful microorganisms and pollutants in foods. Food quality/safety standard has always been underpinned by the work of the Codex Alimentarius Commission (CAC), which has been positioned as the global policy reference point for the food producers, processors, consumers, as well as the national food safety agencies. Both FAO and WHO jointly run the CAC, which protects the global public health, and makes an effort to balance the food trade relationships. (Trienekens, J. And Zuurbier, P. 2008) ^[3].

Good (food hygiene quality safety) practices relevant to agro-food product industry: Some detailed discussions

According to (Varzakas, T. And Tzia, C. 2016) [5], reported that the good practices cut across all key aspects of the supply chain processes found within the (agro) food industry. When the job roles of all who deliver quality within the food industry/sector are not clearly defined as well as understood, the integrity of food safety can be compromised. Thus, there is a need to reiterate the importance of good practices in the domain of food quality and consumer protection. (Raspor, P. And Jevšnik, M.2004).

Good storage practice (GSP)

GSP involves the practical procedures/processes that ensure the appropriate handling of foods, regarding the implementation and control of the product storage consistent with the defined regime(s), and prior to their use. (Raspor, P., 2008) [7]. Applicable to a wide range of sections/units, the GSP should consider all measures of distribution and storage of food products to sustain its intended nature/quality to a large degree when it reaches the consumer. GSP components can involve components like documentation, personnel, stock management, storage facilities, etc. Specifically, for storage to meet the needed requirements, the respective areas have to be assigned as the sampling of products, dedicated to the specific product conditions, and differentiated based on the specific product categories. (Alessandra Guidi. *et al.*, 2021).

Good transport practice (GTP)

GTP involves practical procedures that ensure these are the proper organization, implementation, and control of food products' transport from the producer to the final user (Raspor, P. 2008) [7].

GTP is strictly dedicated to the transport of designated/marked for food use only. Further, the bulk food transported in containers should be reserved for food transport unless the HACCP principles deemed the dedicated transport below the required food safety level. GTP also involves documentation records, e.g., cleaning certificates, food transportation unit number, previous load registration, and temperature/time recordings (Gole, S. 2018) [10].

Quality assurance (QA) and control systems: Some essentials

QA plays a significant role in the food sector by guaranteeing that all quality obligations like food reliability and safety are met. By establishing the processes and procedures, responsibilities, as well as standard organisational structure, several QA systems, successfully targeted the food industry needs through the HACCP, International Standard Organization (ISO), etc. (Dora M. *et al.*, 2013) [11].

Quality control involves inspecting, testing, and monitoring associated with the control of raw materials, process and finished products. It further aims to fulfil quality outcomes as well as specifically detect if unacceptable defects/hazards do actually exist in the foods (Karipidis P. *et al.*, 2009) [13].

Food inspection process and laws/legislation: Some essentials

a) Food inspection process: Some highlights

According to (Bernhardt, H. And W; Raschke, A. 1998) [14], reported that Food inspections are aimed to identify quality improvements, for example, in food-related projects. With respect to food quality/safety, inspection requires planning, prior to implementation, followed by monitoring action/activities – a never-ending cycle of quality improvement, which constitutes a part of (total) quality

management.

Food inspection should not be confused with an audit. This is because the (food) audit (whether internal/external) aims to certify the manufacturing quality of food products, which largely involves product manufacturing, GMP, product quality, and HACCP. (Vasconcellos, J. A.; 2005) [17].

b) Integrating food law, inspection with quality safety: Some briefs

Integrated schematic flow linking food law, food inspection, quality, and safety assurance, with consumers' expectations regards to food safety and quality, is displayed in fig.2. (Sikora, T.; Strada, A.2005) [15]. And here also the food inspection can be seen to directly connect to safety assurance, food quality, and can as well extend to QM. This can point to why the inspectors' role, working within the confines as prescribed by both legal and regulatory frameworks, to implement the food law, is important. (Sikora, T.; Strada, A. 2005) [15].

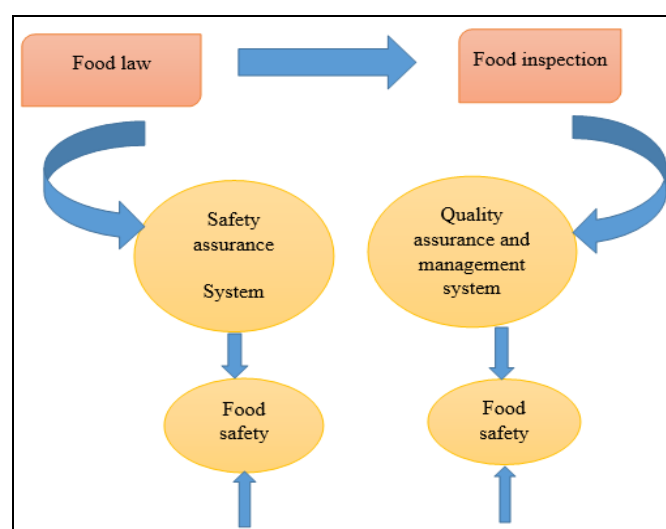


Fig 2. Integrated schematic flow linking food law. (Sources Sikora, T.; Strada, A. (2005) [15])

Conclusion

If QM is to work, moral values have to be developed and maintained, and this is essentially true to the agro-food product industry. Through food quality safety standards, food processors are obliged to ensure food products meet the required quality safety standards. Good practices, from GHP, GAP, GMP, GCP to GTP, all have a common objective if carried out effectively and efficiently, which is, to compulsorily ensure the high quality level of food product hygiene and consumer safety. Through the combined efforts of HACCP and QA control points (QACP) that targets to ensure improved food hygiene, both quality and safety levels can be further enhanced and sustained. This makes the agro-food product industry capable of achieving as well as reaching some desirable QM targets. When good practices are achieved with HACCP, the next target will be that of QM, which would have to utilise the quality standard/system that has been deemed as the most appropriate by the food enterprise/unit. Considering the complexities of the agro-food product supply chain, QM appears strategically situated to advance food hygiene quality standards and related processes. However, establishing the QM system within the agro-food product establishment/unit is not the real deal, it is about maintaining and sustaining it, which certainly requires consistency in planning, organisation, and establishment of a

routine. As ISO promotes standardisation of processes, food industries can greatly benefit from ISO22000.

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