

COMPARISON OF FOOD SAFETY MANAGEMENT SYSTEMS

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Abstract

Today, conscientious societies demand the food products to be healthy in terms of production processes and ingredients, while at the same time demanding access to all sorts of information regarding them. The companies respond to this call by certifying their products regarding food safety through various certifications.

Since the purpose of this study is to compare the Food Safety Management Systems commonly applied in food production plants, the standards of the systems ISO 22000:2005, BRC version 7 and IFS version 6 are used as the main references of this study. A total of 13 topics thought to be critical regarding food safety are found to be fit for comparison. In addition, the issues of the transition of HACCP to ISO 22000 and the points at which the two standards differ have been dealt with and the enlightenment of the food sector on these issues is aimed in this study by emphasizing that the ISO 22000 and HACCP have to be thought as two different standards.

As a result of the comparison of BRC, IFS and ISO 22000 systems, it is found that ISO 2200 treats topics in a more general manner, and not include many topics that are treated in BRC and IFS. These topics are: control and detection of foreign substances, customer complaints, product analysis and finally audit protocols. The issue of audits is the most significant among the issues that are not included. It is seen that BRC and IFSs have given a section about the scope and the application of audits and that BRC has given a more detailed treatment of the issue of audits than the IFS, marking the audit, the requirement of which will be applied, according to its way of procedure.

Keywords: *Food Safety, ISO 22000, HACCP, BRC, IFS*

Introduction

Food comes first among the many other important needs in human everyday life. Safety and quality are some of the important criterias that every food must have. In addition, food should be accessible in terms of food security. Food reliability is described as “accessibility of people to food that is sufficient in amount, safe and high in nutritional value in order to sustain their healthy and active lives” [1]. On the other hand, food safety is to prevent/remove chemical, physical and microbiological dangers that have the potential to harm human health. There have been many organizations founded in the world about food safety and security. Aside from sustaining food safety, these organizations raise consciousness all

around the world about providing nutrition and food to downtrodden people in under-developed, economically damaged or war-torn regions, and take necessary measures to help people who are in need.

In countries where there is no problem with food accessibility and where production and consumption are at normal standards, the most significant issues are the food safety and hygiene. Aside from its relevance for public health, food safety has also been an issue of market competition for food businesses.

Conscientious societies are demanding the food products to be healthy in terms of production processes and ingredients, while at the same

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time demanding access to all sorts of information regarding them. The companies respond to this call by certifying their products regarding food safety and hygiene through various certifications.

In today's world, the demand for food has increased proportional to the population growth. This increase in demand may weaken the care that is given by the producer to food safety on the production line. In the process that begins in the field and ends on the table, the human health has been disregarded and food has been produced in unnatural methods in order to gain boosts in production quantities. In order to increase the yield in food production chain, some misapplications are done by paying no attention to human health, i.e. using GMO (Genetically Modified Organisms) seeds, occurrence of contaminants, using non regulated food additives etc. However, as they are increasing the quantity of the yield, extending the shelf-life of the goods and enriching foods in terms of flavor and texture, such applications are being regulated with certain limits and standards. Furthermore, issues such as the hygiene, quality, marketing and storage conditions in food plants, which are relevant and which must be a part of the whole discussion of food safety, are addressed in these standards.

In these standards, all the factors that come into physical contact with the food—the principle raw material or the ancillary material—throughout the food chain from the field to the table are taken under control with systematic approaches. There exist penal procedures in case firms do not abide by the rules or get involved in any form of cheating or adulteration.

In order to maintain food safety, "Food Safety Management Systems" are formed. These systems are brought together under one roof by International Standards Organization (ISO) and all the standards proper for each institution are issued under distinct branches [1]. In addition to ISO, countries are forming their own standards to standardize imported goods, establish the fairness of the competitive environment between the producers and the retailers and protect the health of

the consumers. Two of the best examples for such standards are IFC and BRC, which are created by German and British retailers, respectively.

In this study, it is aimed to compare the food safety systems ISO 22000, IFS and BRC, which are currently widely used, in order to help companies which want to employ these standards in their decision-making processes.

1. Food Safety Management Systems

Today, significant developments took place as the consumers become more conscious and the countries update their food-related laws in the direction of producing healthier and safer products, which made the issue of food safety one of the most important issues of the last few years. World Health Organization (WHO) and Food Agriculture Organization (FAO) *Codex Alimentarius* Specialists Commission defines food safety as, "abiding by the required rules and taking precautions during the processes of food production, processing, conservation, transportation and distribution, in order to maintain a healthy and perfect food production" [2].

Food safety consists of consumer consciousness and, regulatory rules composed by the state and the totality of methods and procedures employed by the producers and marketers. First and foremost, these three factors must fulfill their responsibilities [3]. The problems which countries all around the world face, emerge when one of these three factors is not properly addressed. Firstly, the consumer must assess the food he or she consumes and should demand the safe product; then, producers and companies must concentrate on this topic in response to the demand, learn about their responsibilities through the state regulations and standards, and implement them. Finally, producers and companies must be subjected to audits and penal sanctions by the state if needed.

With law no. 132, dated 18.11.1960, Turkish Standards Institution (TSE) was created and has been authorized to prepare standards in Turkey. TSE prepares standards and does licensing

regarding Food Safety Management System (GGYS), and Quality Management System (KYS) regarding the raw material, goods and services of all sorts of industries. All types of firms and service industries in our country have to conduct its operations in accordance with GGYS and KYS standards. Issues such as customer satisfaction and conformity with European Union on foreign trade require all firms to abide by the standards that apply to them [4].

The GGYS that this study is based are:

- ISO 22000:2005 (HACCP)
- BRC (British Retail Consortium)
- IFS (International Food Standard)

Among these, the one with the most wide-spread use is ISO 22000 Food Safety Management System. Sole employment of local standards of a country by its companies may cause problems of disconformity in foreign trade when these standards contradict with the local standards of another country. ISO 22000 is prepared as an international standard to prevent such problems [4].

Standards compared in this study are ISO 22000, BRC and IFS. ISO 22000 and HACCP is as taken as constituting one entity and the points of divergence are scrutinized.

1.1 ISO 22000:2005 and HACCP

ISO 22000 is a standard published in September 2005 and is issued in Turkey in April 24, 2006. Its logo is given in Picture 1. With this standard, the implementation of a food safety management standard with the tracking both of the pre-condition program and of the Critical Control Points, that is, the application of HACCP (Hazard Analysis and Critical Control Points), have been merged for the first time [5].



Picture 1. ISO 22000 logo

HACCP system is aimed at pre-detecting possible safety risks that may come out during the production process and taking the necessary precautions. These risks may be biological, physical or chemical. The system is proactive in its approach in that it is an application not of problem-solving but of problem-avoidance [6]. It was first published in Codex Alimentarius and made its way into the literature for the first time when it was used in producing high-safety food for NASA astronauts between the years 1972-73. Many countries published their own HACCP programs since 1990 [4]. The 7 principles of HACCP and 12 principles of Codex Alimentarius are as follows:

- 1) Formation of a food safety team
- 2) Product description
- 3) Product's usage as intended in its design
- 4) Formation of product-flow diagrams
- 5) Confirmation of flow-diagrams
- 6) Detection of hazards –*HACCP 1. Principle*
- 7) Detection of critical control points –*HACCP 2. Principle*
- 8) Determination critical limits for CCPs –*HACCP 3. Principle*
- 9) Formation of monitoring systems for CCP –*HACCP 4. Principle*
- 10) Planning of the corrective actions –*HACCP 5. Principle*

11) Confirmation –HACCP 6. Principle

12) Documentation and registration –HACCP 7. Principle

There are many standards that include these seven principles of HACCP. They made their way into the standards of EU countries in 1993 (e.g. The Netherlands and Denmark’s HACCP, UK’s BRC, Germany and France’s IFS). In Turkey the TS 13001 standards published in March 3, 2003 included the seven principles of HACCP. With the publication of ISO 22000, this standard was annulled and HACCP took its new shape in our standard [4].

ISO 22000 consists of 8 articles. These articles, each of which has its own sub-articles, are as follows:

Article 1 – Scope

Article 2 – Standards and documents cited

Article 3 – Terms and descriptions

Article 4 – Food safety management system

Article 5 – Responsibilities of the administration

Article 6 – Resource management

Article 7 – Planning and realization of safe product

Article 8 – Acceptance, verification and rectification of food safety administration system [7].

1.2 British Retail Consortium (BRC)

BRC, which stands for British Retailer Consortium, is a standard prepared by the British retailers. It was published in November 1988. Under the title of BRC-Global Food, it standardizes the qualities that must be present in food, consumer products and packaging materials. BRC customer products contain the necessary responsibilities needed for obtaining technical proficiency regarding the special products. This standard can be applied both generally and specific to a product. BRC logos are shown in Picture 2 below [3].



Picture 2. BRC’s logos

BRC was revised in January 2015 and this updated 7th Version took its place among other standards. BRC standard consists of 4 principle chapters. Chapter 2 titled “Requirements” consists of 7 articles, each of which are made of further sub-articles. The content of the standard in general is as follows:

Chapter 1: Food Safety Management System

Chapter 2: Requirements

Article 1: Responsibilities of Senior Management

Article 2: Food Safety Plan

Article 3: Food Safety and Quality Administration System

Article 4: Business Standards

Article 5: Product Control

Article 6: Process Control

Article 7: Personnel

Chapter 3: Audit Protocol

Chapter 4: Management and the Supervision of the Program

BRC standard refers to requirements that are critical as fundamental requirements. 3 types of nonconformities are depicted;

Critical: Deficiency in conformity to food safety and legal requirements.

Major: The situation in which there is a serious nonconformity between substance and the product.

Minor: The situation in which the requirements regarding a substance are not completely fulfilled but its conformity is proved through objective evidence [8].

1.3 International Featured Standards (IFS)

IFS food quality and food safety standard was prepared by the German Retailers Federation HDS (Handelsverband Deutschland) together with its French counterpart FCD (Federation des Entreprises du Commerce et de la Distribution). It is currently managed by IFS Management GmbH. IFS logo is given in Picture 3 below. The purpose of the standards is to provide the suppliers with a uniform quality and food safety system [9].



Picture 3. IFS Food logo

Other aims of IFS Food and IFS are as follows:

- Creating a standard in which the assessments are uniform,
- Working with licensing institutions approved and accredited by IFS,
- Creating a supplier ecology that is comparable and transparent,
- Saving time and resource for retailers and suppliers [9].

While version 6 of IFS, published in 2012, consisted of 4 chapters, the 2014 revision added a fifth chapter despite keeping the version number. Accordingly, IFS consists of 5 chapters. Chapter 2 entitled “Requirements” is made up of 6 articles, each of which has sub-articles of their own. The content of the standards in general is as follows:

Chapter 1: Audit Protocol

Chapter 2: Requirements

Article 1 – Senior Management Responsibility

Article 2 – Quality and Food Safety Management System

Article 3 – Resource Management

Article 4 – Planning and Production Process

Article 5 – Measurement, Analysis and Improvements

Article 6 – Food Defense and External Inspections

Chapter 3: Accreditation Institutes, Licensing Firms and Requirements for Audits

Chapter 4: Reporting, auditXpress™ Software and IFS Audit Portal

Chapter 5: IFS Food version 6 audit protocol for unannounced audits.

In IFS, the requirements that are considered critical are referred to as “Knock Out” (KO) requirements. If a nonconformity is seen regarding a KO requirement during the licensing procedure, 50% of the total points of a firm is taken away. The licensing cannot be put through. The nonconformities that fall out of the scope of KO requirements are named “major nonconformity.” A major nonconformity reduces the total points by 15 %, and similarly the licensing cannot be carried out [9].

2. MATERIAL AND METHODS

Since the purpose of this study is to compare the Food Safety Management Systems commonly applied in food production plants, the standards of the said systems (ISO 22000:2005, BRC version 7 and IFS version 6) are used as the main materials of this study. In this direction, a copy of ISO 22000:2005 was obtained from TSE firstly and it is transmitted in the study in a plain manner as much as possible. Then, BRC version 7 and IFS version 6 was downloaded from their websites and are added to the study accordingly. A total of 13 topics thought to be critical for food safety and the implementation of systems are found to be fit for comparison. These are given in the section “Findings” in chart form and their differences are specified.

3. RESULTS

3.1 ISO 22000 and HACCP Comparison

ISO 22000 and HACCP cannot be assessed as two different standards. Aside from being inclusive of HACCP, ISO 22000 is a standard equipped with new details in terms of company application. That is, ISO 22000 is a whole that includes and complements the HACCP system. When a comparison is made, one can only speak of the advantages of ISO 22000 over HACCP system, not the differences of the latter from the former. ISO 22000 has taken the place of HACCP all around the world, but there still are firms who haven't made systems change.

One of the most significant common points of the two systems is the prerequisite program (PP) that both of the systems require, as shown in Figure 1 below. PP is the fundamental duty of a company that helps it to form a secure grounding before the establishment of the food safety system.

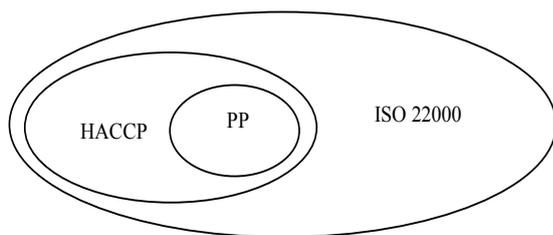


Figure 1. The Relation Between ISO 22000, HACCP and PP [4].

HACCP's limited concern over the production process is seen as a flaw in its way to becoming an international standard and this limited nature is taken as first step for the creation of ISO 22000. With its emphasis for the human factor, ISO 22000 manifests its difference by detailing such important issues not only of the hygiene of the personnel but also of the duties of the management, of the inclusion of the personnel into the system, of communication and many more. If examined closely, we can enumerate such ISO 22000 advantages as:

1) The most important advantage of ISO 22000 is that it has an international acceptance.

2) While the segment of HACCP user tend to be food producers, ISO 22000 has become a system that has been employed by producers who produce products that come in touch with food and by any types of institution that effects food (e.g. producers of animal feed, packaging and food equipment producers, cleaning products producers, institutions that provide storage and transportation services) [5].

3) Decent production practices receive mention in ISO 22000.

4) When a firm possessing a HACCP will also need ISO 9001, while ISO 22000 can be sufficient by itself. Only with an ISO 9001 does the company come into conformity with the system [10]. For this reason, the array of ISO 9001 and ISO 22000 articles are matched for the purposes of convenience.

5) Allergens control issue is among ISO 22000's requirements. This issue is not explicitly demanded in HACCP.

6) ISO 22000 emphasizes that a company's food safety goals and their process management be clearly explained. In HACCP, there is no mention of companies' food safety goals.

7) External communication is required in ISO 22000. It is demanded that in the process which starts with the raw material and ends in the final good, agents such as suppliers, storage and distributor companies be contacted, and that these agents are kept in touch for the purposes of food safety. This situation, which gathers all the monitoring activity in one locus, is very important for information flow. ISO 22000, which demands the detailed description and close examination of the input and the final product, touches upon many issues relating to external communications.

8) ISO 22000 allows for the instalment, updating and confirmation of a system (HACCP or PP) that is developed by ex-company specialists. This is one of the many examples that confirm the external communication requirement.

9) With a realist approach, ISO 22000 is filled with a monitoring system, a corrective practice in terms of PP and CCP and numerous details and warnings regarding the ways of recording all these processes.

10) Despite the fact that hazard assessment and

risk management are two of HACCP's building blocks, ISO 22000 reconsiders these terms as force and probability and defines them completely.

11) The difference between the concepts of confirmation and verification is made clear, and the activity of confirmation is detailed as confirmation plan and confirmation result.

12) ISO 22000 contains the concept of suspicion product. It explains the accepted definition and things relating to the issues.

13) It demands improvement of the system when needed and the strengthening of its reliability through updates to be made on the system.

14) ISO 22000, which developed the concepts of recall and withdraw which are associated with tractability, demands that causes and effects of such a situation be explained through the concepts of revision and nonconformity control [11, 12, 13].

3.2. Comparisons of BRC, IFS and ISO 22000

In our comparison, 13 topics are chosen and the similarities and differences of these topics are worked out. The reason as to why these topics are chosen is that these topics are thought to be the most critical topics when it comes to food safety and application of the systems. These topics are enumerated in Table 1 and the articles in which these topics are elaborated are expressed.

Senior Management Responsibility: In all three standards, the creation of a company policy that contains the food safety and quality goals of the company and the training of the all the personnel on this policy, is demanded as the first duty of the management. In addition, in these standards, tracking of the performance of the safety systems is described as a responsibility of the senior management.

Table 1. ISO 22000, BRC and IFS content comparison

1. The Compared Content	TS EN ISO 22000:2005	BRC Global Standard Version 7	IFS Version 6
2. Senior Management Responsibility	Article 5	Article 1	Article 1
3. Human Resources (Personnel)	Article 6.2	Article 7 + Article 4.8	Article 3
4. Formation of HACCP plan	Article 7.6	Article 2	Article 2.2
5. Ineligible Product Control	Article 7.10.3.3	Article 3.8	Article 5.9
6. Corrective Practices	Article 7.10.2	Article 3.7	Article 5.11
7. Inspection for and Detection of Foreign Substance	--	Article 4.10 + Article 4.9	Article 4.12
8. Product Release	Article 7.10.3.2	Article 5.7	Article 5.7
9. Product Withdrawal and Recall	Article 7.10.4	Article 3.11	Article 5.9
10. Tractability	Article 7.9	Article 3.9	Article 4.18
11. Customer Complaints	--	Article 5.8	Article 3.10
12. Internal Survey	Article 8.4	Article 3.4	Article 5.1
13. Product Analysis	--	Article 5.6	Article 5.6
14. Audit Protocol	--	Chapter 3	Chapter 1 and 5

The differences are as follows:

1) While BRC and IFS adds to this article the creation of an organizational chart that determines the responsibility of the personnel as the management's responsibility, ISO 22000, in this article, determines the creation of a food safety team and the appointment of a leader to this team, as the responsibility of the senior management.

2) ISO 22000 adds the issues of internal and external communication for the purposes of facilitating the management involvement in emergency situations to this article and determines the creation of such (communicative) systems as the responsibility of the senior management. BRC and IFSs do not specifically make room for the issue of communication.

3) BRC gives a special emphasis to the responsibility of the senior respondent(s) of the production in correcting the nonconformities, by demanding that he or she be present in auditory meetings.

4) IFS recites as one of the responsibilities of the senior management the determination of safety goals with a customer-oriented approach and the creation of a procedure for this purpose.

5) BRC marks the senior management's responsibilities and their duty of perpetual enhancement as a fundamental requirement. On the other hand, IFS marks conscientiousness of the personnel regarding food safety and quality (Article 1.2.4), which the standard enumerates as one of senior management's responsibilities, as a knock out (KO) requirement.

Human Resources (Personnel): In all three standards, requirements regarding the hygiene, training and working environment of the personnel are determined. Differences are as follows:

1) While BRC marks personnel training as a fundamental requirement, IFS marks personnel hygiene as an important requirement.

2) BRC and IFSs make room for the rules regarding protective wear under the topic of human resources. BRC handles the issue more extensively than IFS, while ISO 22000 do not give any room for the issue.

3) BRC deals with the issue of medical tracking in terms of food safety and personnel health.

4) In the section on production plant standards (Article 4), BRC mentions standards and rules for the work environment, social facilities and dressing rooms of the personnel, under the sub-section Article 4.8.

Formation of HACCP Plan: All three of the standards treat in detail the establishment of the HACCP system in light of the *Codex Alimentarius* principles and prerequisite programs.

Differences among the systems are as follows:

1) While BRC defines the whole of HACCP as fundamental requirement, IFS defines only the HACCP article that enforces the formation of a monitoring system for CCP (Article 2.2.3.8.1) as a KO requirement.

2) While it is stated in IFS and BRC that the audit regarding the HACCP plan will take place during announced audits as documentation inspection by the licensing institution, in ISO 22000, the audit for HACCP plan is treated as a matter of internal inspection.

Ineligible Product Control: In all three standards, ineligibility is described as non-implementation of or deviation from a requirement, and is seen as the cause of corrective practices. Their points of divergence are as follows:

1) BRC and IFS requires that a procedure regarding ineligibilities be formed. ISO 22000 does not make such a demand.

2) While BRC distinguishes between 3 types of ineligibilities described as critical, major and minor ineligibilities, IFS separates ineligibilities into two groups of major and KO ineligibilities.

Corrective Practices: All three of the standards require that a procedure be created regarding corrective practices and that these practices be recorded.

Their only difference is that while BRC marks all the articles as fundamental requirements, IFS marks only the documentation of the corrective practice action plan as a KO requirement. In both of the standards, these records are subjected to documentation inspection. Such a case is not present in ISO 22000. However, the attention given to the issue in implementations is identical.

Inspection for and Detection of Foreign Substance: This issue is not defined in ISO 22000. The difference between IFS and BRC on this topic is as follows:

Physical and chemical contamination inspection is treated in Article 4.9 in BRC. It includes chemical inspection, metal inspection, glass or ceramics inspection, wood inspection and fragile plastic inspection, and rules regarding the packaging that is done using these materials. In Article 4.10, the properties of equipment used in detection and sorting out of these foreign substances are treated in detail. IFS deals with these issues in Article 4.12, but does not explain as extensively as BRC.

Product Release: All three of the standards demand that the required analyses are applied and their conformity proven before the final product is released.

1) While IFS and BRC standards require that a procedure be created regarding this issue and the results of the analysis be recorded, ISO 22000 does not set such a requirement.

2) This issue is inspected in BRC within the framework of good manufacturing practices.

Product Withdrawal and Recall: To prevent the release and the consumption of the product or to create a crisis management team that will manage the recall of the already released products, to provide the consumers with proper information and to contact with the consumers as though to recall some product in order to assess the time it takes for the ineligible products to reach the costumers at least once a year, are the common points that appear on three of the standards.

The only difference is that IFS indicates providing the consumer with proper information as a KO requirement. In BRC, product withdrawal or recall is not described as a fundamental requirement.

Traceability System: In all three standards, it is demanded from the certificate holders that all the procedures on the path, from raw material to the final product that reaches the consumer, is monitored and recorded. Differences are as follows:

1) BRC expects from certificate holders that their suppliers' tractability is ensured.

2) ISO 22000 characterizes traceability as a precaution that makes the recall of a product possible.

3) IFS suggests that labelling should be done after packaging for a more precise traceability and that shelf-life should be calculated according to the original production lot.

4) BRC describes traceability as a fundamental requirement and inspects it within the framework of good manufacturing practices, while IFS marks tracking until delivery (Article 4.18.1) as a KO requirement.

5) BRC requires the mass balance test to be controlled at least once a year and the records of these controls to be kept. These records are subjected to inspection under the scope of documentation inspection.

Customer Complaints: The issue of customer complaint is not given a separate place in ISO 22000 and is only mentioned as an example in the discussion of external communication (Article 5.6.1). On the other hand, this issue is worked out in the articles indicated in Table 1 above. BRC and IFS demands the issue of customer complaints to be assessed according to the frequency of complaints and that records of these complaints be kept.

Internal Audit: In all three standards, the significance of internal audits for confirmation and updating of food safety system is emphasized. It is demanded that an internal survey procedure founded

on PP and HACCP is created and this procedure is implemented at least once a year. The articles that cover the topic of internal survey in the three standards are indicated in Table 1 above. While BRC defines the issue as a fundamental requirement, IFS marks the survey of all the plant including the storage areas as a KO requirement (Article 5.1.1).

Product Analysis: ISO 22000 makes a determination regarding the issue of product analysis only in the article where it talks about the establishment of the HACCP system. Table 1 shows places where the issue is covered in BRC and IFSs. According to both of the standards, it is required that the laboratory that is set up for product analysis in the plant or the laboratory from which the service regarding product analysis will be obtained, must fulfill the requirements of ISO 17025 (i.e. (laboratory accreditation for the latter option). It is required that the results of the analysis be acceptable on official level and that these result be recorded.

Audit Protocol: BRC and IFS each deal with audit protocol in one complete chapter. These chapters are indicated in Table 1 above. Such a topic does not appear in ISO 22000 standard. This issue is the most significant advantage that BRC and IFS have over ISO 22000. Differences are as follows:

- 1) ISO 22000 does not have an explanation for external audits of the system.
- 2) In IFS' strengthened version 6 published in 2014, unannounced audits are first introduced and are described in the newly added chapter 5 of the standard.
- 3) IFS divides chosen audit into parts of initiatory audit, renewal audit, proficiency audit and expansionary audit. BRC divides it as initiatory audit, follow-up audit and expansionary audit.
- 4) BRC distinguishes audits in accordance with their application as announced and unannounced audits, and makes a further dual distinction for the latter, fully unannounced and two-parted unannounced. It additionally has global markets and voluntary module options.

5) In BRC, all the requirements are color-coded (green and orange) in view of the two-parted unannounced audit to show which requirements will be sought after in such an audit. There is no such practice in IFS.

6) 10 articles are given as KO requirements by IFS while 12 articles are given as fundamental requirements by BRC that are watched for during the auditing period. For both of the standards, any violation of these requirements is regarded as sufficient cause for disqualification for certification or, if given, for retrieval.

4. CONCLUSION AND SUGGESTIONS

In the section on Findings, the transition of HACCP system to ISO 22000 system and the points at which the two differ are pointed out, and in this way, the enlightenment of the food sector is intended. HACCP and ISO 22000 systems must not be thought as two distinct systems. Among the advantages of ISO 22000, the following must be noted by the companies.

HACCP is a system whose concern is exclusively about production process. While the segment of HACCP user tend to be food producers, ISO 22000 has become a system that has been employed by producers who produce products that come in touch with food and by all types of institutions that effect food (e.g. producers of animal feed, packaging and food equipment producers, cleaning products producers, institutions that provide storage and transportation services [5]. With its emphasis on the human resources, ISO 22000 manifests its difference by detailing such important issues not only of the hygiene of the personnel but also of the duties of the management, of the inclusion of the personnel into the system, of communication and many more. With a realist approach, ISO 22000 is filled with a monitoring system, corrective practices in terms of PP and CCP and numerous details and warnings regarding the ways of recording all these processes.

Despite the fact that hazard assessment and risk management are two of HACCP's building blocks, ISO 22000 reconsiders these terms as force and

probability and defines them completely. ISO 22000 contains the concept of suspicion product. It explains the accepted definition and things to do regarding the issue. ISO 22000, which developed the concepts of recall and withdraw which are associated with tractability, demands that causes and effects of such a situation be explained through the concepts of revision and nonconformity control [11, 12, 13].

HACCP system, which some companies singularly employ, is open to question regarding its conformity and reliability. This misuse may lead to serious food safety problems. Companies might think that transitioning to the ISO 22000 system is costly, but they must remember that in the long term perspective, it will be a profitable move both economically and in terms of food safety. It is thought that the new features added to HACCP in ISO 22000 for product safety and a systematic production may be convincing regarding change in systems.

As a result of the comparison between BRC, IFS and ISO 22000, it is observed that while BRC and IFS are wider in scope and more in line with one another, ISO 22000 narrower in scope than these two standards. ISO 22000 is seen to be dealing with many of the topics in a more general framework, aside from excluding many descriptions regarding some topics worked out in BRC and IFS. These topics are: assessment for and determination of foreign substance, customer complaints, product analysis and audit protocol. The issue of audits is the most significant among the issues left out. It is seen that BRC and IFSs have given a section about the scope and the application of audits and that BRC has given a more detailed treatment of the issue of audits than the IFS, marking the audit, the requirement of which will be applied, according to its way of procedure. There seems to be no determinations regarding the external audit of a system in ISO 22000.

ISO 22000 does not have an explanation for external audits of the system and lacks any such protocol. The only topic that speaks of audits in the standard is the part where the companies are required to implement the inspection of their food safety systems through internal surveys.

In IFS' strengthened version 6 that is published in 2014, unannounced audits are first introduced and is described in the newly added chapter 5 of the standard.

IFS divides chosen audit into parts of initiatory audit, renewal audit, proficiency audit and expansionary audit. BRC divides it as initiatory audit, follow-up audit and expansionary audit.

BRC distinguishes audits in accordance with their application as announced and unannounced audits, and makes a further dual distinction for the latter, fully unannounced and two-parted unannounced. It additionally has global markets and voluntary module options.

In BRC, all the requirements are color-coded (green and orange) in view of the two-parted unannounced audit to show which requirements will be sought after in such an audit. There is no such practice in IFS.

10 articles are given as KO requirements by IFS, while 12 articles are given as fundamental requirements by BRC that are watched for during the auditing period. For both of the standards, any violation of these requirements is regarded as sufficient cause for disqualification for certification or, if given, for retrieval.

Audit is the most important guarantor of a system. The proper implementation of a system makes itself manifest during the audit procedure. Among the three standards, BRC is the one to have the most extensive scope regarding this issue. Informing the companies about how to audit of each material helps reduce the errors to a minimum.

In all three standards, the significance of internal surveys for confirmation and updating of food safety system is emphasized. It is demanded that an internal survey procedure founded on PP and HACCP is created and this procedure is implemented at least once a year. However, this practice cannot take the place of audits and helps only for the confirmation of the safety systems internal to the firm.

Another issue where BRC and IFS matters and ISO 22000 does not is the issue of protective wear. BRC and IFSs make room for the rules regarding protective wear under the topic of human resources. BRC handles the issue more extensively than IFS. BRC gives significant attention to human resources. BRC deals with the issue of medical tracking in terms of food safety and personnel health. According to this issue, the health condition of the personnel must be monitored and in case of a contagious disease, contamination of the products must be prevented by taking preemptive measures.

The only issue that BRC and IFS do not cover while ISO 22000 does is the issue of communication. ISO 22000 adds the issues of internal and external communication for the purposes of facilitating the management involvement in emergency situations to this article and determines the creation of such systems as the responsibility of the senior management. BRC and IFSs do not specifically make room for the issue of communication.

Management of nonconformities is an important factor in food safety systems. BRC and IFS requires that a procedure for nonconformities be prepared. BRC divides nonconformities into 3 types of critical, major and minor nonconformities, while IFS divides nonconformities into 2 types of major and KO nonconformities. ISO 22000 does not make any such demand.

The issue of the inspection and detection of foreign substances is not mentioned in ISO 22000. In BRC, the issue is treated and detailed in two articles. Physical and chemical contamination inspection is treated in Article 4.9 in BRC. It includes chemical inspection, metal inspection, glass or ceramics inspection, wood inspection and fragile plastic inspection, and rules regarding the packaging done using these materials. In Article 4.10, the properties of equipment used in detection and sorting out of these foreign substances are explained in detail. IFS deals with these issues in Article 4.12, but does not explain as extensively as BRC.

All in all, the most important common denomination of the three standards is that they all intend to ensure that the consumer is provided with reliable food. EUROPLASTIQUE Quality Manager Nathalie Bernard makes the following comment in an interview regarding BRC, IFS and ISO 22000 standards; “The BRC and IFS frameworks were designed by British and German distributors respectively to set out requirements in terms of procedures and results in the food safety process. However, they are not suited to the whole food chain. ISO 22000, which is highly valued today, promises a food safety system approach based on customer demands. The points that are common to the ISO 22000, BRC and IFS frameworks are good hygiene practice, the use of a HACCP system and a system of traceability. Unlike the BRC and IFS frameworks, the ISO 22 000 standard is based on results and not procedures. The BRC and IFSs are aimed particularly at those who want to work with distributors, while ISO 22000 is aimed at the producers. However, their purposes are the same: food safety for the consumer” [14].

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