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FOOD SAFETY AND VALUE ADDED
PRODUCTION AND MARKETING
OF TROPICAL CROPS

Title: Food Safety Management Systems: Initiatives of Trinidad and Tobago, West
Indies, Philippines and Bangladesh

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FOOD SAFETY MANAGEMENT SYSTEMS: INITIATIVES OF TRINIDAD AND TOBAGO, WEST INDIES, PHILIPPINES AND BANGLADESH

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ABSTRACT

Protecting human health in today's global food market is an important challenge and one which must be addressed through internationally recognized food safety systems. The overall responsibility for food safety is shared by all segments of the food system, including the various industry sectors, government regulatory agencies and consumers in general. Any threat to the food supply, whether by intentional or unintentional contamination could result in danger to health, considerable cost to food chain suppliers and could also affect trade. This paper will highlight some food safety management initiatives of three countries -- Trinidad and Tobago; the Philippines, and Bangladesh in protecting the food supply from hazards. The initiatives of some non-governmental organizations in Trinidad and Tobago are presented. In the Philippines both the public and private sector are active in encouraging strict adherence to the food legislations. A non-government agency has successfully used inventions and innovative training kits under the "4-in-1 Food Safety Training system: 5S, GAP (Good Agricultural Practice), GMP (Good Management Practices) and HACCP (Hazard Analysis Critical Control Point) in the last decade to help the food industries meet the safety and quality requirements of national and international trade. For Bangladesh, the challenges and opportunities of the frozen fish trade through implementing principles of HACCP and some updated food safety legislations are highlighted.

Keywords: Food safety management systems, Food safety regulations, HACCP

Food Safety – a joint responsibility

Governments of developing countries have been working with local companies and food industries to implement food safety measures mandated by WHO and WTO regulations.

Food companies along the food supply chain have recognised the need to streamline food safety activities by implementing food safety management systems (FSMSs) to ensure effective food safety practices, comply with necessary regulatory requirements, meet the specifications of food chain customers downstream, and provide consumers with a high level of confidence in the products they purchase (Surak, 2006). Food safety is the extent to which those requirements relating to

characteristics or properties that have potential to be harmful to health to cause illness or injury are met (Alli, 2004). A safe food is one that does not exceed an acceptable level of risk (Nestle, 2004). Decisions about acceptability, it is argued involve opinions and values as well as science. The 'science –based' approach to food safety balances risks against benefits and costs, and contributes to the estimation of risk as distinguished from a 'value-based' approach which focused on the acceptability of risk against dreaded outcomes or feelings of outrage. Food safety is a joint responsibility that is principally assured through the combined efforts of all the parties involved in the food chain (Fig 1). This paper reviews two food safety management systems (FSMs), Hazard

Analysis and Critical Control Point System (HACCP) and International Standard Organization food safety management systems (ISO 22000: 2005). The initiatives employed by three selected countries, Trinidad and Tobago, West Indies, Philippines and Bangladesh in the implementation of FSMs are presented.

Some food safety issues

There has been some level of concern about food safety, which has intensified over recent years with the outbreak of possible pandemics, including mad cow disease and bird flu. Countries worldwide have sought to improve their food safety management practices through education, training, legislation and surveillance. The International Conference on Nutrition, 1992, in its Plan of Action stated that, achieving food security has three dimensions, one of which is to ensure a safe and nutritionally adequate food supply, both at the national and household level. The Plan of Action of the World Food Summit, 1996 also stresses this aspect.

Several trends have brought greater attention to food safety measures in many countries, such as: (1) identification of new foodborne pathogens and understanding their potential for serious consequences, (2) demand for safer foods as consumers become more affluent, live longer and better understand the links between diet and health, and (3) as both technical and trade barriers are reduced, new sources of risk arise into the food supply (Unnevehr and Jensen, 1998).

Findings of a study conducted in 2003 in Dhaka city, Bangladesh by the Institute of Public Health (IPH) with support from the World Health Organization (WHO), revealed that out of its 400 sweetmeats, 250 biscuits, 50 bread and 200 ice cream samples, 96.8% of sweetmeats, 24% biscuits, 54% breads, 59% ice creams were adulterated. In another study conducted by the IPH in 1994 supported by WHO, it was found that out of 52 street vended food samples, all were contaminated with different types of disease producing microorganisms. Over the decade, it was found that some 50% of the food samples tested in IPH laboratory were adulterated. Another report shows that some 71% of food samples of the Dhaka City were adulterated.

After the European Union ban of frozen fish from Bangladesh, Fish Inspection and Quality Control (FIQC) of the Department of Fisheries implemented mandatory HACCP in fish

processing industries. Disputes over the lots of fish exported have centred on occasional trace of *Salmonella* and vibrio-cholera and more recently on nitroferon residue (Talukder *et al.*, 2006).

A study on Global competitiveness of Philippine food products' revealed that products are detained for (1) presence of filth and decomposition (2) improper process for low acid foods; (3) labeling violations (4) non-declaration of some additives (5) use of prohibited additives (6) microbiological standards not met; and (6) presence of chemical hazards (Chavez, 2006). Also, most of the reasons for detention cited were related to the manufacturing practices of the processor and complimentary field observations. Some of the observations were: (1) poor layout; (2) poor design of fabricated equipment; (3) poor personal hygiene (4) incorrect post harvest practices and (5) improper processing practices.

Food safety management systems (FSMs)

One of the challenges for the food industry has centered on the array of FSMs from which to choose, given the introduction of several different standards, requirements and certification schemes by internationally recognized standard-setting bodies, regulatory and legislation authorities and other driven organizations (Surak, 2006).

Hazard Analysis and Critical Control Points (HACCP)

Food and Drug Administration (FDA) 1994 indicated that the prime focus of a HACCP program should be food safety (Scheuplein, 1996) in the food industry. In the food industry, food safety principles and practices have always been integrated into activities identified with quality management systems. Food hazards may be introduced at any stage of the food chain, thereby adequate control throughout the food chain is essential. HACCP is widely recognized in the food industry as an effective approach to establishing good production, sanitation and manufacturing practices that produce safe foods. Processing companies have incentives for HACCP adoption to prevent losses of reputation and market share should an outbreak occur. Adoption of HACCP as a regulatory standard has been motivated first by food safety concerns, and only second by a desire to facilitate trade (Caswell and Hooker, 1996). The most basic concept underlying the

HACCP system is that of prevention rather than inspection.

A food company which operates with a quality management system can be expected to have an HACCP system that specifically targets food safety. It is a methodological, flexible and systematic application of the appropriate science and technology for planning, controlling, and documenting the safe production of foods (Herrera, 2004). The principles of HACCP are applicable to all phases of food production, including basic husbandry practices, food preparation and handling, food processing, food service, distribution systems, and consumer handling and use (Gaitan, 2004). The successful application of HACCP requires the full commitment and involvement of management and the workforce, using a multidisciplinary approach that should include, as appropriate expertise in agronomy, veterinary health, microbiology, public health, food technology, environmental health, chemistry, and engineering. The development of an effective HACCP program is an intricate process generally comprised of three steps including hazard assessment, critical control point development, and implementation (Sveum, 1996).

ISO 22000: 2005

Background

International Standard Organisation (ISO) 22000: 2005 is a new International standard designed to ensure safe food supply worldwide. It became effective on 1st September, 2005. The growing number of national standards for food safety has led to confusion and consequently there is the need to harmonise national food standards at an international level. The standard was developed within ISO by experts from the food industry in cooperation with Codex Alimentarius Commission (established by United Nation's Food and Agriculture (FAO) and the World Health Organization (WHO) to develop standards.

ISO 22000 relates to food safety management systems providing requirements for any organisation in the food chain (British Standards Institution, 2005). ISO 22000 specifies the requirements for a food safety management system in the food chain where an organization needs to demonstrate its ability 1) to control food safety hazards in order to provide consistently safe end products that meet both the requirements agreed upon by the customer

and those applicable food safety regulations and 2) aims to enhance customer satisfaction through effective control of food safety hazards, including processes for updating the system. The international standard incorporates three requisite components: 1) requirements for prerequisite programs, including good manufacturing and handling practices; 2) requirements for Hazard Analysis and Critical Control Points (HACCP); and 3) requirements for implementation of a management system (Surak, 2006). It affects organizations within the food chain from farm to table (includes agricultural processing, catering, packaging, restaurants, cruisers and anywhere food is processed).

Objectives

The new International Standard Organization, ISO 22000 provides a harmonized framework for the implementation of a hazard analysis system to identify and control food safety hazards and type of organization dealing with any type of food product (Moens-Go-Yanko, 2005). The new ISO 22000 food safety management aims to harmonise Codex HACCP principles relating to food safety management on an international level. It provides specifications for requirements that can be assessed and achieve certification, either from self-declaration or for first, second and third party verification and it is aligned with other management systems standards. ISO 22000 provides a useful model for business management in the food industry, based on the process approach, with the management of the food safety risk at its core (Surak, 2006).

Benefits

A major resulting benefit is that ISO 22000 will make it easier to organize worldwide and to implement the Codex HACCP in a harmonized way, which does not vary with the country or food product. The standard has become necessary because of (a) increase of illnesses caused by infected food in both developed and developing countries (b) rise in economic cost covering medical treatment (c) absence from work and (d) insurance payments and legal compensation.

ISO 22000 extends the successful management system approach of the ISO 9001: 2000 quality management system standard which is implemented in all sectors but does not specifically address food safety.

ISO 2200: 2005 Family of Standards

Table 1 shows the first in a family of ISO 22000: 2005 standards. The documents include ISO/TS 22004, which will facilitate the effective implementation of ISO 22000 and therefore help to maximize the benefits. The key elements of a typical audit of sanitation programmes (ISO/TS 22003) used by food processing companies include management and quality policy, incoming material control, plant facility and process control, employee hygiene, sanitation and housekeeping, pest control, finished product, food safety, laboratory practices and assignment of numerical values and grades to the audit (Carsberg, 2000).

Contribution to agriculture by countries*Trinidad and Tobago (T & T)*

The Republic of Trinidad and Tobago, West Indies is a country situated 11 metres off the Caribbean sea with a total area of 5128 sq metres (Wikipedia, 2006). Unlike most of the English-speaking Caribbean, T & T is a primarily industrialized country whose economy is based on petroleum and petrochemicals (Wikipedia, 2006). The relative contribution of the agricultural sector to the value of goods and services as a share of gross domestic product (GDP) was 5.0% in 1985 and 2.2% in 1999. The average annual rate of growth of agricultural GDP was lower than that of the national GDP 1995-1999 rates of growth and were estimated to be +0.7% and 3.6% for the agricultural and national GDP respectively (Nagy, 2000). Export agriculture comprises cocoa, coffee and citrus. Domestic agriculture comprises of forestry, fisheries and other agricultural commodities, excluding sugar. The crop sub-sector contributes most to the value of the agricultural GDP, for example 64% in 1999 compared to 22% and 10% for livestock and fisheries subsectors respectively (Ministry of Food Production and Marine Resources, Trinidad and Tobago, 2001).

The share of the labour force agriculture declined from 10.8% in 1984 to 9.1% in 1999. T & T is a net food importer for decades. In 1999, the value of food imports was 181% of the value of food exports in 1984. The total value of food imports in 1999 was TT \$ 1.7 billion and the value of food exports was TT\$ 938.8 million (Ministry of Food Production and Marine Resources, 2001).

Philippines

The Philippine archipelago is geographically located between latitude 4°23'N and 21°25'N and longitude 116°E and 127°E. It is composed of 7,107 islands, with a land area of 299,764 sq. km (116, 000 sq miles). It is an island nation in Southeast Asia, with Manila as capital. It is the 12th most populous country of over 85 million people in 2005. Literacy rate is 95.9%. It is divided into 17 regions, with all provinces grouped into one of the 16 regions for administrative purposes. In 2003, the contribution of agriculture to GDP was 10-20% (Wikipedia, 2006). Demographic projections up to 2025 indicate that 30% of total population in Philippine will still be involved in agriculture (UN, 1988).

There are about 5,000 registered food manufacturing establishments in the country, accounting for 25% of the total manufacturing sector. Most (90%) are small and medium enterprises, with the 10% large establishments producing about 90% of the output. Most small and medium food manufacturers are family-owned and are managed as single proprietorship but are registered as corporations with family members (Chavez, 2006).

Bangladesh

Bangladesh has a population of 137 million with an area of 147,570 sq. km (Amin, 2006). Density of population is 928 per sq. km. Growth rate of population is 1.48% and 62.66% of people are literate. Of the 44.30 million labor force 51.69% are engaged in agriculture, 13.56% in industry and 34.75% in the service sector. Per capita national income is US \$ 470. Export earnings in 2004-05 were US \$ 6097 million while import cost were US \$ 8,294 million indicating a trade deficit of US \$ 2197 million. GDP growth during 2004-05 was 5.38%, a moderate but below the required growth for alleviating wide spread poverty.

Contribution from agriculture to GDP was 41.3% (crops-32.9%, fisheries-2.9%, forestry and livestock-5.5%) in 1984-85, but it was 21.91% (crops-12.12%, fisheries-5.05%, forestry and livestock-5.76%) in 2004-05. Service sector has been showing sharp growth having 60.37% contribution to GDP in 2004-05, while it was only 49% in 1984-85.

Agriculture is the highest employment generating sector and potentially the largest consumer of service as well as industrial sector output. Above all, the agriculture sector is becoming more commercialized (with overall

changes in the patterns of economic activities of the country) as a result of socio-economic development of the country. Demographic projections up to 2025 indicate that up to 43% of the total population will still be involved in agriculture (UN, 1998). At present, most of the agricultural production is concentrated on a limited number of major crops, with rice occupying more than 80% of total cultivated area. The vast majority of the farms in Bangladesh are small. About 50% of the farms were less than 1.0 acre in size and 80 % less were than 2.5 acres. Fisheries sector earns foreign exchange and contributes 4.7% to the national GDP. About 1.2 million people are directly involved and 10 million indirectly earn their livelihood in fisheries.

Food safety initiatives by countries

Trinidad and Tobago

In the Caribbean and for Trinidad and Tobago, the Caribbean Food Safety Centre (CFSC) was launched by the Caribbean Industrial and Research Centre (CARIRI) on April 14th, 2006 at the Arthur Lok Jack Graduate School of Business, Mt. Hope, Trinidad, West Indies. This was in response to the need to create greater awareness and improve food safety management practices (Newsday, 2006). The specific goals of the CFSC are to: (1) educate the players at each link in the food chain (farmers, food manufacturers, food service providers, food distributors, food regulatory bodies, consumers and school children) on sound food safety practices; (2) to assist in developing and implementing food safety systems (e.g ISO 22000: 2005, HACCP among food manufacturers, food distributors and food service providers; and (3) to influence changes in the legislation and infrastructure that support food safety locally and in the region. Also, to highlight food safety issues 'Living Food Safety' and radio programs 'CARIRI Corner'. In 2005, CARIRI staff members were trained in auditing ISO 22000, and processors and restaurateurs were sensitized to standard and auditing.

In 2006, the Ministry of Trade and Industry of Trinidad and Tobago embarked on the development of food safety public awareness and sensitization programme. Also, in May 2005, there was a regional food safety conference which was organized by the Caribbean Industrial Research Institute (CARIRI) and World Association of Industrial Technological Research Organization (WAITRO).

There were a number of training programmes on food safety. In September, 2004 there was a training programme on 'Basic food Microbiology' which was facilitated by the Caribbean Industrial Research Institute (CARIRI), St. Augustine Campus, University of the West Indies, St. Augustine held at the CARIRI conference room. In April 23-25, 2002, there was a short course entitled " Food Microbiology, Microscopy and Microbial Toxins for food industry personnel organised by the Pan American Health Organisation/World Health Organisation funded Short Course in conjunction with the University of the West Indies, St. Augustine, Faculty of Engineering, Engineering Institute and the Continuing Engineering Education Centre at Room 101, level 1, March 11th & 12th 2004, there was a workshop on 'Bringing rabbit meat from farm to the table'. It was sponsored by the Inter-American Institute for the Cooperation on Agriculture, Inter-American Institute of Caribbean Agriculture.

In recent time, the Caribbean Community (CARICOM) has been conducting the preparatory assessments for the establishment of the Caribbean Agricultural Health and Food Safety Agency (CAHFSA). CARICOM has proposed that this agency should be housed within the Caribbean Agricultural Research and Development Institute (CARDI). This agency will become intimately involved with the many issues of food safety, which are currently being faced by the global environment. Another CARDI programme which has a direct impact on food safety aspects is the marketing programme – which looks at the chain of activities from production, post harvest, grades and standards, import/export requirements, processing and eventual use by consumers.

Philippines

The government agencies in the Philippines mandated to address food safety issues include the Department of Agriculture (DA), Department of Health (DOH), Department of Trade and Industry (DTI) Department of Science and Technology (DOST) and the Department of Interior and Local Government (DILG). The DA monitors and regulates the availability, safety and quality of fresh, primary- and secondary-processed agricultural and fishery products. The DOH safeguards the welfare of the consuming public from hazards associated with highly processed foods while the DTI aids the local producers, importers and exporters of food as

well as the consumers in trade. The DOST, on the other hand, assists in the conduct of researches to improve the food processing technologies while DILG is the agency responsible for food safety implementation in the local government units.

In 1999, the Department of Agriculture of the Philippines commissioned a study on 'Global Competitiveness of Philippines Food Products.' One of the 7 parts of the study was 'Product Quality Systems Study' which looked at the conformance of Philippine food to global standards of safety and quality (Chavez, 2006). Typical food safety management programmes within the existing Philippines system include Good Agricultural Practice (GAP), Good Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Point (HACCP), HACCP-based systems, and Import/ Export Control and Certification.

In August 2, 2005, the Department of Agriculture (DA) Administrative Order 25 (s. 2005) was approved setting the Guidelines on the 'Certification of Good Agricultural Practices for Fruits & Vegetable (GAP-FV) Farming.' It establishes the rules applied by DA for granting, maintaining and withdrawing Good Agricultural Practices (GAP) Certificate to individual growers or farms in the fresh fruit and vegetable sector, or to their Produce Marketing Organizations (PMOs) that market or trade the produce.

Other laws and regulations were created to serve as the bases and support for the implementation, monitoring and surveillance of food safety. Among these are:

§ **The Food, Drugs, and Cosmetic Act – Republic Act No. 3720**

RA 3720 has the basic provisions of ensuring safe and good quality supply of food and regulate the production, sale and traffic of the same to protect the health of the people. The Bureau of Food and Drug here was thereby established to set standards for food and adopt measures to ensure pure and safe supply of food.

§ **The Consumer Act of the Philippines – Republic Act No. 7934**

The Consumer Act of the Philippines was established in 1993. The aim of RA 7934 was to develop and provide safety and quality standards for consumer products and to undertake research on quality improvement of products and investigate causes and prevention of

product-related deaths, illnesses, and injuries.

§ **The Code of Sanitation of the Philippines – Presidential Decree 856**

This code provides for sanitation requirements for operating a food establishment.

§ **The Philippine Fisheries Code of 1998 – Republic Act 8550**

The Philippine Fisheries Code was responsible for transforming of the Bureau of Fisheries and Aquatic Resources (BFAR) into a line bureau. It was organized to advise and coordinate with local government units (LGUs) on the maintenance and proper sanitation and hygienic practices in fish markets and fish landing areas.

§ **The Agriculture and Fisheries Modernization Act of 1997 – Republic Act 8453**

AFMA or RA 8453 prescribes that sectors involved in the production, processing, distribution and marketing of food and non-food agricultural products shall adhere to and implement the use of product standards in order to ensure consumer safety and promote the competitiveness of agriculture and fisheries products. The AFMA provided for the creation of the Bureau of Agriculture and Fisheries Product Standards (BAFPS).

§ **Republic Act 3639** - Creation of the Bureau of Animal Industry

§ **Presidential Decree 7** - Creation of the National Meat Inspection Commission

§ **Presidential Decree 1144** - Creation of the Fertilizer and Pesticide Authority

§ **Republic Act 8172 s. 1995- Asin Law-**
Section 3C of this act, requires the Bureau of Food and Drugs, to set and enforce standards for food grade iodized salt and to monitor compliance thereto by the food-grade salt manufacturer.

§ **Republic Act 8976 s. 2000 - Philippines Food Fortification Act –**
The Department of Health through the

Bureau of Food and Drugs shall be the lead agency responsible for the implementation and monitoring of this act.

- § **Executive Order 51 s. 1986-Philippines Code of Marketing of Breastmilk Institutes** - aims to contribute to the provision of safe and adequate nutrition for infants by the protection and promotion of breast feeding.
- § **Administrative Order No. 153 s. 2004** - Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking Or Holding Food
- § **Administrative Order No. 152 s. 2004** - Prescribing Regulations For Irradiated Foods

Driven by the need for change towards global competitiveness and food safety, the cluster approach was adopted on a country wide basis. The cluster approach involves the working together of different government agencies to ensure coordinated action among agencies. In some cases, the clusters approved were based on geographical location (region) or on commodities (e.g meat, fruit and vegetable, fish and other marine products).

The food safety intervention scheme involves the work of nationals as well as local provincial or regional consultants based in academic institutions. The national consultants provide guidelines and serve as trainers of the provincial and regional trainers. The system then conveys the knowledge, skills and attitudes down to the barangay (equivalent to countries).

The 'banig ng buhay' (Mat of Life) is a behavioural modification tool that is administered at the start of each training program conducted under the food safety intervention scheme. The main purpose is to give the feeling of importance and to make them realize that the management and trainers do not consider them as just numbers or useless cogs in a machine, but as valuable individuals with particular likes, dislikes, dreams and aspirations. The exercise calls for each one to draw on a sheet of paper, 6 sections indicating: what was their happiest moment, who made them happy, what were their saddest moment, who made them sad, what do they want to be 5 or 10 years

from hence and how will they get there. It has been an effective tool in breaking the ice and getting cooperation of the participants in food safety training and intervention systems. The 30 min spent at the start of the training has made formerly disinterested participants involved in the problem at hand and improve the food safety systems in the company.

Innovative food safety training systems to upgrade the small and medium industries have been developed by non-Government agencies such as the Philippines Association of Food Technologists and the Foundation for the Advancement of Food Science and Technology (FAFST). The Departments of Agriculture (DA) and Department of Health (DOH) in coordination with the other government agencies have updated food safety regulations to conform with regional and international standards pertinent to fresh and processed agricultural products.

Bangladesh

The Government of Bangladesh has emphasized a holistic approach in upgrading the food safety and quality control system. Government has enacted the Bangladesh Pure Food (Amendment) Act, 2005 amending the earlier Pure Food Ordinance 1959. Government through the Ministry of Food and Disaster Management (MOFDM) has completed a programme of 'Strengthening National Food Safety and Quality System' under Food and Agriculture Organization (MOD, 2004). The Bangladesh Standard Testing Institution (BSTI) was strengthened and is responsible for the standardization, testing, metrology, quality control, grading and marking of goods. The BSTI Ordinance, 1985 has been amended as The Bangladesh Standards and Testing Institution (Amendment) Act, 2003. Currently, BSTI is developing a 'Policy on Labeling'. BSTI is the Codex focal point for Bangladesh. The Slaughter of Animals and Meat Act is under review. Under the Bangladesh Pure Food Rules 1967, there are 107 different generic, mandatory food standards and there are 50 mandatory generic food standards of BSTI. In addition, there are some 250 optional standards for different foodstuff. BSTI is in the process of adopting Codex Alimentarius standards.

Under the Bangladesh Pure Food (Amendment) Act, 2005, the Government has established a Food safety Advisory Council which will advise the Government on food safety and quality in an effort to coordinate at the apex level. The act has also provisions for

increased penalty rated for different crimes as defined in the Act. Control measures like vigilance with mobile courts have been geared up. Furthermore a series of workshops/seminars at the national as well as regional levels were held in recent months to increase awareness among stakeholders, consumers and businessmen. The Ministry of Health and Family Welfare is implementing Food safety programme aimed at human resource development, strengthening public health laboratory of IPH, development of mass awareness involving different professional groups and community leaders as well as conducting some research on food safety and quality. Future priorities include the strengthening of the Food Safety Advisory Council and set up of a unified administration for food safety.

Fish and Fish products (Inspection and Quality Control Ordinance 1983) and Fish & Fish Products (Inspection and Quality Control Rules 1997) have incorporated HACCP principles. The seafood quality and safety program is based on good manufacturing practices (GMP) and Sanitation Operating Procedures (SOP) and HACCP principles. The Fish Inspection and Quality Control (FIQC) of the Department of Fisheries perform regular hygienic inspection (raw material handling, process operations, plant hygiene) and sanitation of plant premises, verify HACCP related documents and records to satisfy the Codex Alimentarius guidelines and directives of the European Union and United States Food and Drug Administration (USFDA). The inspector samples products according to the International Commission for the Microbiological Specification for Foods (ICMSF) sampling plan and microbiological, sensory and chemical analyses are performed (Talukder et al., 2006).

A wide range of activities on food safety awareness have been undertaken by Non-Governmental Organisations such as Consumers Association of Bangladesh (CAB), Bangladesh Paribesh Andolon (BAPA) and DOSHER Bangladesh.

Conclusions

For all three countries, there has been a focus towards a holistic approach to food safety. The launch of the Caribbean Food Safety Centre (CFSC), the proposed establishment of the Caribbean Agricultural Health and Food Safety Agency (CAHFSA), Food Safety Network and a number of Government agencies in the Philippines and the strengthening of Food Safety Advisory Council of Bangladesh as

coordinating bodies. Also, relevant food safety policies in both the Philippines and Bangladesh have been included and/or updated. Long term solutions to food safety problems would require collaboration or cooperation with others in the industry association, academic, and research institutions, private consultants, government regulatory agencies and the market or customer of the products.

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Food producers ? producers of pesticides, fertilizers and veterinary drugs
 ?
 Food manufacturers ? Ingredients and food additive producers
 ?
 Wholesalers ? equipment and equipment supplies producers
 ?
 Distributors ? Cleaning and sanitizing chemical supplies producers
 ?
 Retailers & Food service ? Service providers
 ?
 Consumers

Figure 1: FSMS Management Review Example of communications with the food chain
Adapted from ISO 22000: Food Safety Management Systems – Requirements for
any organisation in the food chain. International Organisation for
Standardisation, Switzerland, 2005

Table 1: Family of Standards of ISO 22000: 2005

<i>Standard</i>	<i>Guidance</i>
ISO/TS 22004	Guidance in the application of ISO22000-2005. Could assist organizations around the world, with emphasis on small and medium-size enterprises
ISO/TS 22003	Requirements for bodies providing audit and certification of food safety management systems will give harmonized guidance for the accreditation of ISO 22000 certification bodies and define the rules for auditing a food safety management system as conforming to the standard.
ISO 22005	Traceability in the feed and food chain: General principles and guidance for system design and development (Draft International Standard).