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Review of ISO 22000:2005, Structural Synchronization and Ability to Deliver Food Safety with Suggestions for Improvements

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Abstract ISO 22000:2005 was introduced to the world with objective of ensuring food safety in food supply chain where synergetic effect of GMP, HACCP and ISO 9001:2000 was expected instead of applying three systems separately. Thus ISO 22000:2005 has created a more resilient basis for establishing and demonstrating compliance of organization's food safety management system with appropriate documentation and procedures defined by the standard. However, ISO 22000:2005 was having problems in defining prerequisite programs (PRPs) because, set specifications were not adequate to define PRPs and GMP was implemented through PRPs. However, specifications given on PRPs were not satisfactory where additional guidelines were issued to rectify issues. In addition, supplier evaluation and selection were not prominent while traceability was introduced in a separate standard later; which should have included into system at the beginning. The main standard has set approximately 568 major and minor requirements (Shall) which are repeated in many places. In addition, sister standards issued was considered as guideline documents by auditors and consultants rather than part of the standard. Considering above facts, ISO 22000:2005 can be considered as a loosely structured standard compared to the FSSC 22000, even though it has all relevant requirements and components to control food safety in a harmonized manner. Thus, it has to be reorganized and streamlined into a single set of instructions within a single standard document. Competition among ISO 22000 and FSSC 22000 will intensify in future. Existing auditing model is not 100% credible where alternative approaches are required.
Keywords ISO 22000:2005; Food Safety; PRP, HACCP; GMP; FSMS

Introduction

According to the Webster's Ninth New Collage Dictionary (2015) safety is defined as the "condition of being safe from undergoing or causing hurt, injury or loss" and according to the FAO and WHO (1997) food safety is the "assurance that food will not cause any harm to the consumer when prepared and/or consumed according to the intended use". Ensuring food safety in current complex society is an intimidating task which is possible only with corporation and collective efforts of all stakeholders in food supply chain including consumer organizations, industry and the government (Motarjemi and Mortimore, 2005). On the other hand, food safety is a global phenomenon growing its importance everyday due to the concerns in public health and impact on global trade (Burros, 1997), where, food safety control combines both performance-based approaches such as end-product testing, inspection and sample testing and integrated process-based approaches such as regular audits, assessment by third party auditors, accreditation to food safety management (Mensah and Julien, 2011). In addition, quality is an essential necessity of the competitiveness and organization's survival in highly competitive global economy with continuous improvement of product, process and services (Gavin, 1993; Misterek et al., 1990) where industry has upward moving trends in implementing food quality assurance systems as well as food safety assurance systems. The food safety assurance systems were required for manufacturing organizations to ensure food safety and compliance to statutory and regulatory requirements as well as customer requirements in food supply chain (Trienekens and Zuurbier, 2007).

Technically speaking, standards environment has transformed in recent years (Humphrey and Memodovic, 2006), where standards now encompass much more than product standards which include standards related to production, handling and processing, in order to ensure that products meet certain desired physical characteristics. Standards are agreed criteria, or as to Hawkins, 'external points of reference', by which a product or service's performance, its technical, physical characteristics, conditions and/or the process under which it has been produced or delivered can be assessed (Hawkins as cited in Nadvi and Waltring, 2004). Labour (SEDEC, OSHAS, ETP), and environmental (ISO, 9001, ISO 14001, ISO 22000, HACCP, GMP) standards are two type of examples for process standards where the objective lies not in the product but in the process itself. As Humphrey and Memedovic (2006) stated, the standard environment of agribusiness shows four main trends: (a) increasing stringency of public mandatory standards; (b) a shift from product standards to process standards; (c) increasing importance of private standards; and (d) increasing scope of standards.

On the other hand, organization's competitiveness and position in global food trade can be strengthened through implementation of quality assurance systems (Karipidis et al., 2009) where quality management system can be defined as a complete set of written procedures, practical applications, records of evidence and training (Newman, 2005). Food manufacturers are interested in implementing food safety and quality systems such as Hazard Analysis Critical Control Point (HACCP) and ISO 9001 Quality Management Systems to comply with quality practices (Ziggers and Trienekens, 1999) where ISO 9001:2008 basically concentrate on process management requirements while HACCP is focused on technological aspects of food safety assurance (Luning and Marcelis, 2006). Thus, Manning and Baines (2004) emphasized that both food safety and quality of the product and its manufacturing process can be addressed through effective quality assurance systems by splitting product and the process where quality can be defined in terms of intrinsic quality (product) and extrinsic quality (process).

Accordingly, the ISO 22000:2005 was introduced to the world with objective of assuring food safety in food supply chain (Trienekens and Zuurbier, 2007) where synergetic effect of HACCP, GMP and ISO 9001:2008 was expected instead of applying three systems individually in food industry. Thus ISO 22000:2005 has created a more resilient basis for establishing and demonstrating compliance of organization's quality management systems with appropriate documentation and procedures defined by the standard, where controls has to be established for every aspects of production process while documenting all the operational procedures as well as managerial actions (Mamalis et al., 2009). ISO 22000:2005 was developed for food industry where it is directly applicable with the core production areas of manufacturing process which is a valuable tool for manufacturers in order to ensure that both quality assurance standards and food quality procedures have been met and achieved. Thus it ensures consumers are safe with their choices while considering food safety is a critical control point in industry's future. The implementation of ISO 22000:2005 in industry is related to the structure of manufacturing facility, to the nature and number of products that produced and consumed globally and finally, to the procedures of production.

Due to the growth of information age as well as creation of awareness among consumers, the food safety requirements are never been so as high today where ISO 22000:2005 has become a valuable tool in assessing and preventing food safety even before it started. In contrast, quality is a very difficult term to define or to understand and measuring which cannot be taken as an absolute. The quality assurance is a guarantee of agreed-upon specifications has been delivered (Mamalis et al., 2009). In addition to that, few writers conclude that, explicitly or implicitly the quality is simple; nevertheless many treatises on quality conclude that it is complex, multidimensional, and relative (Meiselman, 2001). According to Juran (1989), Quality is not a scientific or a technical word, it is not a physical entity, but it is a very useful concept in general life and management. Thus, terms "food quality" and "food safety" mean different

things to different people based on their perception.

Consequently, food quality is considered as an interesting concept where it transcends all steps and all actors within the food chain covering one step forward and one step backward; however it is of an intangible nature because it is perceived individually (Olsen et al., 2008). Meaning of the food quality can be vary depending on the situation and can encompass parameters as diverse as organoleptic characteristics, physical and functional properties, nutrient content and consumer protection from fraud. On the other hand, safety is more straightforward, relating to the content of various chemical and microbiological elements in food (Burlingame and Pineiro, 2007). Food safety and food quality assurance are forms of guarantees, where assurance of quality is a guarantee that agreed-upon specifications have been met. However, if the safety related specifications are included in the quality assurance system, then the assurance of quality incorporates safety (Holleran et al., 1999). Nevertheless, consumer is the key to defining quality, where a company's internal definition of quality is meaningless if it fails to reflect consumer requirements (Kontogeorgos and Semos, 2008). Because it is not just like in the past, today retailers are using recognized certification frameworks (hands-off), which set out the basic minimum requirements of food safety acceptable for their consumers in the global food context, where suppler required to be certified by third party auditors, even before qualifying to supply food with specific certifications whether voluntarily or mandatorily sought by suppliers (Mensah and Julien, 2011). This type of buying consolidation has given rise to "buyer-driven chains" and sourcing patterns, which extends well beyond national boundaries; facilitated by developments in communications and transportation, crating a policy environment conducive to more liberal trade (Henson and Reardon, 2005; OECD, 2006; Fulponi 2005; Nadvi and Waltring, 2004).

In the current context, food firms are facing increasingly intense competitive markets and are implementing quality assurance systems (Ziggers and Trienekens, 1999) where each quality assurance system covers different quality aspects e.g., some focus on management aspects (ISO), whereas others focus on technology aspects (GMP, HACCP). The current standards were developed focusing to run on multiple platform quality assurance systems which are often combined to assure several quality aspects, for assuring food safety and food quality e.g., the combination of HACCP and ISO 9001:2000 (Van der Spiegel et al., 2004). Nowadays, Safe production and supply of safe food products are the main aims of the food and beverage industry. Food companies adopt quality assurance systems like HACCP, ISO 9001:2008 and ISO 22000:2005 which have widespread international acceptance to control activities, processes, procedures and resources according to these standards (Mamalis et al., 2009).

ISO 22000:2005

Awareness of consumer and product safety has probably never been so high as today. Significant food crises in world during the past decades have raised doubts in the consumer's mind and created a lack of trust and confidence in products put on the market. Fortunately, most companies already take product quality and consumer safety very seriously. A lot of good practices have been developed and implemented on a voluntary basis. These practices ensure that product safety has never been as high as it is today (The Traceability Blue Book, 2004). Companies continuously challenge their internal quality systems and work on continuous improvement, thanks to new technologies and ways of working.

International trade of food products are increasing while increase in scientific knowledge about hazards associated with foods and their consequent effects on health have made people critically think about their food habits. Thus, there is a growing concern on food safety, because, growing consumer awareness, more foods prepared away from home, rising of incidence of food born illness in some countries, globalization and less barriers to trade present new food safety challenges, unfamiliar hazards or new hazards. For an example, 70% of the approximate 1.5 billion case of diarrhea that occur globally each year are directly caused by chemical or biological contamination of food and more food allergies have been reported over recent years, and the number of people with food allergies is still increasing (DEFRA, 2008).

Foodborne illness is a preventable disease affecting all people, which has significant impact on public health and significant trade implications on economies. As to the published data, around 76 million cases of foodborne illness occur each year in the United States, costing between USD 6.5 and USD 34.9 billion in medical care and lost productivity (Buzby and Roberts, 1997; Mead et al., 1999)

To date, there are 250+ types of food borne illness have been identified with the effects ranging from acute to chronic illness such as mild symptoms to life threatening, i.e. Sequelae - septicemia, abortion, arthritis, hemolytic uremic syndrome, Guillain-Barre syndrome, botulism and death. Foodborne illness is significantly underreported, due to the lack of awareness among community where diarrheal diseases alone - a considerable proportion of which is foodborne illness is killing around 1.9 million children globally every year (WHO, 2008). In addition, food born diseases cause 76 million illnesses while hospitalizing around 325,000 with 5,000 deaths in the United States each year (Mead et al., 1999). Over 40 different food born microbial pathogens including fungi, viruses, parasites, and bacteria, were believed to cause human illnesses at the time and it was estimated that for six bacterial pathogens, the costs of human illness were estimated to be USD 9.3 – USD 12.9 billion annually, of these costs, USD 2.9 – USD 6.7 billion were attributed to food borne bacteria (USDA, 1996). These estimates were developed to provide an analytical support for USDA's Hazard Analysis and Critical Control Point (HACCP) system initiated for meat and poultry at the beginning which overrule entire food industry today with amalgamating in to the core of the various global food standards.

Previously, product safety was perceived and positioned as the voluntary responsibility of companies but the publication of EU Directive 2001/95/EC on General Product Safety in December 2001, and EU Regulation 178/2002 on Food Safety in January 2002 brought about a significant change (The Traceability Blue Book, 2004). In recent years, trade barriers related to tariffs and quotas have been lowered considerably with the involvement of World Trade Organization, which has fostered growing interdependencies through the exchange of food products, across national borders where emphasis has being focused on non-tariff barriers and the wider recognition of their impact on trade (Henson and Caswell, 1999).

Today, European legislation constitutes a set of requirements that each company manufacturing, distributing, importing and/or exporting products to and from Europe must comply with. Beyond the legal aspect, consumer safety is primarily a question of business ethics and responsibility. Good product quality and product safety contribute to build up consumer confidence and consequently strengthen the image of a company or a brand in the consumer's mind (The Traceability Blue Book, 2004). Failure to respect consumers' needs and expectations may be interpreted as betraying this confidence and consequently may lead, in the long term and the worst case, to damage for a company and its brand image and in some cases for the business partners and the whole industry. This is what is at stake when quality and safety are compromised.

Considering these food safety problems and trade issues generated over the time, the International Standard Organization developed the ISO 22000:2005 Food Safety Management System to harmonize the requirements of various food safety standards into integrated system while eliminating lots of trade issues faced on exports. Thus ISO 22000:2005 is an international, auditable standard which specifies the requirements for food safety management system by incorporating all the elements of Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Points (HACCP) together with a comprehensive management system (Pillay and Muliyil, 2005). The new standard ensures the complete food safety of entire food supply chain while satisfying global food safety statutory and regulatory requirements.

ISO 22000:2005 is a quality assurance system introduced by ISO, to ensure consumer safety through food safety while eliminating trade issues, which was a further development of HACCP and other available food safety/quality assurance systems that ensures the food safety of entire food supply chain from farm to fork. It promotes the conformity to the international

standard of the product or services offered by providing the assurance of quality, safety and reliability (Tajkarimi, 2007). According to the Food safety experts in the field, set of well-functioning prerequisite programmes (PRPs) initially simplify and strengthen the HACCP plan, where ISO 22000:2005 is a HACCP-type standard which fits very well with ISO 9001:2000 because, it was especially developed to assure food safety. ISO 22000:2005 has dynamically combine the HACCP principles and application steps with prerequisite programmes, using the hazard analysis to determine the strategy to be used to ensure hazard control by combining the prerequisite programmes and the HACCP plan (Faergemand, 2005).

Structure of the ISO 22000:2005

ISO 22000:2005 is a federative standard which harmonized the most of the food safety requirements set by different global standards and compatible with any food safety regulation worldwide. Nevertheless, ISO 22000:2005 is the first in a family of standards which is entirely focused on food safety that introduced focusing entire food chain, it includes the following documents:

- ISO/TS 22003:2013, Food safety management systems – Requirements for bodies providing audit and certification of food safety management systems (www.iso.org)
- ISO/TS 22004:2014, Food safety management systems – Guidance on the application of ISO 22000:2005 (www.iso.org).
- ISO 22005:2007, Traceability in the feed and food chain – General principles and guidance for system design and development (www.iso.org).
- ISO 22002-I:2009, Prerequisite programs on food safety – Part I: Food manufacturing (www.iso.org).

This international standard specifies the requirements for a food safety management system (FSMS) that combines the following generally recognized key elements to ensure food safety along the food chain, up to the point of final consumption, that are,

1. Interactive communication
2. System management
3. HACCP principles
4. Prerequisite programs (Mensah and Julien, 2011)

Communication along the food chain is essential to ensure that all relevant food safety hazards are identified and adequately controlled at each step within the food chain. This implies the importance of communication between organizations between both upstream and downstream in the food chain. Recognition of the organization's role and the position within the food chain is essential to ensure effective interactive communication throughout chain in order to deliver safe food product to the end user (ISO 22000:2005, 2005).

The most effective food safety systems are established, operated and updated within the framework of a structured management system and incorporated into overall management activities of the organization concerned which provide the maximum benefits for interested parties.

The standard integrates the HACCP system and application steps developed by Codex Alimentarius Commission. By means of auditable requirements, it combines the HACCP plan with (PRPs) perquisite programs (ISO 22000:2005, 2005). On the other hand, new standard offers an alternative to food manufacturers who do not implement ISO 9001:2000, while they want to have an effective food safety management system (Aggelogiannopoulos et al., 2007) as it combines a series of advantages, involving quality management, external and in house communi-cations, designating responsibility, implementing crisis management, continual improvement, good health practices and differentiating between PRP, OPRP and CCP (Talbot, 2007).

The ISO 22000:2005 FSMS has been developed based on risk based management model focusing the entire food supply chain through harmonization. The risk based management model has eight steps,

Through RBMM each and every processing step is evaluated for its suitability, if any step is not complying with validation requirements, (Figure 1) will start from the beginning until it can be validated.

According to the figure 2, ISO 22000:2005 has been developed basically merging GMP, HACCP and ISO 9001:2000. Here the foundation layer is consist of

GMP/GHP/GAP, Codex General Principles of Food

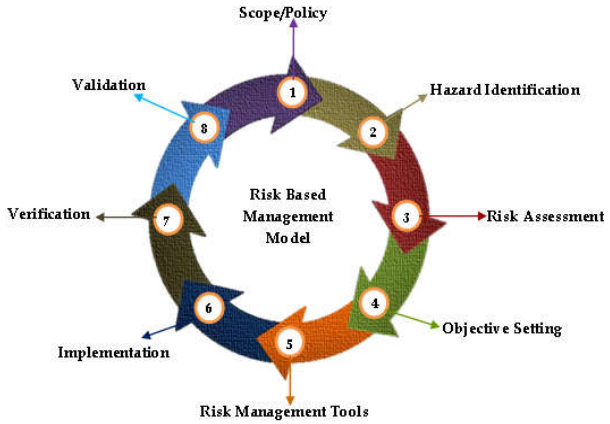

Figure 1 – Risk Based Management System (RBMM)

Hygiene and prerequisite programs which altogether create very sound infrastructure and physical requirements to implement food safety requirements inside the plant focusing on basic food hygiene standards.

The ISO 22000:2005 FSMS has 3 major pillars/ layers to the standard; which can be shown as;

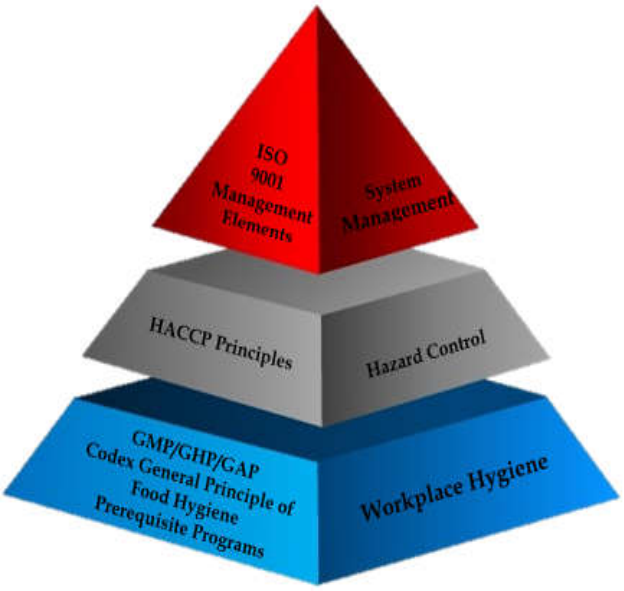

Figure 2 – Three Layer Model of ISO 22000:2005

The total food safety is achieved through HACCP system of Codex Alimentarius using its seven principles to identify hazards and to control them under strict management plan. This includes the hazard analysis, identification of critical control points, establishment of critical control limits, monitoring procedures, corrective actions, record keeping and verification activities. However, these requirements are applied through mandatory food safety procedures. In addition, same procedures and activities are applied to the prerequisite programs and operational prerequisite programs identified according to the risk levels of the product manufactured.

The ISO 22000:2005 management elements are handled through mandatory food safety procedures, that consists,

1. Control of documents
2. Control of records
3. Corrections
4. Corrective Actions
5. Potentially Unsafe products
6. Withdrawals
7. Internal Audits

These procedures are basically identical to ISO 9001:2000, and compatible with its requirements.

The ISO 22000:2005 FSMS also has procedure/ protocol for emergency preparedness and response, which is inherited from reputed safety standards and that is identical to ISO 9001:2000. The organization and the top management must be prepared to respond to potential emergency situations and accidents that can impact on food safety. These can include incidents such as fire, flooding, bio-terrorism and sabotage, energy failure, vehicle accidents, contamination of the environment, various types of weather-related events, or the impact of a pandemic (Chambers, 2007).

A food safety management system needs to be documented. This means that your organization must have, as a minimum, a written food safety policy and related objectives, the procedures and records required by ISO 22000:2005 and any other documents that you might need to ensure the effective development, implementation and updating of your system.

Any business will not only need to document its policies and procedures but it will have to have in place a procedure for controlling its documentation, including records. Food safety management systems will change over time, as will the people doing the

activity. Therefore, one reason for controlling documents is to ensure that the individual using the document has the most recent version of the document. Part of document control ensures that all the proposed changes are reviewed prior to implementation so you can determine their effects on food safety and their impact on the management system. The documentation system is also identical to the ISO 9001:2000 which consists of four layers (Smith, 2002).

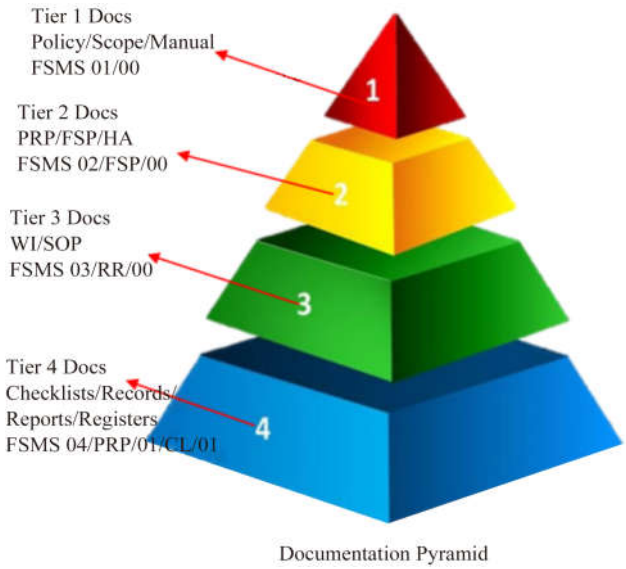

Figure 03 – ISO 22000:2005 Documentation Pyramid

As the organization develops its food safety management system, it will be required to carefully document its activities. These will include the written food safety policy and related objectives, food safety procedures and the required records. However, the scope of the required documentation is much broader. For example, in establishing your control measures you are required to document your hazard assessment and your hazard analysis, including the decision-making process and the selection of control measures. The organization will have to document the validation of its system and verification activities. The work of the food safety team and the management review also require documentation (Chambers, 2007).

Prerequisite programs were basically developed as part of good manufacturing practices initially and later on it was became one of the major components in HACCP, because most of the system developers wanted to keep lowest number of HACCP studies in a system where PRPs were used to cover less critical control points as well as which cannot be measured real time. In ISO 22000:2005, this uncertainty was addressed with separating real time immeasurable critical control points in to operational prerequisite programs. This was not properly segregated in HACCP and later versions addressed the issue up to a certain extent, but it didn't completely cover the gap until the ISO 22000:2005 was released.

Nevertheless, all prerequisite programs have four common factors which are; address indirect food safety issues, cover general programs related to food safety and it can be applied to multiple production lines. Momentary failure to meet prerequisite programs seldom results in a food safety hazard (Surak, 2006). The organization should use documents of external origin relevant for food safety in its various activities, for example in meeting statutory, regulatory and customer requirements. In some situations, electronic documentation may be required to comply with regulatory requirements.

While considering ISO 22000:2005 FSMS, the most of the management elements are directly compatible with ISO 9001 in the areas such as (ISO 22000:2005, 2005),

4.2 Documentation requirements
5.1 Management commitment
5.2 Food safety policy
5.3 Food safety management system planning
5.4 Responsibility and authority
5.5 Food safety team leader
5.7 Emergency preparedness and response
5.8 Management review
6.2 Human resources
6.3 Infrastructure
6.4 Work environment
8.3 Control of monitoring and measuring
8.4.1 Internal audit

Within the ISO 22000 FSMS, the following information is collected (not a comprehensive list) and store as evidence of the system development and maintenance.

1. The food safety team and the competence of team members
2. The scope of the combination of control measures
3 Product characteristics (e.g. raw materials, ingredients and Product contact materials) as well as the end product characteristics and intended use
4 Customer requirements
5 Generic flow diagrams and site schematics
6 Descriptions of process steps and control measures
7 Details of the hazards identified and their acceptable limits
8 Hazard assessment including the HACCP plan, product/process flow diagrams, hazard identification and hazard analysis
9 Selection of the control measures
10 Prerequisite programmes, including those initially selected and those determined by the hazard analysis as well as the management of the prerequisite programs
11 Operational prerequisite programmes
12 Critical control points and their critical limits, etc.
13 Programme elements concerning control of non-conformities verification including evalua- tion and handling of potentially unsafe product or nonconforming product
14 Corrective action records
15 Calibration records
16 Traceability records
17 Supplier evaluation records
18 Results of validations
19 Results of verification
20 Raw material and ingredient records
21 Internal and external communication
22 Monitoring records for operational prerequisite program and HACCP plan
23 Product withdrawal records
24 Training and knowledge records
25 Agreements with external food safety experts
26 Results of internal and external audit
27 Results of management review

Furthermore, ISO 22000:2005 can be considered as a business management tool which links food safety to business processes and encourages organizations to analyze customer requirements, define processes and keep them in control where it enables integration of quality management and food safety management (Mamalis et al., 2009). In this way ISO 22000:2005 FSMS is considered as more focused, more coherent and integrated food safety management system which can satisfy any food safety statutory or regulatory requirements.

Weaknesses Showcased in ISO 22000:2005 Standard

According to the global food safety initiative (GFSI), ISO 22000:2005 was having problems in defining prerequisite programs because set specifications are not adequate to define PRPs, where GFSI has introduced clearly defined PRPs and other regulatory controls in FSSC 22000 (Sansawt and Muliyil, 2012). Thus they have not approved the ISO 22000:2005 standard directly, but they have added ISO 22002-1:2009 to the audit scope to improve the PRP requirements in addition to the accredited ISO 22000:2005 certificate to comply with GFSI's approval. As to food safety magazine "The committee that wrote the standard had to address several critical issues with regard to prerequisite programs where there is not a standard consensus of what constitutes prerequisite programs"(Surak, 2006). However, ISO has rectified the errors on ISO 22000:2005 by introducing ISO 22002-1:2009 and it has been revised in 2013. In contrast, GFSI further focus to comply with customer and regulatory requirements in a single perspective. In addition to that, the standard has not specified supplier evaluation and selection in appropriate manner, while traceability was introduced in other separate standard later on; which must have included into the system at the beginning. The standard has set 568 major and minor requirements (Shall) which are repeated in many places while compromising reader.

Considering above major reasons, ISO 22000:2005 can be considered as a loosely structured standard even through it has all the relevant requirements and components to control food safety in a harmonized manner. Thus it has to be reorganized and streamlined into a single set of instructions within a single

standard document. Due to this reason, consultants in the industry as well as auditors are mainly consider only complying with main standard or the ISO 22000:2005 where other sister standards still remain as guidelines and their use and value become minimal to the industry. GFSI has directly addressed this through binding both standards as well as other applicable standards (PAS 220, ISO 22005, etc.) as a single unit to comply with.

On the other hand, PRP and OPRP segregations need to be further explained to the industry operators where there is no any proper explanations was given by any of the experts. The standard was almost 10 years in existence and has adapted by over 30,000 companies worldwide up to 2014 (ISO, 2015), but announcement of the revision of the standard took very long time even after the problems were identified and explained by many international experts. In the meantime, ISO offered suitable solutions to the problems encountered, but delayed the revision. Nonetheless, ISO 22000: 2005 was developed to harmonize the existing food safety standards at the time of release, but unfortunately it has increased the number of available standards in the world rather than reducing the available numbers where it's initial goal of once certified, accepted by all the parties throughout the world was moved in to GFSI theme. In addition, manufactures still have to certify for different certificates to sell their products where FSSC 22000, the GFSI's standard has gained the significance while ISO 22000 has somewhat diminished its perspective from the market unlike ISO 9001:2008.

Problems Encountered while Implementing ISO 22000:2005

The PRP issue was highlighted in many forums but unfortunately ISO didn't address the issue where GFSI got the millage and further strengthen their standard. Now they have added ISO 17025:2005 to the list of guidelines where the company does not need to accredit their internal laboratory, but they need to follow the guidelines to comply with it. The advantages are better control of the food safety and reliability of the certification to the end user. In contrast, there are significant variations in food safety regulations across the globe and among value chains which increase the burden of auditing costs of certifications on food manufacturers, as retailers require different certification frameworks to qualify suppliers. The impacts of these variations on relevant actors present practical reasons for the need of harmonizing food safety regulations (Motarjemi et al., 2001) which are justifiable reasons that explains these variations (Henson and Jaffee, 2006). Some of these reasons are attributed to the distinct tastes, diets, or income levels and perceptions that influence the tolerance of populations towards the risk associated with food.

Alternatively, this will tend to increase the product price and the accumulated cost for the production than it disserves where companies may tend to let down these practices while make sure auditor meet the minimum requirement. Thus, consumer safety is paramount when it comes to food safety regulation; yet, regulators required to conduct due assessments of food safety risks on consumers as well as cost implications of enforcement strategies on industry to help mitigate costs incurred by industry, without compromising consumer safety (Mensah and Julien, 2011).

Considering the behaviour of enterprises, whether enterprises respond to standards in a positive or negative manner depends on a variety of factors e.g. sector, enterprise size, financial situation and level of risk adversity, which suggest that the response of enterprises is not automatic and it reflects the interplay among different types of incentives operating at the level of mandated government regulation, pressure from the markets and liability laws (Jayasinghe and Henson, 2007; Khatri and Collins, 2007; Henson and Hooker, 2001). Therefore, addition of different extra guidelines will be good as well as bad, because most of the current food safety certifications available in developing countries do not fully complying with any of the available food safety regulations, this may be the case for even developed countries, where audit firms are also managing a business and they very rarely suspend any system they accredit. Even in the process of accreditation, major food safety issues and critical food safety violations are mostly recorded as minor food safety violations. In addition, most of the

certification firms at the beginning (startup face in any country office) lose their controls to gain the market and to attract more customers because all these system certifications have become marketing tools. The food safety issues are further intensified due to such situations as well as auditing practices. The auditor verifies only a fraction of the system while most of the companies only comply food safety requirements on the day of certification or surveillance audits. As previously discussed, different private standards introduced by brand manufacturers (i.e. FSSC 22000) and retailers will further introduce more variations into existing food safety regulations and the modes of conformity assessments (Henson and Mitullah, 2004) to improve and differentiate their standards for one another. Thus a common reference point is required, explaining from where the process of harmonization of standards could be started, to reduce multiple certifications on food enterprises. As an initiative, SPS agreement which was introduced by the WTO facilitates a move towards this much needed common reference point, by providing a basis to establish equivalence and harmonize food safety regulations (Mensah and Julian, 2011).

Future of ISO 22000:2005

Since ISO 22000 already announce the review of ISO 22000:2005 by 2017, the working committees will continue to enhance the ISO 22000 FSMS, which will be a competition between “Farm to Fork” and “Once Certified, Accepted Everywhere”. Thus ISO 22000 will cover all the issues identified during last decade of implementations, where GFSI many also start claiming some of the new problems to directly comply with it or to accept the independent verifications conduct by some other accredited auditor. This is because both organizations are nonprofit organizations selling and profiting from their standards and as annual fees. Thus both organizations want to promote their standard where competition is expected.

On contrary, ISO may further improve their multiple platform initiative while customizing the ISO 22000:2005 such as ISO 9001:2015 DIS version. The ISO 9001:2015 DIS version has step out of the status quo and let the company decide on the requirements based on the context of organization, while keeping the documented requirements as a mandatory compliance criteria without specific terms or references which directly cannot be applied to food safety, but it may be possible with modifications. As it seems, ISO 22000:2005 may be modified to comply with generic format discussed in the multiple platform initiative while strengthening the areas which were lagged in the existing version. Nonetheless, virtual auditing and third party certification based on the fourth player in the game may be able to minimize the issues faced in the system, but this kind of models will have its oven limitations while such kind of system may be highly valuable for contact manufacturer monitoring as well as top management to find out real practices in the system rather than certifications. However, current auditing models are not 100% credible, where alternative ways and technologies will have an opportunity to develop in the future.

Conclusions

ISO 22000:2005 was developed based on the all elements of good manufacturing practices and hazard analysis critical control points together with a comprehensive management system developed based on ISO 9001:2000 management elements. ISO 22000:2005 has created a more resilient basis for establishing and demonstrating compliance of organization’s food safety management system with appropriate documentation and procedures defined by the standard. The GMP was implemented through prerequisite programs, but specifications given in the standard on PRPs was not satisfactory where additional guidelines were issue to rectify issues. ISO 22000:2005 is loosely structured compared to the FSSC 22000, because of its sister standards considered as guideline documents by auditors and the consultants rather than part of the standard. The competition among ISO 22000 and the FSSC 22000 will intensify in the future. Existing auditing model is not 100% credible where alternative approaches are required.

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