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Approach to the Adoption of Multiple Food Safety Management Systems in Food Industry

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Abstract

The present study attempts to fill a gap in the extant literature on Food Safety Management Systems (FSMS), by providing quantitative empirical evidence about the approach and pattern of adoption of multiple FSMS (MFSMS) standards by the food processors. The effects of selected business and operational factors on the pattern of adoption of MFSMS were also analysed. The term 'Multiple Food Safety Management Systems' is used by the study for the situation in which one organisation has adopted and implemented more than one FSMS standard. The ideal scenario is that an organisation adopting an internationally accepted and benchmarked standard, efficiently and effectively implement and maintain the same. The research was conducted in 119 seafood-processing firms in India using a structured questionnaire. Basic statistical analyses were done using SPSS 22.0. The findings bring up important issues with implications on the policies of food processors, standard developers, benchmarking bodies, certification bodies, and organised customers. The MFSMS was found mainly in the factories focused on export business. The study revealed an alarming increase in the adoption of MFSMS in the food industry. The direct involvement of certification bodies in the implementation of FSMS was also observed. The results of the study trigger the need to review the benchmarking process, educating and communicating about benchmarking among the industry stakeholders and the importance of planned approach in the adoption and certification of FSMS standards focusing on efficiency and effectiveness of FSMS, so that there is no need of adopting MFSMS standards.

Keywords: Multiple Food Safety Management Systems, FSMS, Seafood, Standard, Adoption, Profile

Introduction

The food processors have to implement and maintain different food safety management system (FSMS) standards as per customer and market requirements to ensure that the safety of the product to the level of expectation of their customers. Taylor (2011) has pointed out that the percentage of the population suffering from food borne diseases each year is up to 30 percent in developed countries. Increased demand for processed and packed food obviously increases the risk of food safety issues. Because of this, customers look for food safety and quality guarantees when they visit retail outlets to purchase food products. This caused the proliferation of different FSMS standards in the food industry. The efforts to improve supply chain performance also results in the formation of different standards (Kumar, Singh, & Shankar, 2012; Bhatt, Bector, & Appadoo, 2014). The first objective of the present study is to conduct a thorough investigation to identify the pattern and approach to the adoption and implementation of multiple FSMS (MFSMS) to analyse why the organisations are adopting more than one FSMS standard instead of a management system based on a single standard. It contributes to solving the problem in two ways. Firstly, by performing a detailed literature review to understand the FSMS standards commonly followed in the food industry. Secondly, by being the first study that focuses on implementing a MFSMS in the food industry and on the pattern and approach to the adoption of FSMS standards in the seafood processing industry in India.

The second objective of this study is to analyse the relationship of selected business and operational parameters with the adoption MFSMS in the seafood processing plants. As a basic rule, if an organisation has implemented an FSMS based on one internationally accepted standard, that is good enough to satisfy food safety concerns and hazards from the supply of the raw material to the final production for its national or international supply chains. Why the organisations are going for more than one standard is a question of concern. Identifying the FSMS standards followed and pattern and approach to the adoption of a MFSMS is relevant to help stakeholders in the food industry, such as manufacturers, standard developing bodies, benchmarking organisations, certification bodies, regulatory bodies and organised customers, to formulate solutions for this problem.

Literature Review

Food Safety Management System Standards

The FSMS standards are to implement a management system in the organisation aiming safe products to be delivered to the customer. The International Organization for Standardization (ISO) defined 'food safety' as the concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (ISO, 2005a). A 'management system' is a set of interrelated or interacting elements to establish policy and objectives and to achieve those objectives (ISO, 2005b). A standard is "a document, established by consensus and approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context" (ISO, 2014). The management system of a firm is crucial in identifying internal problems, bottlenecks and for building capacities for innovation and change (Goedhuys & Sleuwaegen, 2013). Most of the time, food safety is not a tangible parameter unlike other quality parameters. Mitchell (2003) and Antle (2013) pointed out that consumers cannot determine how safe the food is before purchase, or consumers often cannot say exact food caused illness or long-term health effects of food they consume. The FSMS standards and regulations aim at producing and serving safe food and continually improving quality of management system and thereby products. Ansari, Kumar, Singh, Shukla, and Kumar (2013) opined that the FSMSs are a set of controls implemented and verified by the responsible person(s) at each step in the supply chain. Manning and Baines (2004) stated that an FSMS principally controls the specific food safety hazards associated with the product and process, and ensures compliance with the food safety legislations. Any FSMS shall support the organisation to produce safe product consistently thereby conforming and complying with the requirements of organisation, customers and regulatory bodies.

Based on the literature available, the FSMS standards can be broadly classified as global, international, national, private, and proprietary standards.

Global, International and National Standards on Food Safety

On the global level, the Food and Agricultural Organisation (FAO), the World Health Organization (WHO), and the World Trade Organization (WTO) deal with food safety issues and these organisations bring food safety norms and standards under one roof. The General Agreement on Tariffs and Trade (GATT) concluded in 1947, included provisions for countries to apply measures necessary to protect human, animal or plant life or health (Sperber, 2005). In 1994, the World Trade Organisation (WTO) enacted an agreement on sanitary and phytosanitary measures, which was negotiated during the Uruguay Round of the General Agreement on Tariffs and Trade, and entered into force with the establishment of the WTO at the beginning of 1995. Codex Alimentarius Commission (Codex), World Organization for Animal Health (OIE), and the Secretariat of the International Plant Protection Convention (IPPC) set the standards that enable WTO members to base their SPS methodologies. The GATT SPS agreement calls on countries to 'further the use of harmonised measures….on the basis of international standards, guidelines and recommendations developed by the relevant international organisation, including the Codex Alimentarius Commission'. There are criticisms on SPS agreement, which says it is an international trade agreement on food safety, not an international food safety agreement (Silverglade, 2000), being focus is mainly on smoothening trade between the member countries. The SPS Agreement requires that the needs of developing countries be considered when setting international food standards, which raises a criticism that SPS Agreement lowers food safety standards (Shears, Zollers, & Hurd, 2004).

Codex standard - General Principles of Food Hygiene -CAC/RCP 1-1969, details the Hazard Analysis Critical Control Point (HACCP) system and guidelines for its application. The HACCP is a management tool developed

in late 1960s to ensure safety of foods to space flights, which was later recognised and recommended by World Health Organization (Ropkins & Beck, 2000; Tzouros & Arvanitoyannis, 2000). HACCP-based systems were gradually adopted in the food industry from 1980s and now it is widely recognised in the industry as an effective approach in establishing good production, sanitation and manufacturing practices that produce safe foods (Pierson & Corlett, 1992). HACCP principles are integrated to the official regulations of many countries (Higuera-Ciapara & Noriega-Orozco, 2000; Vasconcellos, 2004). The HACCP approach is a seven-principle system designed to assess hazards associated with potentially hazardous foods from point of receipt to shipment of finished product (Martin, 1998). There are criticisms on HACCP also. HACCP is found to be not effective when it is implemented stand-alone as it lacks management approach to tackle food safety issues. Wallace, Powell, & Holyoak (2005) and Kok (2009) opined that HACCP is most effective when used with other quality management systems and standard operating procedures, such as Good Manufacturing Practices (GMP) or Good Hygiene Practices (GHP). Further, Chountalas, Tsarouchas, and Lagodimos (2009) made it clear that the weakness of classical HACCP is concern on its integrity as a management system, which is often been implemented as an isolated system and poorly integrated with other management systems.

ISO 22000 - 'Food Safety Management Systems-Requirements for any organisation in the food chain' introduced by ISO in 2005, specifies the requirements for an FSMS where an organisation in the food chain needs to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption. The standard is applicable to all organisations, regardless of size, which are involved in any aspect of the food chain and want to implement systems that consistently provide safe products (ISO, 2005a; Ansari et al., 2013). ISO 22000 is said to be the only standard, which harmonises the practices of management and the safety of food products (Gaaloul, Riabi, & Ghorbel, 2011). According to El-Bayoumi, Heikal, Abo-El-Fetoh, and Abdel- Razik (2013), the implementation of ISO 22000 allows controlling of different hazards affecting the health of the consumers. The well-known Deming cycle Plan-Do-Check-Act (PDCA) is also applied in ISO 22000 and to conform to this, ISO 22000 has adapted a requirements presentation scheme directly analogous to the ISO 9001 quality management systems standard (Chountalas et al., 2009). Though ISO 22000 is widely accepted, there are questions on its very generic nature. Global Food Safety Initiative (GFSI) has not benchmarked ISO 22000 standard stand-alone. Current standard available was issued in 2005, whereas the competing private standard like BRC Global standard for food safety is updated on average not exceeding three years since its introduction in 1998.

Countries set national FSMS standards in the form of legislations. For example, the EU Directive 93/43 on the Hygiene of Foodstuffs states that food business operators shall identify any step in their activities critically to ensure food safety and to ensure that adequate procedures are identified, implemented, maintained and reviewed on the basis of HACCP. Food Safety and Standards Act, 2006 enacted by Indian Parliament has brought further regulations for the import, production and service of safe food. USA and EU have also mandated HACCP-based regulations for food products (Ramnauth, Driver, & Vial, 2008).

Private and Proprietary Food Safety Management System Standards

Private FSMS standards are the standards designed and owned by non-governmental entities, such as food industry stakeholder groups (Manning, Baines, & Chadd, 2006), individual retailers or retailing groups and industry associations. Over the last 10 to 15 years, private standards have emerged as a key element of food safety governance in the agri-food chain (Henson & Humphrey, 2009). Private markets often fail to provide for adequate food safety because the safety is not readily apparent to consumers and it is often very costly to test for the safety of products. Furthermore, producers or retailers may not be able to ascertain or certify the safety of foods given the wide array of microbial agents and their potential for hazard (Unnevehr & Jensen, 1999). Limited resources, which is always a problem with governments, coupled with a trend toward deregulation and privatisation of services, is steadily increasing the reliance upon third-party or similar private organisations to protect public health (Tanner, 2000). Grigg and McAlinden (2001) specify that there is increasing customer pressure on the industry in UK to adopt private food safety standards like BRC Global Standard for Food Safety as the customer becomes increasingly influential. The private standards are evolving in response to regulatory developments and more directly, consumer concerns and as a means of competitive positioning in the markets for high-value agricultural and food products. As a result, it is private rather than public standards that are becoming the predominant drivers of agri-food systems (Henson & Hooker, 2001). Manufacturers are committed

to develop good relationship and satisfy its customers especially large retailers (Farsijani, Fard, Kharazian, & Nikabadi, 2012; Sharma, 2015; Pathak, 2016,) which results in the adoption of proprietary standards enforced by the customers.

The major private standards followed in the food industry are British Retail Consortium (BRC) Food, Food Safety Certification (FSSC) 22000, International Featured Standards (IFS) Food, Dutch HACCP, and other proprietary retailer standards. The BRC Global Standard for Food Safety was originally developed and published in 1998 by BRC, a stakeholder group of British Retailers (Herzfeld, Drescher, & Grebitus, 2011). The FSSC founded in 2004, developed FSSC 22000, which includes requirements of ISO 22000, ISO 22002-1 and additional requirements (FSSC, 2014). IFS food standard is also a quality and food safety standard for retailer branded food products, which was developed by the collaboration of three retail federations from Germany, France, and Italy (IFS, 2014). The BRC Food, IFS Food and FSSC 22000 schemes were recognised and benchmarked by the GFSI, which is a global business-driven initiative for the continuous improvement of FSMS (GFSI, 2014). The other key private standards are the Global Red Meat Standard, published by the Danish Agriculture & Food Council, Safe Quality Food (SQF) owned and managed by the Food Marketing Institute (FMI) based in Virginia, and the PrimusGFS food safety audit scheme, owned and managed by Azzule Systems, United States. Proprietary FSMS standards are owned by individual organisations such as a retail chains and are enforced in their supply chains. For example, TESCO food manufacturing standard and McDonald's supplier quality management system specifies the FSMS that has to be followed by its suppliers.

Multiple Food Safety Management Systems and Standards

To summarise the literature review, there are many different FSMS standards available to food manufacturers and standards can be broadly classified as global, international, national, private and proprietary standards. The food processing organisations widely follow these standards because of various reasons, though there are compliments and criticism on FSMS standards. The study uses the term 'Multiple Food Safety Management Systems' for the situation in which one organisation has adopted and implemented more than one FSMS standard. MFSMS in one organisation leads to a condition where the organisation has to adopt various management system strategies, and this raises several conflicts between management system approaches. This implies that the ideal scenario would be one internationally accepted and benchmarked standard rather than allowing private entities to come up with their own standards.

Materials and Methods

Sampling Design

This study investigates Indian seafood processing firms who have adopted more than one FSMS standard. There are 465 seafood-processing companies in India (MPEDA, 2015) located in nine costal states. Based on the expert opinion, pre-survey and list of certified organisations available online in the British Retail Consortium (BRC) directory, International Featured Standards (IFS) portal and Food Safety System Certification (FSSC), it is estimated that approximately 200 factories have adopted MFSMS, and this forms the body of the study. Probability sampling technique; proportionate stratified sequential random sampling was adopted to select samples. Nine states where seafood plants are located were considered as nine strata. Samples from each stratum were taken proportionately by sequential random sampling to reach the required sample size. The survey was carried out during October 2015 to May 2016. The respondents from the sample firms were senior production managers, quality or food safety managers or assistant managers with a minimum of one-year experience in the firm and was a graduate.

Questionnaire Design and Survey

The structured questionnaire for primary data collection was developed in a four-stage process. In the first phase, a preliminary questionnaire was made to collect basic information about FSMS in the seafood industry in India and responses from 30 random processing firms with MFSMS were collected. This information was used as a foundation for preparing a survey instrument. Secondly, a detailed review of published national and international papers was carried out and listed all the profile variables on implementing a single FSMS. In the third step, additional questions and variables were also identified based on industry experience and discussions with 12 industry experts and three academic experts. All the variables for the adoption of a single FSMS and additional questions and variables were reviewed, analysed, and summarised to form a final questionnaire. This resulted in 21 questions to measure the pattern and approach to the adoption of

MFSMS. Content, criteria, and construct were validated through expert reviews and panel discussions. All the comments received were included appropriately. Finally, a validated questionnaire was administrated to the samples selected.

The questionnaire was emailed with the brief information about the objectives of the survey and advised to be filled by the defined respondents. Direct visits, telephone interviews, and discussions were also carried out to help the firms to complete their questionnaires. The responses to the questionnaires were verified on receipt for completeness. Out of 162 firms to whom the questionnaire was sent, 121 firms returned completed questionnaires (a 74.69 percent response rate). 12 questionnaires returned partially completed were returned to the firms and all of them were later received complete. Two received questionnaires did not meet the criterion for a valid sample, and were rejected yielding a valid sample size of 119. The Statistical Package for the Social Sciences - SPSS 22.0 was used to analyse the data.

Results

Profile of the Firms

The distribution of the sample firms by size in terms of the number of employees was: 13.5% with 100 or less employees, 52.1% with 101- 200 employees, 19.3 % with 201-300 employees, and 15.1 % with >300 employees. The distribution of years of operation of the firms was: 34.5% of the firms from 1-10 years, 41.2% from 11-20 years, 19.3% from 21-30 years and 5% over 30 years. In short, 75.7% of the firms with MFSMS have been less than 20 years in operation. Newer firms with state of the art facilities will find it easier to adopt FSMS standards. It was found that 48.7% of the firms were producing 1-5 numbers of product categories, 33.6% 6-10 categories, 8.4 % 11-15, 6.7% 16-20 and 2.5% over 20 product categories. Upon analysing product categories produced by the firms, it was found that the firms were processing multiple product categories simultaneously (Fig. 1). 101 companies were producing frozen products targeting re-processors. Frozen products for retail sales were also processed in 103 firms. Ready to eat products were processed by 24 firms and chilled products by 17 processors. No company was processing dried seafood products. Thus, it confirms that MFSMS is also prominent among frozen product manufactures of wholesale or retail, which is against the notion that it is common phenomenon in processors of ready to eat products. 78% of the firms were purely export oriented and 22 % of the firms were targeting both export and domestic markets. There were no firms with MFSMS focusing purely on the domestic market.

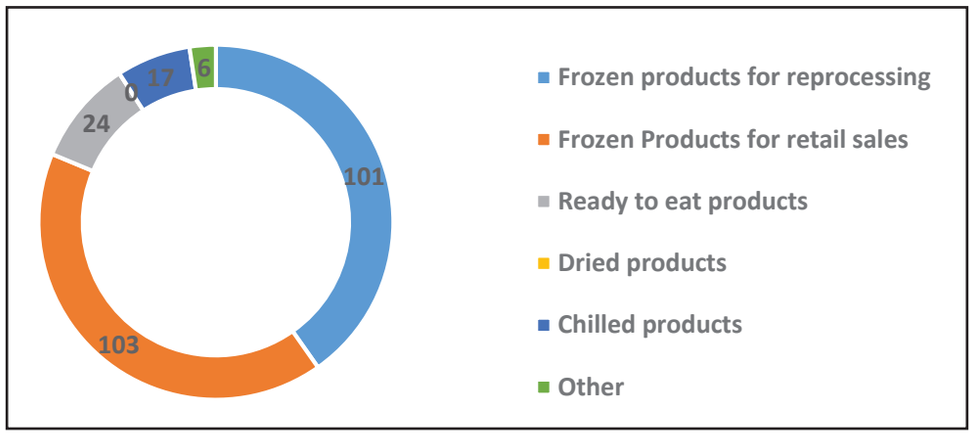

Fig. 1: Major Product Categories Produced by the Firms

In order to test the statistical relation between the size of the company (in terms of number of employees) and number of FSMS standards adopted, a Pearson's correlation test was conducted. A significant positive relation was found between the number of employees and number of FSMS standards ($r = 0.423$, $p < 0.05$, $n = 119$). The Pearson's correlation test between number of product categories and number of FSMS standards adopted also showed a significant positive relation ($r = 0.326$, $p < 0.05$, $n = 119$). It shows that with the increase in the size of the firm and the number of product categories, there is a higher tendency to adopt MFSMS standards.

Approach to the Adoption of MFSMS Standards

All the sample firms had adopted MFSMS. 64.7% of the samples had implemented 2-4 FSMS standards, 27.7 %

firms 5-7 standards, 5.9 % 8-10 standards and 1.7 % more than 10 standards (Fig. 2). The first FSMS standard was adopted in the last 1-5 years by 56.1 % of the organisations and 36.8% in last 6-10 years. The remaining 7.1 % of the firms adopted its first FSMS standard 10 or more years ago (Fig. 3). This result shows that adopting MFSMS is a growing concern and recent trend in the food processing industry.

The Food Safety Team Leaders (FSTLs) who head the implementation of FSMS in the sample firms were highly qualified: 67% with a master's degree and 33% with a bachelor's degree. However, 43% of FSTLs did not have any experience in the implementation of FSMS prior to the adoption of FSMS in the surveyed samples. Moreover, 75% of firms had not conducted any feasibility study before the adoption FSMS standards. FSMS implementation was done by their own mangers in 57% of the sample firms, by consultants in 20% of firms, and jointly by own managers and consultants in 14% of firms. A certification body was directly involved in the system implementation in 6% of the firms and in 3% a certification body jointly with managers (Fig. 4). This reveals an important point that certification bodies were involved directly in the implementation of FSMS in 9% of the sample companies, which shows the significance of the maintenance of impartiality by certification bodies.

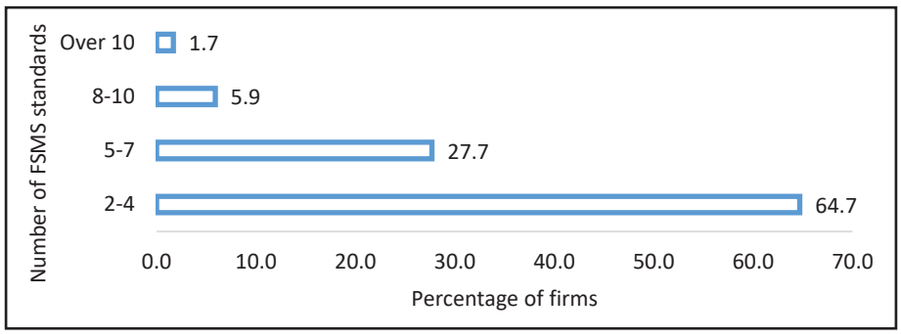

Fig. 2: Number of FSMS Standards Adopted

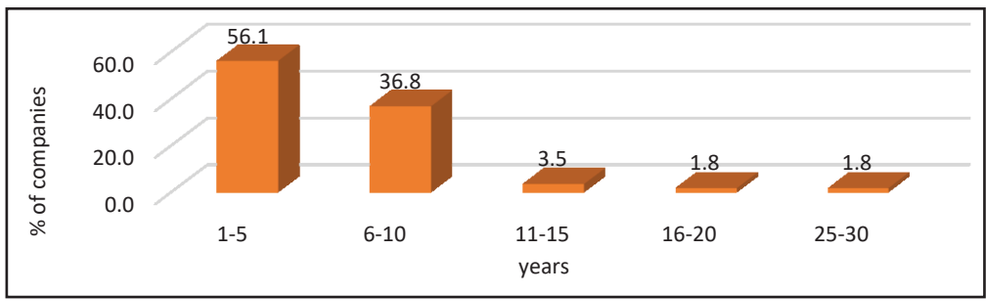

Fig. 3: Period of Adoption of First FSMS Standard

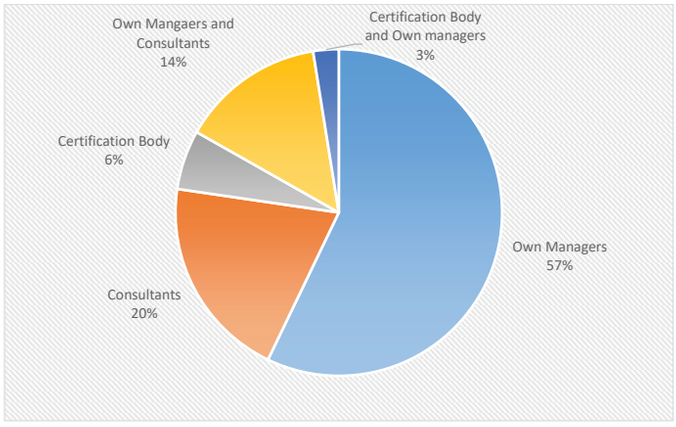

Fig. 4: Responsibility of the FSMS Implementation

Adoption of Global, International, National and Private FSMS Standards

The CODEX HACCP standard was found followed by all the 119 firms (Fig. 5). The next major standard followed by Indian seafood processors was BRC Food by 91 firms (76.5%), followed by ISO 22000 by 45 firms (37.8%). 59% of firms were planning to implement additional FSMS standards over the next two years, of which 14% were planning additional 2 standards. IFS food was planned for adoption over next two years by 42 firms (35.3%) and FSSC 22000 by 15 firms (12.6%) as shown in Fig. 5. These statistics highlight the level of adoption of MFSMS in the food industry and the significance of the problem. The fig. 6 shows the pattern of adoption of GFSI benchmarked standards. 47.1% of the firms were holding 1 or more GFSI benchmarked standards and 92.4% firms planned to adopt 1 or more GFSI benchmarked standards over next two years along with other FSMS standards (Fig. 6). This indicates the critical situation in the adoption of benchmarked FSMS standards by the organisations.

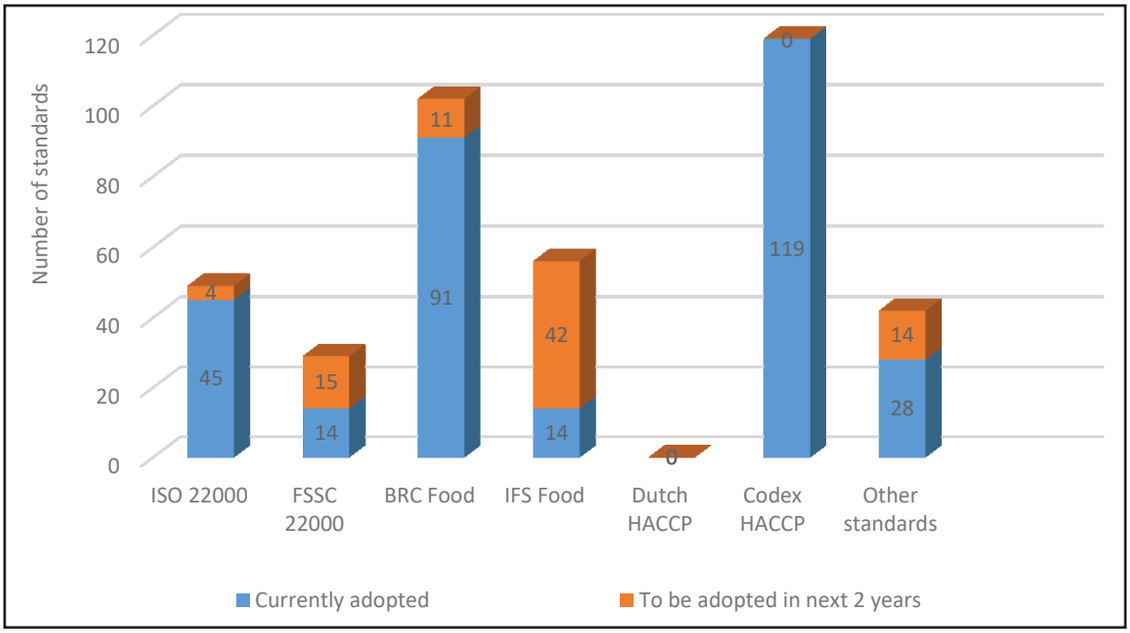

Fig. 5: Type of FSMS Standards Adopted

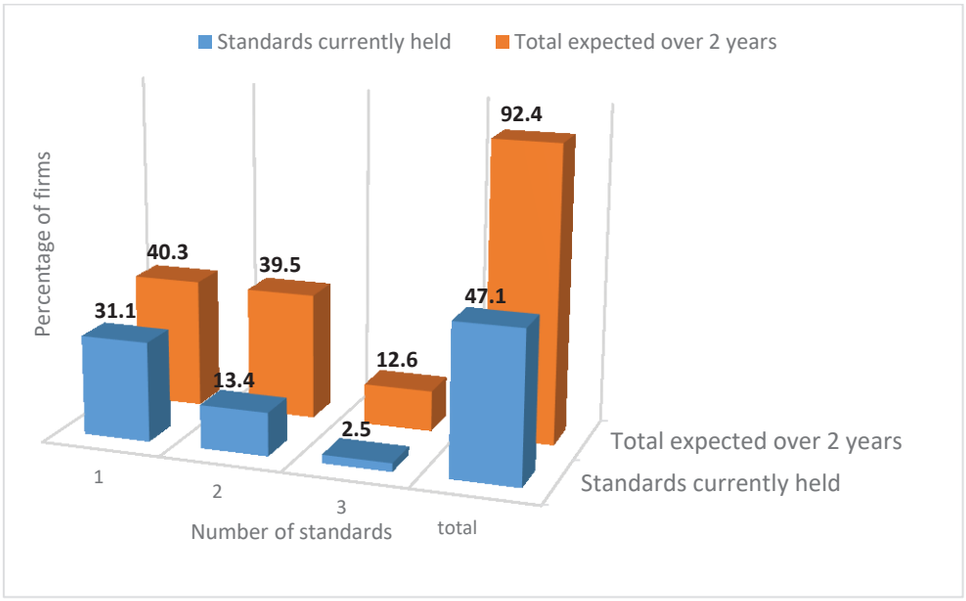

Fig. 6: Adoption of Benchmarked FSMS Standards

Adoption of Proprietary FSMS Standards

The study showed that majority of the firms were also holding FSMS based on proprietary standards. 79% of the firms were facing audits based on proprietary standards at definite frequencies. 46% of the firms were facing audits once in a year, 13% every 6 months and 5% less than 6 months (Fig. 7). Adoption of one or more proprietary standards was also planned by 38% of the samples over the coming year.

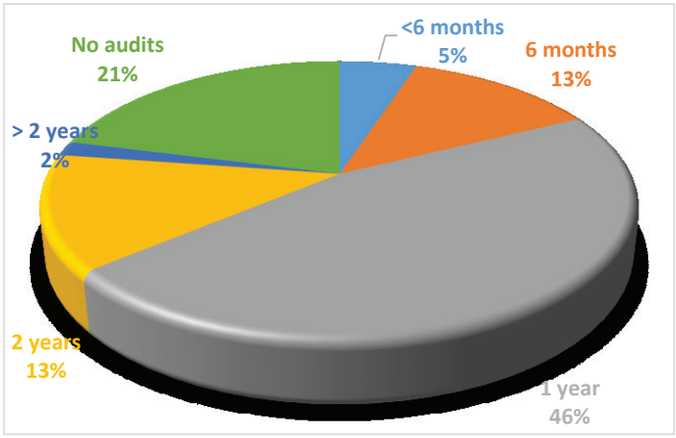

Fig. 7: Frequency of Customer Audits Based on Proprietary Standards

Discussion

The literature review revealed a broad category of FSMS standards followed in the food industry which were identified as global, international, national, private, and proprietary standards. The food processing organisations widely follow these standards because of various reasons. The ideal scenario would be one internationally accepted and benchmarked standard is followed by the organisations rather than following many standards simultaneously. This study uses the term 'Multiple Food Safety Management Systems' for the situation in which one organisation has adopted and implemented more than one FSMS standard. MFSMS in one organisation leads to a condition where the organisation has to adopt various management system strategies, and this raises several conflicts between management system approaches

This paper also reviewed the profile of the firms covered in the survey in term of the size of firm, years of operation, product profile, markets, approaches, and pattern of adoption of MFSMS. The effects of selected business and operational factors on the pattern of adoption of MFSMS were also analysed as part of the study. The study has found that the size of the organisation in respect of number of employees was significantly correlated with level of adoption of MFSMS. It showed that the higher the number of employees, higher the number of FSMS standards adopted. This has to be discussed along with other significant positive correlation observed, that is number of product categories and number of FSMS standards adopted. Again, it was noted that 82.3% of the firms had 1 to 10 product categories. In total, it indicates that the firms with larger operation maintaining higher number of employees and product groups adopted MFSMS. The larger organisations dealing with comparatively more markets and customers tend to have various requirements of FSMS certifications. It was also found that 75.7% of the firms with MFSMS have been less than 20 years in operation. This indicates that the newer firms with state of the art facilities will find it easier to adopt FSMS standards and certified compared to older facilities. The research has confirmed that the MFSMS is also prominent among frozen product manufactures of wholesale or retail, which is against the notion that it is common phenomenon in processors of ready to eat products.

Organisations that have adopted MFSMS were export oriented. 78% of the firms were purely export oriented and 22% of the firms were targeting both export and domestic markets. There were no firms with MFSMS focusing totally on the domestic market. This reveals that the organisations tends to adopt MFSMS to reach export markets. In other words, the international trade and export markets directly or indirectly requires adoption of MFSMS. This finding is in line with points noted by Holleran, Bredahl, and Zaibet (1999), Maldonado et al. (2005), Jin, Zhou, and Ye (2008), Elgert (2012), and Handschuch, Wollni, and Villalobos (2013) that the third party certification of FSMS or the adoption of HACCP is likely to become an important

factor of competitiveness in export markets.

The analysis also revealed that there are firms who have adopted even more than 10 FSMS standards, though the majority of the firms had adopted 2-7 standards. This indicates the significance of the research problem and its grave nature in the industry. To add to this, result showed that the 92.9% of the firms adopted MFSMS in the last 1-10 years of period, which shows that adopting MFSMS is a growing concern and recent trend in the food processing industry.

The study found that the FSTLs in the firms were educationally highly qualified; however, a large share did not have any experience in the implementation of FSMS prior to the adoption of FSMS in the surveyed samples. Moreover, 75% of firms had not conducted any feasibility study before the adoption FSMS standards. This shows lack of adequate training and communication in the area of adoption of FSMS standards and unplanned approach of organisations while adopting FSMS standard. It was also critical to note that a certification body was directly involved in the FSMS implementation in 9% of the firms. This shows the significance of the maintenance of impartiality by certification bodies. Involvement of certification bodies in the implementation of FSMS in the organisation reveals various implications on the credibility of the certification process, effectiveness and impartiality of auditing. This finding is against the expectations of many researchers that a certification audit should give confidence to compliance to the requirements of a certain standard based on a valid examination (Van Gerven, Block, Geens, Cornelis, & Vandecasteele, 2007; Block, Van Gerven, & Vandecasteele, 2007; Albersmeier, Schulze, Jahn, & Spiller, 2009; Tuominen & Maijlala, 2009; Jacxsens et al., 2010) and add greater value because objectivity and the fresh perspective that external auditors bring to their task (Hepner, Wilcock, & Aung, 2004; Nguyen, Wilcock, & Aung, 2004).

The HACCP, ISO 22000 and GFSI benchmarked standards such as BRC Food, FSSC 22000, and IFS food were widely followed by the firms along with other proprietary standards. By the adoption of further standards, which were in the plan, 52.1% of the firms would be holding 2 or more GFSI benchmarked standards along with other FSMS standards. This indicates that the purpose of benchmarking, to reduce the duplication of audits (GFSI, 2016), is not adequately met. 79% of the samples were facing audits based on proprietary FSMS standards at definite frequencies and 38% planned the adoption of one or more proprietary standards over the coming year, which reveals the proliferation of proprietary standards in the food industry.

Conclusion

The study exposed many findings that have various policy implications concerning adoption of FSMS. MFSMS was found mainly in the factories focused on export business and number of standards adopted is significantly correlated with number of employees and products produced by the company. The larger organisations dealing with comparatively more markets and customers tend to have various requirements of FSMS certifications. Majority of the firms adopted its first FSMS in the last 10 years period, which shows that the multiple FSMS is a very recent concern developed in the industry. Large number of the firms have adopted 2 to 7 standards and there are companies who have adopted even more than 10 FSMS standards. This point at the alarming increase in multiple FSMS in the seafood export companies in the country. Direct involvement of certification bodies in the implementation of FSMS was observed in the study, which shows the violation of impartiality which need to be maintained by certification bodies. This also indicates the potential ineffective third party auditing which could be a reason for the growth of proprietary standards. Majority of the companies face audits based on proprietary standards every year, which highlights growth of proprietary standards in the industry. The study revealed a lack of adequate training and communication in the area of adoption of FSMS standards and an unplanned approach of organisations in adopting FSMS standards. The increase in number of organisations holding multiple GFSI benchmarked standards shows the purpose of benchmarking is not adequately met. The results of the study triggers the need of the review of benchmarking process, educating and communicating about benchmarking among the industry stakeholders and planned approach in the adoption of FSMS standards focusing on efficiency and effectiveness of FSMS, so that there is no need of adopting MFSMS standards. The organised customers also need to accept the effective implementation of the benchmarked standards rather than promoting proprietary or other private standards.

References

Albersmeier, F., Schulze, H., Jahn, G., & Spiller, A. (2009). The reliability of third-party certification in the food chain: From checklists to risk-oriented auditing. *Food Control, 20*(10), 927-935.

Ansari, M. A., Kumar, V., Singh, C., Shukla, V., & Kumar, R. (2013). Studies on food safety management and it's significance in maximizing the profit for food industry. *Internet Journal of Food Safety, 15*, 20-28.

Antle, J. M. (2013). Food safety regulation in food sector manufacturing. *American Journal of Agricultural Economics, 78*(5), 1242-1247.

Bhatt, S. K., Bector, C. R., & Appadoo, S. S. (2014). Efficiency issues in supply chain management. *Journal of Supply Chain Management Systems, 3*(2), 9-16.

Block, C., Van Gerven, T., & Vandecasteele, C., (2007). Industry and energy sectors in Flanders: Environmental performance and response indicators. *Clean Technologies and Environmental Policy, 9*, 43-51.

Chountalas, P., Tsarouchas, D., & Lagodimos, A. (2009). Standardized food safety management: The case of industrial yoghurt. *British Food Journal, 111*(9), 897-914.

El-Bayoumi, M. M., Heikal, Y. A., Abo-El-Fetoh, S. M., & Abdel- Razik, M. M. A. (2013). Implementation of ISO 22000 as a Food Safety Management Tools in Wheat Milling Industry. *World Journal of Dairy & Food Sciences, 8*(1), 27-37.

Elgert, L. (2012). Certified discourse? The politics of developing soy certification standards. *Geoforum, 43*(2), 295-304.

Farsijani, H., Fard, Y. S., Kharazian, M. A., & Nikabadi, M. S. (2012). A method for identifying critical success factors of JIT implementation in different circumstances. *Journal of Supply Chain Management Systems, 1*(1), 1-9.

FSSC. (2014). Food Safety System Certification. Retrieved from http://www.fssc22000.com/documents/about-us.xml?lang=en (accessed on 11 July 2014)

Gaaloul, I., Riabi, S., & Ghorbel, R. E. (2011). Implementation of ISO 22000 in cereal food industry "SMID" in Tunisia. *Food Control, 22*(1), 59-66.

GFSI. (2014). Global Food Safety Initiative. Retrieved from http://www.mygfsi.com/

GFSI. (2016, December 11). Global Food Safety Initiative. Retrieved from http://www.mygfsi.com/market-access/global-markets-programme/overview.html (accessed on 15 July 2014)

Goedhuys, M., & Sleuwaegen, L. (2013). The impact of international standards certification on the performance of firms in less developed countries. *World Development, 47*, 87-101.

Grigg, N. P., & McAlinden, C. (2001). A new role for ISO 9000 in the food industry? Indicative data from the UK and mainland Europe. *British Food Journal, 103*(9), 644-656.

Handschuch, C., Wollni, M., & Villalobos, P. (2013). Adoption of food safety and quality standards among Chilean raspberry producers: Do smallholders benefit? *Food Policy, 40*, 64-73.

Henson, S., & Humphrey, J. (2009). *The impacts of private food safety standards on the food chain and on public standard-setting processes*. Food and Agriculture Organization and World Health Organization, Rome.

Henson, S. J., & Hooker, N. H. (2001). Private sector management of food safety: Public regulation and the role of private controls. *International Food and Agribusiness Management Review, 4*, 7-17.

Hepner, I., Wilcock, A., & Aung, M. (2004). Auditing and continual improvement in the meat industry in Canada. *British Food Journal, 106*(7), 553-568.

Herzfeld, T., Drescher, L. S., & Grebitus, C. (2011). Cross-national adoption of private food quality standards. *Food Policy, 36*(3), 401-411.

Higuera-Ciapara, I., & Noriega-Orozco, L. (2000). Mandatory aspects of the seafood HACCP system for the USA, Mexico and Europe. *Food Control, 11*(3), 225-229.

Holleran, E., Bredahl, M. E., & Zaibet, L. (1999). Private incentives for adopting food safety and quality assurance. *Food Policy, 24*, 669-683.

IFS. (2014). International Featured Standards. Retrieved from http://www.ifs-certification.com/index.php/en/retailers-en/introduction-to-ifs/ifs-history (accessed on 15 July 2014)

ISO. (2005a). ISO 22000, *Food safety management systems: Requirements for any organization in the food chain.* International Organization for Standardization,

Switzerland.

ISO. (2005b). ISO 9000. *Quality management systems: Fundamentals and vocabulary* (3rd ed.). International Organization for Standardization, Switzerland.

ISO. (2014). International Organization for Standardization - Standards and Regulations. Retrieved from http://www.iso.org/iso/home/standards_development/governance_of_technical_work/standards-and-regulations.htm (accessed on 10 July 2014)

Jacxsens, L., Uyttendaele, M., Devlieghere, F., Rovira, J., Gomez, S. O., & Luning, P. A. (2010). Food safety performance indicators to benchmark food safety output of food safety management systems. *International Journal of Food Microbiology, 141*, 180-187.

Jin, S., Zhou, J., & Ye, J. (2008). Adoption of HACCP system in the Chinese food industry: A comparative analysis. *Food Control, 19*(8), 823-828.

Kok, S. (2009). Application of food safety management systems (ISO 22000/HACCP) in the Turkish poultry industry: A comparison based on enterprise size. *Journal of Food Protection, 72*(10), 2221-2225.

Kumar, R., Singh, R. K. & Shankar, R. (2012). Supply chain management issues in an Indian SME: A sap-lap analysis. *Journal of Supply Chain Management Systems, 1*(2), 34-44.

Maldonado, E. S., Henson, S. J., Caswell, J. A., Leos, L. A., Martinez, P. A., Aranda, G., & Cadena, J. A. (2005). Cost-benefit analysis of HACCP implementation in the Mexican meat industry. *Food Control, 16*(4), 375-381.

Manning, L., & Baines, R. N. (2004). Effective management of food safety and quality. British Food *Journal, 106*(8), 598-606.

Manning, L., Baines, R. N., & Chadd, S. A. (2006). Food safety management in broiler meat production. *British Food Journal, 108*(8), 605-621.

Martin, R. E. (1998). HACCP: Present and future implications for U.S. seafood industries and regulatory agencies. *Journal of Aquatic Food Product Technology, 7*(3), 5-27.

Mitchell, L. (2003). Economic theory and conceptual relationships between food safety and international trade. In: J.C. Buzby, ed. *International trade and food safety: economic theory and case studies* (pp. 10-27). Washington, DC: Electronic Report from the Economic Research Service, United States Department of Agriculture.

MPEDA. (2015). Marine products exports crosses US $ 5 billion in 2013-14. Retrieved from http://www.mpeda.com/inner_home.asp?pg=Trade (accessed on 14 April 2015)

Nguyen, T., Wilcock, A., & Aung, M. (2004). Food safety and quality systems in Canada: An exploratory study. *International Journal of Quality & Reliability Management, 21*(6), 655-671.

Pathak, S. (2016). Benchmarking supplier network collaboration. *Journal of Supply Chain Management Systems, 5*(1), 1-13.

Pierson, M. D., & Corlett, D. A. (1992). HACCP: *Principles and applications*. Chapman and Hall, New York.

Ramnauth, M., Driver, F., & Vial, P. B. (2008). Food safety management in the fish industry in Mauritius: Knowledge, attitude and perception. *British Food Journal, 110*(10), 989-1005.

Ropkins, K., & Beck, A. J. (2000). Evaluation of worldwide approaches to the use of HACCP to control food safety. *Trends in Food Science & Technology, 11*(1), 10-21.

Sharma, B. R. (2015). Regulatory bodies perceived retailing ethics. *Journal of Supply Chain Management Systems, 4*(4), 38-44.

Shears, P., Zollers, F. E., & Hurd, S. N. (2004). The European food safety authority: Towards coherence in food safety policy and practice. *British Food Journal, 106*(4), 336-352.

Silverglade, B. A. (2000). The WTO agreement on sanitary and phytosanitary measures: Weakening food safety regulations to facilitate trade? *Food and Drug Law Journal, 55*, 517-524.

Sperber, W. H. (2005). HACCP and transparency. *Food Control, 16*(6), 505-509.

Tanner, B. (2000). Independent assessment by third-party certification bodies. *Food Control, 11*, 415-417.

Taylor, J. (2011). An exploration of food safety culture in a multi-cultural environment: Next steps? *Worldwide Hospitality and Tourism Themes, 3*(5), 455-466.

Tuominen, P., & Maijlala, R. (2009). Evaluating food safety management in professional kitchens. *Journal of Food Safety and Food Quality, 60*, 151-160.

Tzouros, N. E., & Arvanitoyannis, I. S. (2000). Implementation of Hazard Analysis Critical Control Point (HACCP) system to the fish/seafood industry: A review. *Food Reviews International, 16*(3), 273-325.

Unnevehr, L. J., & Jensen, H. H. (1999). The economic implications of using HACCP as a food safety regulatory standard. *Food Policy, 24*(6), 625-635.

Van Gerven, T., Block, C., Geens, J., Cornelis, G., & Vandecasteele, C. (2007). Environmental response indicators for the industrial and energy sector in Flanders. *Journal of Cleaner Production, 15,* 886-894.

Vasconcellos, J. A. (2004). *Quality Assurance for the food industry: A Practical approach*. Florida: CRC Press LLC.

Wallace, C. A., Powell, S. C., & Holyoak, L. (2005). Development of methods of HACCP assessment. British *Food Journal, 107*(10), 723-742.