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HARMONIZING INTERNATIONAL FOOD SAFETY: A CASE STUDY OF THE ASIA PACIFIC REGION AND THE UNITED STATES INDENTIFYING MECHANISMS, CONTRAINTS AND RESOURCES

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HARMONIZING INTERNATIONAL FOOD SAFETY: A CASE STUDY OF THE ASIA PACIFIC REGION AND THE UNITED STATES IDENTIFYING MECHANISMS, CONTRAINTS AND RESOURCES

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ABSTRACT

HARMONIZING INTERNATIONAL FOOD SAFETY: A CASE STUDY OF THE ASIA PACIFIC REGION AND THE UNITED STATES IDENTIFYING MECHANISMS, CONTRAINTS AND RESOURCES

By

Cathy Ann Weir

Globalization and free trade have opened up boarders, establishing a world food market, yet countries are at different stages of development. To ensure safe food for the Asia Pacific region and the United States a harmonized food safety system is needed. This research has developed a fundamental understanding of the key constraints to a harmonized food system, the mechanisms used to solve food safety problems, and the resources available in the Asia Pacific region and the United States.

Many have identified a need for countries to work together to build capacity and address food safety problems from a global perspective. The Delphi Method proved effective to generate interaction from an international panel of participants who lived in both developed and developing countries, across many time zones, and with multiple cultural and work related differences. The results from this process will be useful in future efforts to obtain input from geographically diverse individuals constricted by resources to meet face-to-face.

As a result of this study the participants identified 15 key constraints to a harmonized food safety system in the Asia Pacific region and the United States, elaborated on 23 mechanisms used to solve food safety problems and identified 30

food safety resources. The key findings developed and agreed to by the participants regarding key constraints include: inadequate knowledge of food safety in developing countries; difficulty in understanding and complying with international food safety standards; differences in culture, including food habits, agricultural practices, Islamic food laws; political and economic concerns before public health; difference in type of businesses-mechanized vs. small operations; and the U.S. has a highly sophisticated infrastructure, therefore difficult for many countries in the Asia Pacific region to meet U.S. requirements.

Comments from the participants provide a roadmap for developing and instituting mechanisms required in solving food safety problems in both developed and developing countries. Those recommendations unanimously agreed to by all of the participants are: 1) Risk analysis training is needed to ensure a systematic approach to science-based decision making, 2) Review and adjust inspection systems, based on science, using methods that are consistent to the international community, 3) Involve stakeholder participation, include building partnerships, 4) Validated risk communication research is needed, 5) Utilize relevant expertise from universities, professional groups, trade groups, and food safety writers when developing food safety systems, 6) When developing food safety policy, risk assessments are followed by risk management actions, and 7) There is a need to educate/train all stakeholders (farmers, consumers, producers, media, and regulators) in a clear and consistent manner. Findings from this research will assist in developing policy, identify quality control issues, developing training needs and program implementation.

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There is a network of friends, colleagues and family that have been integral to my peace of mind; without all of you this would not have been possible. Thank you. I hope that one day I will be able to encourage another as all of you have done for me.

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Chapter I

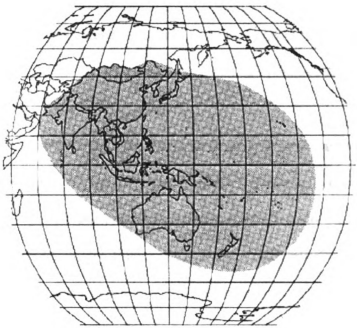
Introduction

In recent years, science and technology in food processing has grown by leaps and bounds. The food industry consists of a large continuously expanding system. For some of the new food products and processes, safety is being questioned. In addition, food recalls and the discovery of emerging foodborne pathogens are becoming more frequent occurrences. Governments want to make sure that all food products are safe for their citizens. This is where the question of food safety comes to the forefront of foreign trade and public health. The primary purpose in this study was to identify the mechanisms, constraints, and resources to harmonized food safety systems in the Asia Pacific region and the United States. A further purpose was to determine whether a panel of geographically dispersed food safety experts could effectively communicate without regards to location, time zones, cultural background, and, without face to face meetings.

A food system is defined as an array of activities, interrelated components, working together towards producing and distributing food (Staatz, 2000). Before the twentieth century, food systems were highly localized. Today, food production, distribution and transportation have become international in scope and more complex. As a result, harmonizing international foods standards and regulations makes possible a synchronization of systems which are free to interact and operate together. The overall Asia Pacific economy is growing faster than any other region in the world. To better understand global food safety systems this study concentrates on corresponding food safety systems in the Asia Pacific region

and the Untied States. The countries included in this region are: Afghanistan, Australia, Bangladesh, Bhutan, Burma, Cambodia, China, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, New Zealand, Pakistan, Papua New Guinea, The Philippines, Sri Lanka, Singapore, Taiwan, Thailand and Vietnam (See Figure 1).

Figure 1. Asia Pacific Region



In developed countries like the United States, food safety is generally accepted due to technical expertise and scientific advances in agriculture. There is a high regard for the food regulatory systems and trust in national food safety standards (*FDA protects the public health: ranks high in public trust*, 2002). So much so, that average American consumers are confident that the food products purchased from supermarkets are safe from contamination. However, this is not true in other countries where there are barriers to the institution of food safety

systems (Vries, 1997). These countries, however, are desirous to ensure food safety in their respective countries.

Many countries around the world are facing difficulty in meeting international food safety, quality standards and fair practices in the food trade. Individual countries are not able to solve food problems alone. There is a need for regions to develop the capacity to address food safety issues in the local and international community. Hence, this study was undertaken to identify mechanisms, constraints and resources from a regional perspective, in a cost effective way.

Aside from public health concerns, food safety is important to global economies who seek to engage in free trade which requires safe food products. The presence of contamination or adulteration in food is a major factor affecting free trade (Crutchfield, Buzby, Frenzen, Allshouse, & Roberts, 2000). Food safety issues create an enormous social and economic burden on countries and their health systems. International trade policies such as WTO, GATT and regional treaties, APEC and NAFTA, are driving changes to ensure the safety of food.

Over the past 15 years, the Codex Alimentarius Commission of Food and Agricultural Organization (FAO) and the World Health Organization (WHO) of the United Nations, has become the recognized international food standard-setting body (Traill, Bedouin, Gourlie, Husch, & Lustre, 2002). By using scientific justification, these food safety standards are aimed to protect consumer health globally. In addition, the World Trade Organization (WTO), the only international

organization dealing with the global rules of trade between nations, has referred to the Codex Alimentarius standards when settling disputes (WTO, 2002).

Along with trade issues, there are emerging food safety concerns such as genetically engineered food products/food products from biotechnology (GMOs), animal feed, pesticide residue, Mad Cow Disease, avian flu and bioterrorism. These concerns are bringing new challenges to the food supply and international markets. Industry and national governments strive for systems that ensure all food is safe and wholesome. This has created a growing need for regulators and food safety experts from all areas of the world to cooperate in developing food standards and harmonization of food laws. When both developed and developing countries work together, each benefit from a shared knowledge base to develop safe, effective food control systems. By providing opportunities for open communication, experts can share their experience and provide an opportunity to assist others in developing programs that focus on food safety, policy development, risk analysis and program implementation.

The United States and the nations of the Asia Pacific region are important trading partners in agricultural products. Most recently, the United States and China have signed an agreement to establish a mechanism to address food safety issues and exchange information on laws and regulations. This cooperative agreement is seen as the first step in harmonizing these two country's food systems. The U.S. Agricultural Secretary Ann Veneman said, "China is an increasingly important market for U.S. food and agriculture products. Exports to China have tripled in the past two years" (*US-China Food Safety Accord*, 2004).

Further, the Asia Pacific region is expected to have a 16-percent population increase in the next two decades (Coyle, Gilmour, & Armbruster, 2004). This amount of people and resulting economics will likely have long-term implications in the region's food supply. For example, in Japan higher incomes have shifted food consumption patterns; consumers demand convenience foods and perishable commodities. More than ever people are working in urban settings and food is eaten away from home. As a result of these changes, more foreign suppliers are establishing themselves in this region. While in the U.S., food products from the Asia Pacific region are on the rise. Both food systems need to ensure safe food for its consumers and adjust its goods to meet the needs of global market systems.

The goal of this study is to identify a list of the key constraints to a harmonized food safety system, mechanisms used to solve food safety issues and resources available in the Asia Pacific region and the United States. By using qualitative research techniques, this study seeks to enable interaction among key international policy makers, regulators, consumers, scientists, university professors and other food safety experts.

Problem Statement

More and more food products are being exchanged across borders without food safety systems in place. Countries are at different stages of developing food safety systems for the Asia Pacific region and the United States. Without the benefit of a harmonized food safety system between these countries safe food supplies are in question.

Purpose of This Research

This research aims to identify and list key constraints to a harmonized food safety system, the mechanisms used to solve food safety problems, and resources available in the Asia Pacific region and the United States.

Research Objectives

Four objectives were identified to give guidance to this research:

1) To utilize the Delphi method, via electronic communication, to enable interaction among a panel from diverse backgrounds and locations.

2) To identify a list of key constraints to a harmonized food safety system in the Asia Pacific region and the United States.

3) To identify a list of mechanisms used in solving food safety issues in the Asia Pacific region and the United States.

4) To identify resources (websites, publications, and unpublished reports) available to address food safety issues in the Asia Pacific region and the United States.

Assumptions

The following assumptions were made in conducting this study:

1) The participants are food safety experts, providing knowledgeable and candid responses to the questionnaire.

2) The participants represent a cross section of food safety experts in industry, academics, government and private industry.

3) The food safety issues found may have a broader application in other regions such as West Africa and Central America and Eastern Europe.

Limitations

The following limitations were made in conducting this study:

1) This study is limited to the relationship between the Asia Pacific region and the United States.

2) Only participants residing in the following countries in the Asia Pacific region and the United States responded: Australia, China, India, Indonesia, Japan, Papua New Guinea, Philippines, World Health Organization, Thailand, and United States.

3) The results are limited to the perceptions of the experts included in this study.

Definitions

The following terms are defined in the context in which they are used in this study.

Asia Pacific Region – For this study: the Asia Pacific region, Afghanistan, Australia, Bangladesh, Bhutan, Burma, Cambodia, China, India, Indonesia, Japan, Korea, Laos, Malaysia, Nepal, New Zealand, Pakistan, Papua New Guinea, The Philippines, Sri Lanka, Singapore, Taiwan, Thailand and Vietnam (See Figure1).

Asia Development Bank (ADB) – Promotes regional economic cooperation. ABD includes the following countries of this study: Afghanistan, Australia, China, India, Indonesia, Japan, Kazakhstan, Malaysia, New Zealand, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Sri Lanka, Thailand, Tonga, Vanuatu, and Vietnam.

Asia Pacific Economic Cooperation (APEC) – Promotes trade and investment in the Pacific Rim. APEC includes the following countries of this study: Afghanistan, Australia, China, India, Indonesia, Japan, Kazakhstan, Malaysia, New Zealand, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Sri Lanka, Thailand, Tonga, Vanuatu, Vietnam and United States.

Association of Southeast Asia Nations (ASEAN) - A group of countries which have a bearing on the security of the Asia Pacific. ASEAN includes the following countries of this study: Afghanistan, Australia, China, India, Indonesia, Japan, Kazakhstan, Malaysia, New Zealand, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Sri Lanka, Thailand, Tonga, Vanuatu, Vietnam and United States.

Bioterrorism – The unlawful release of biologic agents or toxins with the intent to intimidate or coerce a government or civilian population to further political or social objectives.

Centers for Disease Control and Prevention (CDC) – established in 1946 to maintain a nationwide system of food-borne disease surveillance. This federal agency estimates actual incidence of foodborne bacterial, viral,

and parasitic illness in the United States and assists other countries with developing global systems.

Codex Alimentarius Commission (CAC) – International standard setting body created in 1962 by the Joint FAO/WHO Food Standards Program of the United Nations. The purpose is to protect the health of consumers and to ensure fair trade practice in food trade worldwide.

Developed Countries – The top group of developed countries; mainly democratic nations also known as high-income countries, the North, industrial countries; generally have a per capita GDP in excess of $10,000. Developed countries included in this study are: Australia, Japan, New Zealand and the United States.

Developing Countries – a term used by the International Monetary Fund (IMF) for the bottom economic group of countries in transition, and developing. IMF statistics take in 126 developing countries in the world. Developing countries included in this study are: Afghanistan, China, Fiji, India, Indonesia, Malaysia, Pakistan, Papua New Guinea, Philippines, Samoa, Thailand, Tonga, Vanuatu, and Vietnam.

Foodborne illness – Acceptable worldwide is The World Health Organization (WHO) definition: diseases, usually either infectious or toxic

in nature, caused by agents that enter the body through the ingestion of food.

Food safety – absence of likelihood of harm under a given set of conditions.

Food security – United Nations – food security implies that all people at all times have both physical and economic access to enough food for an active, healthy life.

Food Security – United States – FDA statutes and regulations surrounding intentional adulteration with hazardous materials and economic fraud

Genetically modified foods (GMOs) – food derived from plants that have been genetically engineered or modified.

Harmonization – in relation to international food law, refers to the process in which different states adopt the same laws. Harmonization often occurs as a result of the operation of international treaties.

Hazard Analysis Critical Control Point System (HACCP) – a system to identify notable hazards to food. HACCP is the most effective approach

for controlling hazards and ensuring food safety throughout the entire food system (farm-to-fork), controlling microbes, chemical and physical hazards.

International Plant Protection Convention (IPPC) – established in 1952, is an international treaty whose purpose is to secure a common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control.

Office International des Epizooties (OIE) – established in 1928 to provide expertise and encourage international solidarity in the control of animal diseases, and mandated under the WTO SPS Agreement to safeguard world trade by publishing health standards for international trade in animals and animal products.

Pacific Island Forum – established 1971 to promote regional cooperation in political matters. This forum includes countries in this study: Australia, Fiji, New Zealand, Papua New Guinea, Samoa, Tonga, and Vanuatu.

Sanitary and Phytosanitary (SPS) agreement – the application of food safety and animal and plant health regulations that are part of the treaty which established the World Trade Organization (WTO).

United Nations Food and Agriculture Organization (FAO) – established in 1945 to raise the living standards and increase availability of agricultural products, as a United Nations specialized agency.

United States Food and Drug Administration (FDA) – responsible for protecting the public health of US citizens by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, and medical devices. This organization publishes a Food Code, which provides requirements for ensuring food safety at foodservice, retail, and vending operations. This can be used as a resource worldwide.

United States Environmental Protection Agency (EPA) – established in 1970 to protect human health and the environment for the American people. This agency monitors pesticides and the safety of new pesticide products, and sets residue levels with risk assessments.

United States Department of Agriculture (USDA) – established in 1862, to protect public health of U.S. citizens by preventing and responding to contamination of the food supply throughout the farm-to-table continuum: including meat inspection; monitoring hormone residues; domestic and imported meat and poultry; and, related products.

World Health Organization (WHO) – established in 1948 to deal with health matters worldwide; a United Nations specialized agency.

World Bank – established in 1945 to provide economic development loans; a United Nations specialized agency.

World Trade Organization (WTO) – established in 1995, to provide a means to resolve trade conflicts between WTO members and to utilize negotiations with the goal of further lowering and/or eliminating tariffs and other trade barriers. WTO is the only international organization dealing with the global rules of trade between nations. Its main function is to ensure that trade flows smoothly, predictably and freely as possible.

Chapter II

Literature Review

Section 1: Introduction to Harmonizing Food Safety Systems: A Global Issue

The literature review is divided into four parts. An introduction to the overall concept of harmonized food systems is discussed in Section 1. Food safety: mechanisms, constraints and resources in the United States are discussed in Section 2. A similar set of topics for Asia Pacific is considered in Section 3 and Section 4 discusses the significance of the research method used in this study.

A network of international standard-setting organizations has been formed to provide an immensely important source of help to deal with harmonizing food safety systems. International organizations such as the United Nations and the World Trade Organization (WTO), governments, industries and businesses have established fair market-oriented trading protocols in which safe food products are expected (WTO, 2002). Food safety systems are made up of individual parts that include science-based research, culture, international trade agreements/food laws, and industry standards. These parts also operate together as a mechanism to hold together food safety frameworks. Any constraint to this system of connected parts may hinder food safety and restrict trade. Constraints that might hinder include: resources, technical skill, government support, food laws, etc.

Science-based food safety research

Foodborne pathogens, readily found in all environments, play an important role in international trade, politics and health. The United Nations Food and Agricultural Organization (FAO) and World Health Organization (WHO) through the Codex Alimentarius Commission have developed an international approach to safe food. There is a coordinated effort to attain harmonized food safety standards for international trade regulations by using science-based standards for food production, processing, and transport (*Proposed draft working principles for risk analysis*, 2001).

In the past century, science has added tremendous insight into food safety issues. As a result, the U.S. and other governments have established regulations based on public exposure to contaminants and risks to these containments in food, water and the environment. For international food safety systems to work fairly, it is necessary to have a consistent use and application of science-based principles, accessible to anyone (Siegrist & Cvetkovich, 2000; Starr, 2003).

Further, there is a need to build an interchange of biological risk assessment data and to develop an international surveillance system for foodborne illness. Effective food systems are essential to implement food safety standards for global public health. Multilateral coordination and harmonization within food inspection systems and standard setting bodies transcend national boundaries and facilitate trade (J. Buzby, 2001; Secretariat, 1998; Unnevehr, 2003).

Food Safety Culture

Cultural information from different parts of the world related to food hazards, local customs and agricultural practices is needed to establish international food safety standards. Ideally, the framework of the Codex Alimentarius Commission takes into account all available data throughout the food chain, including the food related traditions and practices of developed and developing countries (Traill et al., 2002).

The challenge in assessing international health hazards from chemicals and microorganisms is the lack of scientific data (*Food-borne disease: a focus for health education*, 2000). Records, laboratories and surveillance systems may not exist because food contamination is not always recognized as a priority by national governments. Most information related to food safety in developing countries is about malnutrition and infant diarrhea. This data has become an important indicator of contaminated food and drinking water. As a result, the World Health Organization (WHO) concludes that "illness due to contaminated food is perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity" (WHO, 1984).

International Trade Agreement and International Food Laws

In the past twenty years trade agreements such as, GATT/WHO, NAFTA and SPS/TBT, have brought countries together by removing restrictive tariffs and technical barriers to trade. These trade agreements have established international

laws that are based on predictability, transparency and fairness so that conducting business is possible. (Burfisher & Zahniser, 2003).

The functions of international food laws are to protect the public health, inform consumers, assure fair trade practices and protect the environment (Hegarty, 2003). Countries need to understand international food laws and regulations so they may meet the legal requirements and expand economically.

Many developing countries are currently in the process of modifying or implementing food safety guidelines and regulations to meet international and industry requirements. In 1999, 70 percent of the member countries of WTO were developing countries. In order for developing countries to remain competitive in the global market place they need to establish and implement food safety laws and regulations. However, limited resources are causing governments to weigh decisions that incur financial costs to impose food regulations and have access to the foreign market (*Implementation of initiatives to manage food safety*, 2000; Traill et al., 2002; WTO, 2001).

Industry Standards, HACCP and private grades

In addition to international trade agreements, industry is increasing food standards beyond international regulations. Food industries, such as large multinational grocery stores and food companies, are continuously seeking ways to exceed quality concerns for their consumers. To increase their market share, producers have established private standards and grades that are related to quality

standards. These are a system of grades higher than national and international food safety regulations/requirements.

Multinational food producers and supermarket chains have implemented private standards and quality assurance programs aimed to improve food supply and customer base, whether domestic or foreign (Busch, 1997). Small firms are being forced to comply with these food standards and may have problems staying in business. "To meet consumers expectations of safer food and maintain product loyalty, industry has established production practices beyond regulations and standards" (Mather, 2001).

The Codex Alimentarius mechanism is working toward safe food and fair-trade, but may be significantly affect by the controls of private standards. As a result, private standards may be a constraint on developing countries ability to have market access. For developing countries to implement private standards they need help from developed countries (Wilhelm, 2003; WTO, 2001).

Section 2: Food Safety in the United States: Mechanisms, Constraints and Resources

"Currently, there are more than 130 countries around the world that provide food to U.S. consumers" -- Food Safety Begins on the Farm: A Grower's Guide (Rangarajan, Bihn, Gravani, Scott, & Pritts, 1999)

Food Safety Culture and Demographics in the United States

The United States is a melting pot of people who bring a variety of food and culture with them. Newly migrated families have continuously added diversity to America's favorite food choices. Because there is an abundance in economic resources and consumers willing to try new foods, the U.S. imports a wide variety of agricultural goods year round (J. Buzby, 2001; Crutchfield et al., 2000).

As a person's income rises, they are more willing to pay for food that is safer, fresher and of higher quality (Regmi, 2001). However, all the food we consume must be produced, shipped, processed, packaged, stored and prepared. Along the way--from farm to fork--there are many opportunities for contamination. Though food safety is a high priority for people in the United States, it is estimated that up to 76 million foodborne illness occur each year costing between $1-10 billion a year and causing approximately 5,000 foodborne illness related deaths per year (Mead, 1999). As a result, the U.S. spends a tremendous amount of resources on food safety, food processing, new technology, and protecting food supplies (Gerald & Perkin, 2003; Medeiros, Hillers, & Kendall, 2001; Siegrist, 2000).

Though most people are only slightly affected by foodborne hazards, there are certain groups of people who could have complications for the duration of their lives. Therefore, in the United States food safety measures are aimed at those most sensitive to food borne pathogens. This includes pregnant women, young children, elderly persons and people with deficient immune systems. Statistics

have shown that almost one-third of all foodborne illnesses in the United States occur in children less than 10 years old (J. C. Buzby, 2001). More research is needed to address food safety risks and measures to protect special populations (J. C. Buzby, 2001)

Science-based food safety research

The United Nations Food and Agricultural Organization (FAO) and World Health Organization (WHO) through the Codex Alimentarius Commission have developed an international approach to safe food. There is a coordinated effort to attain harmonized food safety standards for international trade regulations by using science-based standards for food production, processing, and transport (*Proposed draft working principles for risk analysis*, 2001).

Risk analysis weighs relevant risk factors, using science-based practices. In the past century, science has added insight into food safety issues. As a result, governments are asked to regulate public exposure to contaminants/risks in food, water and the environment. For international food safety systems to work fairly, it is necessary to have consistent application, using science-based principles and transparency of the results.

At some time or another, most of the U.S. population has eaten contaminated food and experienced a short bout of gastrointestinal problems. Most foods will naturally contain organisms that might cause illness unless the organisms are washed off the food, hands, and utensils, killed during cooking, or kept from growing by keeping the food hot or cold. Because of this, biological,

chemical and physical hazards are a constant threat to any food supply (Forsythe, 2000).

Hazards and conditions that contaminate food are classified as: chemical (cleaning agents, toxins, allergens), biological (bacteria, viruses, parasites), and physical (bone, glass, metal) (Fox & Hackney, 2003). Foodborne agents can be added to food or found naturally. Because not all food hazards can be completely removed from food, scientific research (risk assessment) establishes maximum limits (ML) and regulating agencies (risk managers) monitor the industry (Byrd & Cothern, 2000).

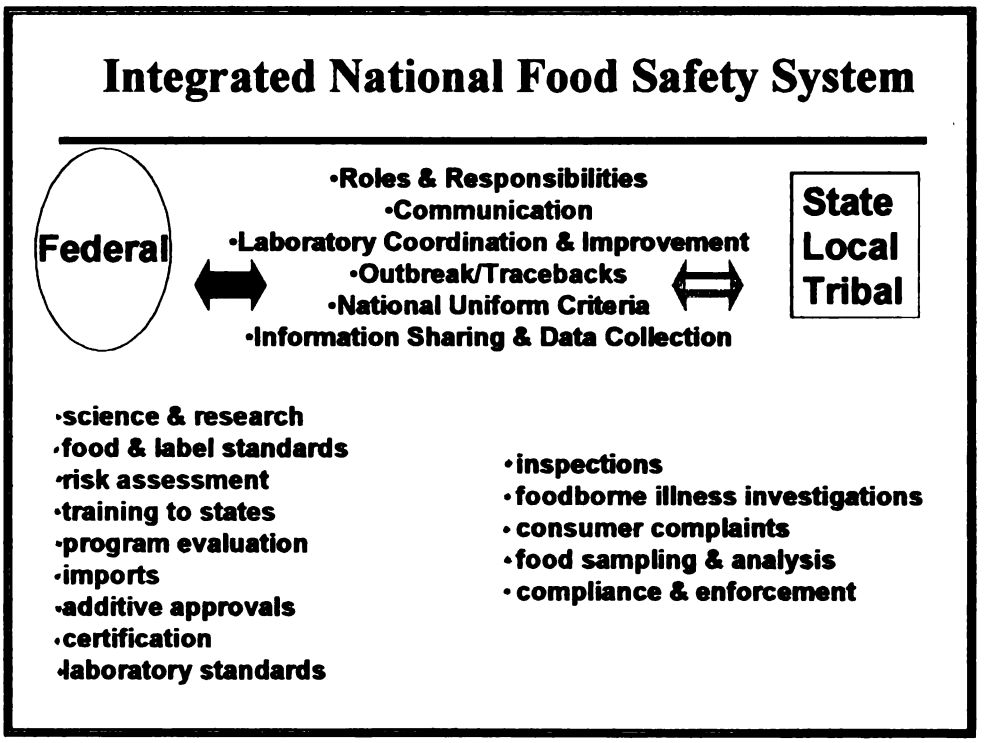
Examples of food hazards include, *E. coli* O157:H7, first found in 1982 after people ate hamburgers from a fast-food chain, and, *Cyclospora*, a pathogen found in Guatemalan raspberries in 1996 (Tauxe, 1998). More recently, Mad Cow disease or bovine spongiform encephalopathy (BSE), which is now linked to human illness, was discovered in the United Kingdom's cattle herds (Powell & Leiss, 1997). Also, avian flu virus has led to precautions in Japan and other countries that banned chicken imports regardless of the relationship to human illness (2004).

Because global food trade is expanding there is a potential for the spread of new and emerging pathogens. Food outbreaks in one country can be a disaster for another country if the tainted food is traced back to another region of the world.

U.S. Food Safety System and International Trade

In the U.S., more than 12 federal agencies are given resources and legislative authority to ensure safe food. Armed with over 100 years of food laws this integrated mechanism of national food safety systems in the U.S. includes agencies such as the Food and Drug Administration (FDA), the United States Department of Agriculture (USDA) and the Environmental Protection Agency (EPA). See Figure 2 for the arrangement of connected parts.

Figure 2. United States Integrated National Food Safety System



Michigan Department of Agriculture, 2004

Many countries such as the United States have their own set of food laws and regulations that account for their own perception of risk and resources. Climate, agricultural production, economic, political, social, cultural and religious differences are all related to food safety. While national policies are rapidly

changing to meet the demands of science, there is still a lack of available means for many countries to meet food safety standards within U.S. acceptable levels of risks (Burfisher & Zahniser, 2003).

International free trade agreements have reduced barriers to allow for the U.S. to expand its markets. In the 2003, nearly 60 billion dollars in agricultural export supported 750,000 jobs, one-third of those in rural communities. As a result, the U.S. experienced sales of over $1 billion per week to more than 100 countries. In the U.S. international trade in agriculture production equals one of every three cropland acres (Boehm, 2004).

The United States is a member of The World Trade Organization (WTO). This organized membership of countries rule trade between nations at a global or near-global level. The basic principles of the WTO are: 1) trade without discrimination, and, 2) removal of trade barriers (WTO, 2002). A separate agreement on basic rules for food safety and animal and plant health standards is called the Sanitary and Phytosanitary Measures Agreement (SPS). An important aspect of the SPS agreement is the right of all WTO member countries to establish their own sanitary measures for the protection of health and life of their human, animal and plant populations (Secretariat, 1998). For example, established regulations allow the USDA animal and plant health unit to inspect and prevent the entry of exotic plant and animal pests and diseases (Strongin, 2002).

International trade and food standard setting may constrict trade because food regulations differ among countries (Henson, 2003; Mills & Hilt, 2003; Sen, 2004; Yuen, 2004). At times, politics is accused of setting standards as an effort to

camouflage agricultural protectionist practices of member countries (Jackson, 2001). Without harmonization of procedures and standards, trading partners may be restricted to access food markets and sell their agricultural exports (Crutchfield et al., 2000). Food safety outbreaks and the presence of contamination or adulterated food affect people everywhere. A survey on barriers to U.S. trade indicate that food safety accounts for a fourth of all trade disputes and half of export revenue losses (*Foreign agriculture trade of the U.S.*, 2001). Because of these serious economic consequences, the U.S. supports the idea of an international harmonized food safety system.

Industry, HACCP, and Private Grades

Hazard Analysis and Critical Control Points (HACCP) is a preventative science-based system developed by industry to assure safe food production. The scope of HACCP is comprehensive--from farm to fork. Its purpose is to prevent, reduce or minimize risks associated with foods and provide a legal framework to produce food safely (Chesworth, 1997). The HACCP system is an example of regulators and industry working together to reduce foodborne illness by applying science-based measures (Hulebak & Schlosser, 2002).

In the U.S., regulations state that juice, meat and poultry, and seafood industries are required to follow HACCP principles. Most U.S. firms have an incentive to follow HACCP procedures. HACCP principles are recognized world-wide for preventing food safety problems. As many food manufacturers and industry representatives are anxious to avoid lawsuits, lose their reputation and

customer loyalty, many include HACCP plans even when it is not required. In practice, this system identifies all possible hazardous or contamination points and then applies appropriate controls (Farber & Todd, 2000). To be an effective mechanism for safe food, industry must provide detailed documentation to identify the corrective actions, original source of product, and verify that the controls are working.

Intentional food contamination, known in the U.S. as bioterrorism, came to light as a result of terrorist attacks on September 11, 2001. Before this, U.S. food safety concerns centered on accidental and natural food contamination. Recent bioterrorism legislation, to make the U.S. food supply even safer, resulted in giving more authority and financial resources to FDA. Congress allocated a portion of the Emergency Supplemental Appropriations Act for Recovery from and Response to Terrorist Attacks on the United States (P.L. 107-39) providing $40 billion to "improve homeland security through food safety enhancements" (Strongin, 2002). Included in this new legislation is a measure to improve surveillance and rapid response to any suspected foodborne illness. Along with improved surveillance activities, all foreign and domestic food facilities require a mechanism for traceability, prior notification of imported food shipments and extensive record keeping to trace back original source of food (Meadows, 2004). As a result, scientific research and investigation in the U.S. is shifting resources to focus on intentional contamination rather than accidental contamination.

Food Safety Outreach, Education and Training in the United States

In the United States, years of food safety research have produced a wealth of information. In the U.S., public health campaigns by the regulatory agencies (FDA, USDA, EPA, etc.) encourage proper food handling, sanitation and storage and other related food safety messages. By law, federal agencies that regulate food are responsible for communicating strategies that are effective in reducing foodborne risks. The regulations made by these agencies have a tremendous impact on an individual's health, industries and economy. As a result, the U.S. seeks to include the public's help in the rule-making process. In addition, public input is considered when the regulators determine a final rule (*Making Your Voice Heard at FDA: How to Comment on Proposed Regulations and Submit Petitions*, 2003).

There are several U.S. food safety linkages, various institutions and food safety experts that develop training, education programs and outreach activities. Many food safety programs in the U.S. interact with networks around the world. Communicating food safety messages are designed to heighten public awareness and motivate people to take action. People are very concerned with a safe food supply, but do not always know what to do. Science can explore safe food solutions; however, ultimately consumers are the ones to adopt new behaviors. More information is needed so that science and regulators can communicate relevant decisions about foodborne risks and informing those most affected (Frewer, Howard, Hedderley, & Shepherd, 1996). To be the most effective, food safety messages must consider culture-specific concepts when communicating

their message. Preparing effective messages for different segments of the population requires determining what recipients think, what is relevant, and what their lifestyle and living conditions are like. More research is needed to identify what is important within cultural groups and their understanding of food safety messages (Weir, 2002). In addition, more research is also needed to create action strategies that empower individuals to reduce foodborne risks (Huerta & Macario, 1999; Lundgren & McMakin, 1998).

Section 3: Food Safety in Asia Pacific: Mechanisms, Constraints and Resources

"No region in the world holds greater promise for U.S. food and agricultural trade than Asia Pacific" – National Policy Association (Breth, Auerbach, & Benz, 1999)

Food Safety Culture and Demographics in Asia Pacific

Asia, including part of the Pacific Rim, is the world's largest continent. This region ranges from the arctic Siberia, to deserts of South and Central Asia Pacific and the tropics of Southeast Asia Pacific. While there is an abundance of natural resources (e.g., forests, agricultural land, minerals, and petroleum), they are not available to everyone. The Asia Pacific region includes almost half the people of the world and home to more than 500 million people. Included in this region are over 10 percent or 60 million people in the middle-to-upper-income group

(Richardson, 2003). The per capita income and living standards of this region ranges from amongst the highest in the world, to some of the lowest. As a result of its growing population and rising upper-income consumers, food safety issues are a growing concern (Coyle et al., 2004; Richardson, 2003; Zoellick, 2004).

One of the biggest trends for the Asia Pacific region is greater expectations for cleanliness. For the first time, food safety issues, public health and the right to access clean water and food are being discussed. Among some of the food safety concerns in this region are increased uses of agricultural pesticides and chemicals used in food processing (Khanum, 2001). However, research shows that when it comes to food safety, it is unsure whether consumers in this region have a willingness-to-pay for safe food and food safety systems (Huang, Kan, & Fu, 1999).

The new demographics in this region include growing urban settings that are surpassing rural agricultural populations. New urban dwellers are not always able to feed themselves as before. Therefore, eating patterns have changed in the Asia Pacific region with less focus on traditional foodstuffs and more on processed goods. This is creating an increased demand for more meat consumption, which results in grain being used to feed livestock rather than people. It is clear that urbanization is altering food options for citizens of developing countries in this region (*Asian Development Outlook 2003*, 2003; Blij & Murphy, 2004; Coyle et al., 2004). There is an urgent need to help improve food systems and infrastructure to better provide safe food supplies to the poor. Not having enough food to eat is an ongoing problem in this region and one that unfortunately has no

"magic bullet" to achieve food security (Novartis, 1999). The Food and Agriculture Organization of the United Nations (FAO) defines food security as "a state of affairs when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Imai, 2004) . By establishing quality agricultural practices and increased yearly production economical development in this region is possible.

Differences in agricultural practices exist between most of the Asia Pacific region and the United States. For example, in Asia the majority of wage-earning women plays a vital role in food production yet do not own any land or have a say in production practices. A significant amount of food production is frequently "backbreaking hand-cultivation of staples dominated by women" (Blij & Murphy, 2004). Solutions to solving international food safety problems are linked to poverty and the role of women in developing countries (Breth et al., 1999). Policymakers will require a structure that includes access for women to education, adequate health care, sanitation, and economic opportunities. Traditional food processing in the Asia Pacific region serves an important economic function, therefore, role of women will need to be considered in the whole food system (Unnevehr, 2003).

This area of the world has a tremendous cultural diversity which includes the world's major religions: Christianity, Judaism, Islam, Hinduism and Buddhism. In this region of the world, religious affiliations have a huge impact on food choices. For instance, Muslims are not allowed to consume pork. Buddhists

do not eat beef and a Hindu may eat meat but not beef. Some Hindus object to having their food handled by members of different castes. For Muslim consumers, beef and poultry products must be certified as Halal[1] and originate from slaughterhouses that follow Islamic slaughter practices. These facilities must be inspected and approved by religious authorities. If these products are not certified Halal, Muslim consumers will not buy them (Fleck, 1997).

Science-based food safety research

Food safety risks in the Asia Pacific region vary from the U.S. due to differences in technology, access to refrigeration, food production practices, cultural differences, and climatic differences (J. Buzby, 2001). International cooperation is necessary to share risk analysis, microbial data and other food related information during disease outbreaks. Because trade is so closely related to food safety issues, there can be a significant impact on regional food supplies if negatively affected. This was seen in the wake of the recent avian influenza outbreak in Asia , Hong Kong and other countries have banned poultry imports from South Korea, Vietnam, Japan, Taiwan, Thailand, Indonesia, Laos and China (2004).

More research is needed in this region to help identify food safety issues and specific value systems and cultural practices. Currently, many alternative views by consumers, scientists, industry and government regarding what is food

[1] Halal is an Arabic word meaning lawful or permitted. In relation to food products these laws include rules for slaughter, no swine/pork, alcohol, blood products, etc., (IFANCA).

safety exist in this region. Representatives have reported to international organizations that science may devalue tradition and culture when considering food safety (Committee, 2001; Ten Eyck, 2000). Currently the United Nations reports that limited information is available about regional health in the Asia Pacific (*Food Safety*, 2003).

Surveillance information and data collection is necessary to identify the food safety needs and to set priority in this complex setting. Therefore, it is necessary to gain more information on biologically and chemically contaminated food in this region. Foodborne hazards and high-risk foods that result in illness/disease are usually not known. Without systematic foodborne surveillance activities, including epidemiological studies, it is difficult to improve the safety of the food supply and reduce foodborne diseases. The U.S. Centers for Disease Control and Prevention (CDC) is assisting in developing a standardized health information system for the United Nations to be used in this region.

Microbial diseases are common because in many parts of the region, water is usually not potable and open sewers are common. Poverty, poor sanitation, and superstition still contribute to a high infant mortality rate. Pollution and living conditions in large crowded urban settings have resulted in serious health hazards (Bjorkman, 1985). In this region, there is a rise in the availability of street foods (vendor food, fast food) which corresponds to the increase in consumer disposable income. However, there are few sanitary controls over preparation. Food is prepared, distributed and displayed without any food safety standards. Bacterial contamination is common because food stalls are without refrigeration and lack

proper cooking facilities. Water and sanitary services are not always available; therefore hand washing almost never occurs. Without sanitation, customers run the risk of vendors passing food borne pathogens along (Garin, 2002).

As with microbial pathogens, chemical hazards are also a major problem in the Asia Pacific region. This is a result of unregulated pesticide residue and food additives. There is a lack of trained personnel and nationally Integrated Pest Management (IPM) plans for pesticide use (Singh, Singh, & Rao, 2003). This has resulted in a significant number of vegetables, fruits, and teas that have exceeded minimum residue limits and are unfit for human consumption. Not only is there a lack of knowledge and guidance regarding pesticide risk and food additive regulations, there is widespread use of forbidden products and formulations (Chiang, Kusnawiria, & Sawangduam, 2002).

The World Health Organization (WHO) has been working towards the improvement of food safety since its inception. They have become a source of support and resources to this region. In 2000, WHO, during the Fifty-third World Health Assembly, affirmed the importance of food safety, and identified key actions to achieve safe food. As a result there is a published report listing this region's key constraints to improved food safety systems (Table 1).

Table 1: Summary of the World Health Organization (WHO) Food Safety Constraints in Asia Pacific

World Health Organization's List of Key Constraints to Safe Food in the Asia Pacific region (2000)
▪ Lack of laws that address food safety ▪ Lack of one authority with responsibility to food safety ▪ Lack of technical expertise to articulate written policy on food safety ▪ Lack of government and consumer awareness to national food safety problems ▪ Lack of food control systems such as inspection methods and Hazard Analysis Critical Control Point (HACCP) plans ▪ Lack of consumer education ▪ Lack of resources, e.g., trained experts, laboratories, sufficient data related to foodborne diseases, trends, microbiological, etc.

Asia Pacific Food Safety System and International Trade

Economic growth and consumers with increased personal wealth have linked the Asia Pacific region with the U.S. by offering a wide range of foods exchanged between countries. In 2000, it was estimated that more than $900 million of U.S. foods were sold in retail food outlets in the Asia Pacific region

(*Foreign agriculture trade of the U.S.*, 2001). International trade in the Asia Pacific region in not only limited to trade with the United States. Between 1990 and 2001, trade between the Peoples Republic of China and the rest of the world more than tripled, and trade between Southeast Asia and the rest of the world nearly doubled (*Asian Development Outlook 2003*, 2003). This region currently accounts for approximately US$53 billion in U.S. direct investment, is the third largest overseas market for U.S. exports, and two-way Association of Southeast Asia Nations (ASEAN) - U.S. trade totaled US$120 billion in 2001 (Hutagalung, 2003). It is clear that the world desires goods from this region more than ever. A recent international restaurant trade magazine stated, "Asia Pacific cuisine is hot and luckily lowering tariffs and other trade barriers has made lemon grass, galangal, and fish sauce available to the rest of the world" (Gould, 2000).

However, for the most part the Asia Pacific region's food systems, controls and policies are not yet fully developed and are unable to address rapidly expanding markets, technologies, and emerging pathogens (*Asian Development Outlook 2003*, 2003). Developed and developing countries are not at the same economic and technical level. Street vendor foods are an example of outdated systems. Without laws, food inspections are unable to control food processing and marketing activity (*Third Asian Conference on food safety and nutrition*, 2000).

In the past, domestic factors such as food security, droughts, floods and military tension often overshadowed food safety concerns. This resulted in many countries of the region without a clear written food policy on food safety, leaving many people in this region without access to clean water and safe wholesome food

(Traill et al., 2002). When WHO identified key constraints of the Asia Pacific in achieving a safe food supply they stated that "above all, there is a tremendous need for food safety laws and regulations to build a solid framework in this region" (*10-point regional strategy for food safety in the south-east Asia region*, 2002).

Generally this region has under-staffed food inspection units and under-resourced food safety laboratory facilities and limited food regulation or integration of HACCP systems (*Implementation of initiatives to manage food safety*, 2000). International organizations have recognized that it is necessary to help developing countries of Asia Pacific to establish a foundational food safety framework for long lasting positive advances. The region has shown advances overall, however, governments still lack an understanding of what competitiveness means and how food safety fits in the development process (*Asian Development Outlook 2003*, 2003).

Industry, HACCP, and Private Grades

Competitive domestic markets and collaborative partnerships have helped to provide economic growth to the Asia Pacific region. However, for some countries of the region, WTO agreements such as the Sanitary and Phytosanitary (SPS) measures and intellectual property protection measures do not adequately reflect their interests (Sen, 2004). Many developing countries feel that they have not been considered when these agreements are made. More recently, food standards created by Codex Alimentarius have been criticized for putting too much focus on science-setting agendas from the food industry. There are complaints that

specifications include only developed countries' practices and not ethnic foods and cultural practices in developing countries. As a result, there have been recent efforts to include public participation as a means to "break through assumptions and gives voice to valuable cultural-knowledge" (Reisner, 1992).

Yet, private sector links between developing country suppliers and buyers are increasingly the driving force in quality standards. Global supermarkets, food service operators and processors, are changing food safety rules. Southeast Asia Pacific has recently received U.S. technical assistance to "offer a step-by-step pathway to deeper trade and economic relationships with the United States via the ASEAN Initiative" and to strengthen WTO's global rules-based system (Hutagalung, 2003). This initiative is aimed at establishing linkages with American businesses, and to help countries in the region meet U.S. food safety and other private standards (Zoellick, 2004).

The relationship between multinational food companies such as McDonald's and its Indian suppliers is bringing access to the latest in food technology and exposure to advanced agricultural practices. As a result, there are a growing number of local suppliers operating with HACCP principles (*Vital Links in our Cold Chain*, 2002). International, regional and national resources are being poured into this area to address food safety and agricultural trade and develop competitive market place standards. As an example, the Pacific Island Countries are a regional forum supported by FAO to provide US $4.5 million for development of food industries that are able to trade internationally. This initiative

and similar ones are contributing to globalization and rapidly changing trading regimes in this region ("Sub-regional representative for the Pacific," 2003).

Food Safety Training and Education in Asia Pacific Region

Capacity building in the Asia Pacific region is essential to help increase productivity of agriculture and raise farmers' incomes (*Asian Development Outlook 2003*, 2003). For this part of the world to benefit from global markets in food and to represent their interest in international organizations, they must build capacity in science-based food safety systems (Breth et al., 1999; Zoellick, 2004). Representation at standard setting committee meetings of the Codex Alimentarius is often disproportionate. More voice is given to those who regularly attend, such as governments and industry who can afford to send experts. After a careful review of this criticism, the Codex Alimentarius Commission has begun to consider financial assistance and other strategies to include a broader group of stakeholders in their international food standard-setting process (Traill et al., 2002).

The Codex Alimentarius Commission has made available funds to strengthen food safety capacity building efforts. Building skills and capacity of farmers and producers is the only way a country will remain competitive and take advantage of globalization (*Codex Trust Fund*, 2003). By providing financial assistance, Codex envisions a structured, efficient, regional food safety system that is able to meet international standards. These steps in training and education are aimed at increasing input from consumers in developing countries and to remove

constraints to traditional production methods science has not considered in the past.

Globally, countries can assist one another and support appropriate capacity-building elements such as providing technical assistance, laboratories, communication, financial management, human resource development, legal structure, training workshops and conferences.

The Asia Pacific region and the United States share many interests in food safety. By working together through multilateral trade agreements such as the Asia Pacific Economic Cooperation (APEC), harmonized food safety systems, policy development, risk analysis and program implementation are possible (*About APEC*, 2003). Developed countries such as the U.S. have an opportunity to share food safety experiences and transfer the know-how to help train scientists in food safety risk assessment and risk management techniques (*International technical guidelines for safety in biotechnology*, 1995). This type of collaborative education and training effort is currently shaping the development of a global foodborne disease surveillance network, Global Salm-Surv, a Salmonella surveillance network that was initiated in January 2000.

Because developing countries have faced problems in exporting food products and have difficulty meeting the standards of importing countries, The World Bank supports education and training initiatives. The World Bank seeks to help this region of the world to build capacity as a "means investment in learning and knowledge-sharing," while it "strengthens institutions and gives individuals

the skills they need to problem solve, innovate, educate and harness productive potential of societies" (Wilhelm, 2003).

Agricultural Biotechnology Technology Exemplifies the Need to Harmonize

Although national and international organizations recognize the benefits of agricultural biotechnology, not everyone supports its uses. There has been extensive media reporting about the potential risks of biotechnology and genetically modified food (GMs). Social, ethical, environmental and economic reports surround this issue. Those who support organic farming are concerned about cross-contamination. Some public opinion expresses fear of future health hazards claiming a lack of scientific evidence. Most frequently, this new technology has become an integral part of multilateral trade disputes. There have been many open discussions and public hearings regarding this issue which has brought to light criticism pertaining to research techniques and public perception of risks associated with GM foods (Frewer, Miles, & Marsh, 2002; Rampton & Stauber, 2001; Siegrist, 2000).

Applications of agricultural biotechnology in the U.S. have been very successful. Key health officials, scientific and academic organizations have been quick to support the "tremendous benefits" to consumers (Geller, Bernhardt, & Holtzman, 2002; Struble & Aomari, 2003). The U.S. National Academy of Science reports, "crops modified by molecular and cellular methods should pose risks no different from those modified by classic genetic methods for similar traits" (Bren, 2003). The U.S. experience offers other countries an alternative to

solving some of their agricultural problems. For example, GM technology has the potential to address food security (lack of food) and pest management problems in developing countries. International regulatory problems, food safety/biosafety concerns, have slowed down cultivation of genetically modified foods, affected consumer acceptance and limited government approvals. At this point developing countries are challenged to build regulatory capacity and public awareness that is essential to GM approval (Cohen, Quemada, & Frederick, 2003).

In the U.S., regulation of biotechnology falls under the jurisdiction of three federal agencies (FDA, USDA, and EPA). Each agency determines a certain aspect of the use and application of each product. This intensive regulatory process evaluates the product and process. For example, FDA applies science-based risk assessment to all foods regardless of those derived from new plant varieties of conventional breeding or genetic biotechnology. This concept is referred to by the FDA as *substantial equivalence*, meaning science-based risk assessment for genetic products has proved equivalent to conventional foods. If any new food product introduces substances that change the make of the final product, such as a new formulation of vitamins, FDA will stipulate additional safety studies.

"There is little doubt that biotechnology will change where and how our food is produced" (Shand, 1994). Many countries are moving forward and participating in international discussions to harmonize technology and promote science-based food safety/biosafety protocols. The U.S. government has a policy to aid developing countries with agricultural biotechnology as a part of the

solution to feed expanding populations. However, these highly sophisticated techniques must be made affordable to help ensure the widest possible benefits for the public good (Cook, 1994). Former U.S. President Jimmy Carter stated, "If biotechnology is regulated unnecessarily, the real losers will be the developing countries" (Carter, 1998).

This new technology may be especially beneficial to the Asia Pacific region as it looks to find new ways to feed growing populations (Borlaug, 2001). Rice is the basic food crop, important to food security and highly politicized. The production of this important crop accounts for more than 80 percent of calories consumed in this portion of the world. The Rice Biotechnology Network sponsored by the Rockefeller Foundation has been instrumental in developing genetically modified rice. This program has also created applications to produce improved rice varieties. At the same time, it trains scientists to use the techniques (*Agricultural biotechnology, poverty reduction, and food security*, 2001). As a result of this regional research, one of the first developing countries to address the potential risk of agricultural biotechnology was The Philippines. In 1990, The Philippines governmental legislative body established biosafety guidelines and a process that included public representatives. Public outcry for commercial use of genetically modified has so far prevented the Philippines from moving forward (Aerni, 2002).

Most of the Asia Pacific region supports agricultural biotechnology products and has begun to build capacity in biosafety and food safety. For example, Singapore strongly supports the development of biotechnology along

with Bangladesh, India, Malaysia, Nepal, Pakistan, Sri Lanka, Thailand, and Viet Nam, all who are seeking researchers who will apply biotechnology to traditional foods such as fruits and export commodities such as shrimp. The World Bank is helping Indonesia to activate agricultural biotechnology programs and in the Peoples Republic of China, approximately 50 genetically modified plant varieties have been approved for environmental release, or small-scale field testing.

Section 4: Delphi Research Method

The main objective of this section is to describe the Delphi method and its purpose and effectiveness as the selected research method for this study. The research method used in Golzynski's research in which e-mail was used to elicit a body of knowledge from food experts established precedent for using Delphi with this subject matter (Golzynski, 2001). In addition, the Delphi method is particularly suitable in providing a means to gain knowledge from experience in professional fields to solve problems and aid in developing training programs (Reuber, Dyke, & Fischer, 1990).

In order to better understanding global food safety issues, it has been recognized that experts are necessary in solving problems through knowledge sharing and helping to sort out the issues (Jarratt & Mahaffie, 2002; McCampbell & Helmer, 1993). Considering the nature of particular problems in food safety, it is natural to ask experts their understanding and experience. A feature of the Delphi Method is to form groups related to a common issue and elicit ideas on how to solve a problem. Experts can be used to develop fundamental

understanding of the impacts on globalization and how harmonize regulations effect their food safety systems. In addition, feedback of this type may stimulate thoughts not considered before.

In the recent past, the Delphi method was used to establish interaction between food safety experts in the U.S., and identify consumer food handling behaviors for food safety education (L. C. Medeiros, P. Kendall, V. Hillers, G. Chen, & S. DiMascola, 2001). Their study provided effective results to address U.S. food safety training issues. In addition, participants were geographically dispersed individuals, living in different time zones. The Delphi proved to be cost effective and capable of obtaining a quick response to emerging issues.

Food safety is a complex and evolving global issue because of the impacts from globalization, free trade, food production, culture, private standards and Codex Alimentarius. To address these issues there is a urgent need for food safety experts to share information and together design strategies that harmonize food safety systems. The Delphi method creates such a forum and allows for diversity of all points of view. Issues such as basic food safety education, scientific risk analysis, and disease surveillance need to be brought to the light, approached collaboratively and together, develop national, regional and international food safety systems. The Delphi method offers a research tool for food experts from different entities to interact and plot their course. The participants from this type of research method can include scientist, industry, academia, consumers and government to partake in the design and delivery of food safety systems.

Chapter III

Methods

Section 1: Introduction

Countries around the world are seeking ways to ensure safe food supplies for their citizens. For our study, food safety issues in each country can be discussed in relation to an overall objective to make food safe worldwide. The Delphi method is able bring together representatives from developed and developing countries regardless of time zones, work patterns, culture, language and geographic location . By using a set of guidelines for electronic communication this research method is able to enable interaction to reach mutual understanding and cooperation (Dillman, 2000; Linstone & Turoff, 1975). This research method is a qualitative approach, recognized as an excellent tool for gaining input from experts (R. Dalkey & Helmer, 1963; Roth & Wood, 1990). As a result, food safety experts are able to bring to the surface a comprehensive list of important domain concepts and factors such as constraints, mechanisms and food safety resources (Baldwin-Morgan & Amelia, 1993).

This research was motivated by interaction among participants who have attended an international food safety short course and senior decision makers in the global community. Annually, Michigan State University holds an international short course, in collaboration with developing countries, regulators, and industry. The purpose is to address food safety policy development, risk analysis and program implementation of good manufacturing practices for both private and public

participants. The international participants have requested further insight into food safety mechanism, constraints and resources in their geographic regions. They are seeking more information that could lead to developing appropriate strategies and provide protection to food supplies in their home countries. As a result, this research uses the Delphi method to provide an international forum of food safety experts, utilizing electronic communication, to improve the development and dissemination of training materials, course packets, and internet resources.

Research Problem

More and more food products are being exchanged across borders without food safety systems in place. Countries are at different stages of developing food safety systems for the Asia Pacific region and the United States. Without the benefit of a harmonized food safety system between these countries safe food supplies are in question.

Purpose of This Research

This research aims to identify and list key constraints to a harmonized food safety system, the mechanisms used to solve food safety problems, and resources available in the Asia Pacific region and the United States.

Research Objectives

Research objectives are designed:

1) To utilize the Delphi method, via electronic communication, to enable interaction among a panel from diverse backgrounds and locations.

2) To identify a list of key constraints to a harmonized food safety system in the Asia Pacific region and the United States.

3) To identify a list of mechanisms used in solving food safety issues in the Asia Pacific region and the United States.

4) To identify resources (websites, publications, and unpublished reports) available to address food safety issues in the Asia Pacific region and the United States.

Section 2: Design

Research Design

The Delphi method was used for this research because of the advantages of using a web based survey and the positive results of similar studies (Golzynski, 2001; Medeiros, Kendall, Hillers, Chen, & DiMascola, 101; L. Medeiros, P. Kendall, V. Hillers, G. Chen, & S. DiMascola, 2001). The Delphi design has been shown to be effective in obtaining good results with similar research objectives. For example, this method is uniquely designed to include participants who may be geographically dispersed (Schmidt, Lyytinen, Keil, & Cule, 2001). The Delphi method has been widely used when the research focus is on subjective information (Sanchez & Escobar, 2000) and when program development is needed (Delbecq, Van de Ven, & Gustafson, 1975). Overall, Delphi research has been useful in problem resolution in several fields such as education, professional competencies, health, food safety behaviors and international affairs (McCampbell & Helmer, 1993; L. C. Medeiros et al., 2001).

Historically, the Delphi method has been comprised of a series of questionnaires sent by mail to a pre-selected group of experts. These questionnaires are designed to elicit and develop individual responses to the problems posed and to enable the experts to refine their views as the group's work progresses in accordance with the assigned task. The group interaction in Delphi is anonymous, in the sense that comments are not identified but are presented to the group in such a way as to suppress any identification (Linstone & Turoff, 1975). This decision making process allows people to an equal voice in the outcome.

This Delphi research will further Golznyski's work which used e-mail to contact geographically dispersed participants (Golzynski, 2001). By using electronic communication, including a web-based survey, this research provides a potential for overcoming international boundaries (Dillman, 2000). The Delphi method uses a highly structured and focused questionnaire to establish consensus opinion from experts (Czinkota & Ronkainen, 1997; Story, Hurdley, Smith, & Saker, 2001). The web-based survey design is able to elicit and develop individual responses through a password protected site and constructing a fixed format, making the questionnaires appear the same for all of the participants. This design makes possible a low cost means of communication between a panel of experts from diverse backgrounds and locations.

Human subject approval was obtained from the University Committee on Research Involving Human Subjects at Michigan State University prior to beginning this research

Selection of Participants

The first step in the Delphi method is to identify experts. In some Delphi studies, the participants are known to the researcher (Chang & Gable, 2000). However, for this study, participants were identified using the snowball sampling technique. This is defined as a "purposive technique for finding research subjects that can provide the relevant information about the topic" (Ary, Jacobs, & Razavieh, 2002). The sampling consisted of an initially selected group of experts in food safety, who in turn provided the name of another expert, who in turn provided the name of a third, and so on (Vogt, 1993). By following Golzynski's (Golzynski, 2001) research design, an electronic communication (e-mail) message was sent asking to identify three to four international experts in the field of food safety. (See Appendix A for e-mail requesting food safety experts to recommend other experts). The message stated that this was not a commitment to participate in the study. To supplement the expert referral and seek a broad range of participants, a literature search was made to further identify food safety experts (Delbecq et al., 1975). Recruitment continued for two weeks.

Description of the Participants

The group of participants who were asked to participate in the initial Round I consisted of a group of identified experts that came from diverse communities (22 countries), able to respond in English, and had e-mail addresses. It has been reported that the Delphi process and methodology can be done with as few as 10 participants but works best with a group of 15-20. Again, following

Golzynski's work and others, a potential pool of 147 participants was determined to be a sufficient size group to begin the study (N. C. Dalkey, 1970; Golzynski, 2001; Linstone & Turoff, 1975; Olson, Olson, Storrøsten, & Carter, 1993).

This study only surveyed people who use electronic mail or the Web. The population selected for this study, such as university professors, government employees, workers in many companies, and corporations generally have an Internet address and access to the Web. Therefore, research has shown good probability for conducting a survey to this limited population (Dillman, 2000).

Section 3: The Instrument

Instrument

After the identification of a potential pool of participants, an electronic communication (e-mail) was sent explaining the purpose of the research, how the Delphi method worked, and how long the study would last. (See Appendix B for e-mail instructions for food safety experts to participate in Round I.) In this communication, instructions were given to access the password protected web site with a participant number. When designing this web-based survey all of the responses were routed to an e-mail account identified only the participants' personal identification number (PIN).

Reliability and Validity

To address the reliability of this study, several factors were considered. The survey instrument and delivery mode needed to address the demands of international participants. To ensure the soundness of using a web-based survey,

consideration was given to developing a simple design to accommodate the differences that may exist with the capabilities of people's computers and software access to the web. (See Appendix C for sample of the Password protected web-based survey used in this study.) Considerations of older equipment or widely varying computer connections were also taken into account. By following Dillman's principles (Dillman, 2000) of designing Internet and web surveys, this study:

- Tested the survey "as seen by the respondent's using different kinds of web browsers" (e.g., Internet Explorer verses Netscape and different operating systems (e.g., PC versus Macintosh);
- Included a welcome page that had motivational ease of responding and instructions for the participants to respond;
- Ensured a password protected web site with a participant number PIN number for limited access only; and
- Followed a conventional format.

In a Delphi study, Dalkey reports for a reliability of 0.80 of the data was assured if at least 13 participants return responses (R. Dalkey & Helmer, 1963). Experts in food safety, research design, and computer technology pilot tested the questions for soundness and clarity. These pre-test groups of experts were not included in the study.

A request was made to have several experts view the survey questions resulting in minor adjustments made. Following the responses in Round I, additional food safety experts (not included in the study) were asked to validate the

items. Comments were sought regarding the soundness and accuracy of the responses. Results from Round II were reviewed by outside experts to help validate the results as being a voice of expert opinion in food safety.

Round I

Round I questions were developed to define the problem and provide broad understanding of the views of the experts. The responses from Round I were routed to an e-mail address, identified by the participants PIN, and then coded based on similar responses and categorized using HyperReserch©, a code-and-retrieve data analysis program. See Appendix D for an example of a web-based survey.

Round II

The first step in creating the questionnaire for Round II was to compile the findings from Round I. The participants were asked to look at the synthesized list of statements from Round I and state their degree of agreement. Each statement used a five point Likert-type scale: SD (strongly disagree), D (disagree), U (undecided), A (agree), and SA (strongly agree). Participants were encouraged to comment on the list from Round I and to write in clarification of the issues revealed in Round I. The responses from Round I were routed to an e-mail address, identified by the participants' PIN. See Appendix E for e-mail providing instructions to Round II survey.

Round III

In this final round, the participants were asked to give final consideration to results summarized in Round II. Statements that reflect the top level of agreement from Round II were presented to the participants to state their degree of agreement. Each statement used A (agree) or D (disagree). Participants were encouraged to comment on the list and to write in clarification of the issues revealed in Round II. Round III was used to facilitate electronic discussion and build group consensus. The responses from Round III were routed to an e-mail address, identified by the participants PIN. See Appendix F for e-mail instructions to respond to Round III survey.

Section 4: Data Analysis

A code and retrieval software program, HyperResearch© was used to categorize the text from the responses in Round I. A master code list was created from the list of research objectives (Miles & Huberman, 1994). This list was used to mark off segments of the data that were closely related. One advantage of using data retrieval software is that it allows for key words to be linked to text very quickly. This coding approach pointed to general domains developed and major categories emerged based on similar traits (Strauss, 1987). As these categories emerged, they were used to build a list for Round II.

For Round II and Round III, a percentage of the group's average rating was calculated using a Word Excel© worksheet. This descriptive statistic provided a

numerical value for further analysis regarding the responses and significance determining what questions scored above the 75th percentile.

Chapter IV

Results

Introduction

The research results are organized into four main areas in an attempt to address the following research objectives:

- To utilize the Delphi technique to enable communication among a panel of experts from diverse backgrounds and locations.
- To identify a list of key constraints to a harmonized food system in the Asia Pacific region and the United States.
- To identify a list of mechanisms used in solving food safety issues in the Asia Pacific region and the United States.
- To identify a list of resources (websites, publications, and reports) available to address food safety issues in the Asia Pacific region and the United States.

The Four Main Areas

1) Results of Delphi Round I

The first section provides both a broad overview of the results during Round I, as well as the factors related to the Delphi technique via electronic communication. Specifically, I provide:

a) results of key constraints;

b) results of mechanisms to address food safety issues;

c) results of food safety resources;

d) thematic analyses of electronic communication to develop Round II of Delphi; and,

e) insights from electronic communication.

2) Results of Delphi Round II

The second section provides results of Round II including:

a) results of key constraints;

b) results of mechanisms to address food safety issues;

c) statistical analyses of electronic communication to develop Round III of Delphi; and

d) insights from electronic communication comments.

3) Results of Delphi Round III

This section of the results elaborates my research results from the first two sections to facilitated electronic communication to build group consensus through Round III of the Delphi. This includes:

a) results of key constraints;

b) results of mechanisms to address food safety issue;

c) statistical analyses of electronic communication to develop group consensus; and,

d) insights from electronic communication.

4) Research Objectives

The results are categorized according to the corresponding research objectives.

Results of Delphi Round I

As a first step, the snowball method was used to obtain a panel of experts who would become the potential participants of this research. The potential pool of participants were sent an electronic communication (e-mail) and asked to participate in the study via a password protected website. See Appendix G for a list of countries represented by the pool of potential experts asked to participate in this study. As a result nearly 50 percent of the pool of participants in this study was from developing countries including: China, India, Indonesia, Korea, Malaysia, Pakistan, Papua New Guinea, Independent Samoa, Singapore, Thailand, The Philippines, Tonga, Vanuatu, and Vietnam.

- 147 potential pool of food safety experts
- 22 countries were contacted
- 55 participants from developed countries
- 62 participants from developing countries
- 1 International agency
- 3 participants countries were unidentified
- 24 Electronic mail addresses were undeliverable out of 147

Participants for Round I

A group of experts emerged by using the snowball technique. With this pool of potential participants, Round I began. The potential pool of participants was asked to identify key constraints to a harmonized food safety system in the Asia Pacific region and the United States. As a result, half of the participants represented developing countries that included: China, India, Indonesia, Papua New Guinea, The Philippines, and Thailand.

- 18 participants responded to Round I
- 10 countries were represented
- 50 % developed-developing countries represented
- 1 participant responded from an international agency

Round I – Survey Results of Question Regarding Key Constraints

The participants responses from Round I were coded based on similar responses and categorized using HyperReserch©, a code-and-retrieve data analysis program. See Table 2 for the results of responses sorted into similar categories.

- 15 key constraints were identified by the participants.

Table 2: Results of Round I: Participants Identified a List of Key Constraints to a Harmonized Food Safety System in Asia Pacific and United States

"What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?"
• Inadequate knowledge of food safety (microbial, chemical, technical capability) in developing countries • Difficult to understand and comply with International food safety standards • Differences in culture including, food habits, agricultural practices, Islamic food laws • Political: Economic concerns before public health • Too many government agencies • SPS is being used to politically deter imports • Type of pathogens commonly found in Asia Pacific and United States • Data from industry considered propriety rights • Pest control more complex in tropics • Tolerances to be agreed on to reflect value of food trade between Asia Pacific and United States • Standards are based on detectable criteria, not on implementable criteria • Limited government framework (enforcement, regulations, laws, resources) in developing countries • Difference in type of business –mechanized vs. small operations. • Systems for monitoring greatly affected by politics • U.S. has a highly sophisticated food safety infrastructure and it is difficult for many countries in Asia Pacific region to meet U.S. requirements

Round I – Survey Results of Question Regarding Mechanisms

Round I asked participants to identify the mechanisms used to address food safety issues. Responses were then coded based on similar responses and categorized using HyperReserch©, a code-and-retrieve data analysis program. See Table 3 for the responses sorted into similar categories.

- 23 mechanisms to address food safety issues were identified by the participants.

Table 3: Results of Round I: Participants Identified a List of Mechanisms Used to Solve Food Safety Problems in Asia Pacific region and United States

"What are the mechanisms used to solve food safety problems?"
• Food and Drug Agencies (government) control of all food sold • Goods must be registered • Mandatory Food laws • Established group of ministers to resolve issues • Technical assistance from developed countries • Risk analysis training • Building food recall systems • Visit developing countries • Ban agricultural products that may pose a risk to human health • Intensify research when problems arise • When problems arise obtain expertise from other countries • Review and adjust inspection systems, based on science • Involve stakeholder participation (farmers, food industry, retail, consumers) • Improve risk communication • Test chemical and microbes in food-domestic and imported • Legislation lobbying • Mass media • Food industry self-regulation • Utilize experts (universities, professional groups, trade groups) • Voluntary standards • Risk assessments are followed by risk management actions • Education and training of all stakeholders (farmers, consumers, producers) • Creating rapid alert systems

Round I – Results of Question Regarding Food Safety Resources

Round I asked participants to identify food safety resources such as websites, publications, reports, unpublished materials, training, etc. See Table 4 for the complete list of food safety resources identified by the participants in Round I.

- 30 resources available to address Food Safety

Table 4: Participants Identified a List of Food Safety Resources in Round I

Resources available to address food safety:
• Global Handbook of Food and Water Safety (published by CTThomas) • Websites • Publications reports • Training • Workshops • Government publications • Text book • Reports unpublished • Newspaper • Magazine • Experiences • Trainings – Universities • NGO • Consultants • Knowledgeable experts that are perceived by the public to be independent • Scientific institutions • Inter-governmental agencies like WHO, FAO, GEMS/FOOD, IPPC, OIE • FAO/WHO scientific committee reports and evaluations • Codex standards • National legislation and standards • Reports from inspection services • WTO/SPS training material • Hands-on experience to train • Research studies that address key food safety issues • Food Safety Forum • Websites: www.foodstandard.gov.au, www.moac.go.th, www.moph.go.th, www.moi.go.th, www.nfi.or.th, www.tistr.or.th, www.biotec.or.th, www.nstda.or.th, www.ku.ac.th • Mass Media- TV • Reports developed by FSANZ • Country food safety agency websites • Training programs developed by region

Thematic Analyses to Develop Round II of Delphi

A master code list was generated to retrieve data using an analysis program. This coding approach pointed to general domains that emerged into a list for Round II. See the Methods Chapter for more discussion.

Results from Electronic Communication

Several of the participants declined participation. Reasons included:

- "did not feel qualified";
- "was no longer in the position";
- "did not have the time";
- "automated 'out of office'"; and
- 24 electronic communications were returned as "undeliverable."

One week after the study began, a reminder electronic communication was sent out to the pool of potential experts asking for their participation. This resulted in 3 more responses.

Results of Delphi Round II

All of the participants who responded to Round I were contacted to participate in Round II. This included 18 participants, who were sent an electronic communication (e-mail) and asked to respond to the next round of the study via a password protected website. The response rate was a 100% from this group. In addition, two more participants from the initial pool of participants asked to join the study. See Appendix H for a list of countries represented in which participants completed the tasks in Round II.

- 20 participants completed Round II
- 100% participation from those who responded to Round I
- 2 participants joined the study at Round II
- 9 countries were represented

Results of Key Constraints

Participants in Round II were asked to respond using a Likert-type scale to the statements that related to the question, "What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?" Table 5 represents to what degree they indicate disagree or agree with the statements distilled from the responses in Round I. The results of the responses sorted into SD (strongly disagree), D (disagree), U (undecided), A (agree), and SA (strongly agree). See Appendix I for Round II list of comments from participants regarding: Constraints.

Table 5: Results from Round II: Participants Indicate Disagree or Agree with the Statements Distilled from Round I

"What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?"	SD	D	U	A	SA
a. Inadequate knowledge of food safety	0	3	2	10	4
b. Difficult to understand and comply with international food safety standards	0	1	1	13	5
c. Differences in culture including, food habits agricultural practices, Islamic food laws	0	1	2	10	7
d. Political: Economic concerns before public health	0	4	0	9	7
e. Too many government agencies	0	5	3	9	3
f. SPS is being used to politically deter imports	0	3	6	5	5
g. SPS is being used to politically deter imports	0	3	7	5	6
h. Type of pathogens commonly Asia Pacific and US	0	6	4	7	2
i. Data from industry considered propriety rights	0	8	4	7	1
j. Pest control more complex in tropics	0	3	5	8	4
k. Tolerances to be agreed on to reflect value of food trade between Asia and U.S.	0	2	9	6	3
l. Standards are based on detectable criteria, not on implemental criteria	0	3	4	11	2
m. Limited government framework (enforcement, regulations, laws, resources) in developing countries	0	1	0	0	12
n. Difference in type of business - mechanized vs. small operations	0	1	4	9	6
o. Systems for monitoring greatly affected by politics	0	3	4	10	3
p. U.S. has a highly sophisticated food safety infrastructure and it is difficult for many countries in Asia region to meet U.S. requirements	1	2	2	11	4

Results of Mechanisms

Participants in Round II were asked to answer the question, "What are the mechanisms used to solve food safety problems?" See Table 6 for the responses and to what degree they indicate disagree or agree with the statements distilled from the responses in Round I. See Appendix J for Round II list of comments from participants regarding: Mechanisms.

Table 6: Results from Round II: Participants Indicate Disagree or Agree with the Statements Distilled from Round I.

"What are the mechanisms used to solve food safety problems?"					
	SD	D	U	A	SA	%
a. Food and Drug Agencies (government) control all food	1	3	1	12	2	70%
b. Goods must be registered	1	5	2	10	2	60%
c Laws mandatory	0	0	0	1	12	95%
d. Groups of Ministers have been established to resolve issues	0	5	5	9	1	50%
e Technical assistance from developing. countries	0	1	0	11	8	90%
f. Risk analysis training	0	0	0	8	12	100%
g. Building food recall systems	0	0	3	12	5	85%
h. Visit developing countries	0	0	2	14	3	85%
i. Ban agricultural products that may pose a risk to human health	1	2	3	10	4	70%
j. Intensify research when problems arise	0	3	2	9	6	75%
k. When problems arise obtain expertise from other countries	0	1	2	15	2	85%
l. Adjust inspection systems-based on science	0	0	0	13	7	100%
m. Involve stakeholder participation (farmers, food industry, retail, consumers)	0	0	1	10	9	95%
n. Improve risk communication	0	0	1	11	8	95%
o. Test chemical and microbes in food-domestic and imported	0	0	0	14	6	100%
p. Legislation lobbying	0	2	8	7	2	45%
q. Mass media	0	0	6	11	2	60%
r. Food industry self-regulation	1	4	3	7	4	55%
s. Utilize experts (universities, professorial groups, trade groups)	0	0	1	12	7	95%
t. Voluntary standards	3	6	1	9	1	50%
u. Risk assessments are followed by risk management actions	0	1	1	8	10	90%
v. Education and training of all Stakeholders (farmers, consumers, producers)	0	0	1	9	10	95%
w. Create rapid alert systems	0	0	2	10	8	90%

Statistical Analyses to Develop Round III of Delphi

The responses from the participants were entered into a Word Excel© spreadsheet to allow for statistical percentile. This was done to examine the group responses and determine what questions score above the 75th percentile. The list of responses distilled from the group regarding: "What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States" is shown in Table 7. In addition, there is a list of responses above the 75th percentile from the group regarding: "What are the mechanisms used to solve food safety problems in the Asia Pacific region and the United States" also shown in Table 7.

Table 7: Summary of Participant's Responses Above the 75th percentile

"What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?"
• Inadequate knowledge of food safety (microbial, chemical, technical capability) in developing countries; • Difficult to understand and comply with International food safety standards; • Differences in culture including, food habits, agricultural practices, Islamic food laws; • Political: Economic concerns before public health; • Difference in type of business- mechanized vs. small operations; and • U.S. has a highly sophisticated food safety infrastructure and it is difficult for many countries in Asia Pacific region to meet U.S. requirements.
"What are the mechanisms used to solve food safety problems?"
• Food laws - mandatory; • Technical assistance from developed countries; • Risk analysis training; • Building food recall systems; • Visit developing countries; • Intensify research when problems arise; • When problems arise obtain expertise from other countries; • Review and adjust inspection systems, based on science; • Involve stakeholder participation (farmers, food industry, retail, consumers); • Improve risk communication; • Test chemical and microbes in food-domestic and imported; • Utilize experts (university, professional groups, trade groups); • Risk assessments are followed by risk management actions; • Education and training of all stakeholders (farmers, consumers, producers); • Creating rapid alert systems.

Electronic Communication Comments

All of the participants who completed the tasks for Round I completed the task for Round II. Two individuals sent an electronic communication requesting participation in the study, although they had missed participation in Round I. The electronic communication inviting participants to join the study during Round I was received while they were out of town. A participant who completed Round II did not include the PIN/ID number, therefore there is an assumption that one response was from the group who completed Round I and move to Round II. An electronic communication was sent as a reminder one week before the end of Round II. As a result the final two responses were received.

Results of Delphi Round III

The last section of the results elaborates the findings from the first two survey rounds in an effort to build group consensus. The electronic communication was extended to include the participants from Round I and Round II, which formed a panel of 20 individuals. When Round III began, two participants responded: "out of office" and e-mail address not working. See Appendix K for a list of countries represented in which participants completed the tasks in Round III.

- 19 participants completed Round III
- 8 countries were represented
- 1 International agency
- 40% of the participants were from developing countries

List of Key Constraints

Round III of the Delphi process is an attempt to build group consensus. See Table 8 for complete breakdowns of group results to the question do you agree or disagree to the statements regarding: "What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?" The group was unable to unanimously agree on any of the key constraints identified in Round II to a harmonized food safety system in the Asia Pacific region and United States:

Table 8: Results of Round III: Participants Responses (Agree or Disagree): "What are the Key Constraints to a Harmonized Food Safety System in the Asia Pacific region and the United States?"

"What are the key constraints to a harmonized food safety system in the Asia Pacific region and the United States?"		
Agree	Disagree	Statement
17	**1**	**Inadequate knowledge of food safety**
16	**2**	**Difficult to understand and comply**
17	**1**	**Differences in culture, including food habits**
15	**3**	**Political: Economic concerns before public health**
14	**4**	**Difference in type of businesses**
15	**3**	**U.S. has a highly sophisticated system**

List of Mechanisms to Address Food Safety Issue

Round III of the Delphi process also attempted to build group consensus for the questions "What are the mechanisms used to solve food safety problems?" See Table 9 for complete breakdowns of the group response to the question do you agree or disagree to the statements regarding: "What are the mechanisms used to

solve food safety problems?" The group was able to completely agree on several of the mechanisms identified in Round II essential to harmonizing food safety systems in the Asia Pacific region and United States.

- Risk analysis training;
- Review and adjust inspection systems, based on science;
- Involve stakeholder participation (farmers, industry, retail, consumers);
- Improve risk communication;
- Utilize experts (universities, professional groups, trade groups);
- Risk assessments are followed by risk management actions; and
- Education/training of all stakeholders (farmers, consumers, producers).

Table 9: Results of Round III: Participants Responses (Agree or Disagree): "What Are the Mechanisms Used to Solve Food Safety Problems?"

"What are the mechanisms used to solve food safety problems?"		
Agree	Disagree	Expert Consensus
12	**6**	**Government control of all food sold**
18	**0**	**Risk analysis training**
15	**3**	**Building food recall systems**
15	**3**	**Visit developing countries**
16	**2**	**Intensify research when problems arise**
17	**1**	**Obtain expertise from other countries**
18	**0**	**Review and adjust inspection systems,**
18	**0**	**Involve stakeholder participation (farmers, industry, retail,**
18	**0**	**Improve risk communication**
16	**2**	**Test food – domestic and imported**
18	**0**	**Utilize experts (universities, professional groups, trade groups)**
18	**0**	**Risk assessments are followed by risk management**
18	**0**	**Education/training of all stakeholders**

Summary of Key Findings

The key findings developed and agreed to by the participants regarding key constraints include: inadequate knowledge of food safety in developing countries; difficulty in understanding and complying with international food safety standards; differences in culture, including food habits, agricultural practices, Islamic food laws; political and economic concerns before public health; difference in type of businesses-mechanized vs. small operations; the U.S. has a highly sophisticated infrastructure, therefore, difficult for many countries in the Asia Pacific region to meet U.S. requirements.

Those recommendations unanimously agreed to by all of the participants are: 1) Risk analysis training is needed to ensure a systematic approach to science-based decision making; 2) Review and adjust inspection systems, based on science, using methods that are consistent to the international community; 3) Involve stakeholder participation, include building partnerships; 4) Validated risk communication research is needed; 5) Utilize relevant expertise from universities, professional groups, trade groups, and food safety writers when developing food safety systems; 6) When developing food safety policy, risk assessments are followed by risk management actions; and 7) There is a need to educate/train all stakeholders (farmers, consumers, producers, media, and regulators) in a clear and consistent manner. In addition, more than 30 recourses were identified to address food safety in the Asia Pacific region and the United States.

Chapter V

Conclusions, Observations and Recommendations

Introduction

This chapter contains conclusions and observations drawn from the major findings in this study. Chapter V concludes with recommendations for using the findings, as well as recommendations for further research. The purpose of this research was to develop a list of key constraints to harmonized food systems, mechanisms used to solve food safety problems, and resources available in the United States and the Asia Pacific region. Many findings of this study are supported by the literature. New information pertaining to this topic, particularly to the United States and the Asia Pacific region, were also discovered.

The Delphi Method utilized in gathering information was effective in proving that: 1) geographically diverse participants can come together via electronic communication to provide useful information in a cost effective way; 2) findings from this study can be used to develop regional strategies to address food safety capacity building; 3) working groups can be formed and may continue beyond participation in the study; 4) this platform is adaptable and may be useful to other countries/regions; and, 5) the Internet offers an opportunity for interaction and encourages timely responses.

Discussion of Research Objectives

The discussion is categorized according to the corresponding research objectives.

Objective 1 - To utilize the Delphi method, via electronic communication, to enable interaction among a panel from diverse backgrounds and locations.

An objective of this study was to use the Delphi method to determine if interaction between a panel from geographically diverse backgrounds and locations would occur. By using the World Wide Web to deliver a Delphi method study a solution was found in recruiting a panel of participants from diverse backgrounds and locations. This approach was able to generate interaction from an international panel of participants who lived in both developed and developing countries, across many time zones, and with multiple cultural and work related differences. The results from this process will be useful in future efforts to obtain input from geographically diverse individuals constricted by resources to meet face-to-face.

When international food safety standard setting forums occur there tends to be a proportionally higher representation from developed countries (Traill et al., 2002). For the most part, developing countries are unable to afford the expense of travel and have limited resources for participation. Frequently, individuals who could afford participation, are needed in their home countries and are unable to attend out-of-country meetings. These results of this study demonstrate that the Delphi technique is an alternative method of improving communication.

Extensive output of time away from work and costs such as overseas travel, long distance telephone calls and/or traditional mail can be avoided.

Since food safety is a global issue, participation from developing countries is necessary to help establish international standards, guidelines and other recommendations. Currently, the Codex Alimentarius Committee is seeking a means for greater participation and representation of all countries to obtain international consensus for food safety requirements (Moy, 2002). For more than 40 years, Codex has played a leading role in providing scientific information through a science-based exchange of views to reach a consensus (Hiroshi Yoshikura, 2000). In the past, this forum has required face-to-face meetings resulting in international guidelines that affect every aspect of food systems (food labels, levels of contaminates maximum residue limits of pesticides and rules for animal feeding). Representatives from international organizations have recognized that there is a need for the process of consensus building among food safety experts; however, it is clear that building consensus must include all of the stakeholders (*Provision of Scientific Advice to Codex and Member Countries*, 2004). The participants in this study emphasize the point by stating, "Solving problems in relation to food systems, industry and regulations calls for a round table discussion," and "It is difficult to understand and comply with rapidly changing international food safety standards. There needs to be improved communication and dissemination of information." Clearly, the Delphi Method has provided a viable solution to bringing together interested parties in a cost effective way.

At times the nature of food safety is political and therefore anonymity is particularly valuable when individuals may feel constrained in expressing their

own views (Linstone & Turoff, 1975). "Frequent changes in food standards in the developed world and lack of proper flow of information to the developing countries, not allowing reasonable time and duration, is an example of how the international standards setting process is being used to politically deter exports" is a summary statement made by a participant of this study. By employing the Delphi method, anonymity of each participant is assured and the diversity of the participants is preserved by avoiding dominance.

It has been recognized that better communication is needed to ensure scientific procedures to promote public health and food safety (Rampton & Stauber, 2001). Governments everywhere are seeking ways to engage stakeholders and promote open discussions. As stated in Golzynski's study, "The Delphi method provided a reasonable start for examining complex topics" (Golzynski, 2001). Going one step further, this study's high participation rates, readiness to participate and quality of responses successfully indicates the Delphi method as an exceptionally suitable tool for international food safety forums to communicate with diverse groups.

Objective 2 - To identify a list of key constraints to a harmonized food safety system in the Asia Pacific region and the United States.

Published literature addresses constraints to harmonized food safety systems on a global scale. There have been reports that food safety systems in the Asia Pacific region lack food laws, resources, and government support. In addition, the U.S. food system, compared to the world, is a very sophisticated structure. Yet, the interconnectedness of our global food supply calls for a more detailed

understanding of what are the constraints to harmonized food safety systems in the Asia Pacific region and the United States. The panel of participants in this study were able to develop and agree to several constraints that include: inadequate knowledge of food safety in developing countries; difficulty in understanding and complying with international food safety standards; differences in culture, including food habits, agricultural practices, Islamic food laws; political and economic concerns before public health; difference in type of businesses-mechanized vs. small operations; and the U.S. has a highly sophisticated infrastructure difficult for many countries in the Asia Pacific region to meet U.S. requirements. The responses from this study provide important information.

In some situations, food safety constraints focused on differences of food habits and cultural conditions of countries (Fox & Hackney, 2003; Kaferstein, 2003; Ryser, 1999). For example, responses from some participants in this study bring to light important slaughter practices to ensure Halal meat and Muslims' willingness to purchase food from the United States. "The halalness (the Islamic lawfulness) of the food for people in the Moslem countries may not be understood by people from non-Moslem countries." This forum is able to bring to focus on behaviors that may not be scientific food safety issues, but never-the-less affect trade.

Participant responses indicate a willingness among experts in food safety need to work together and address issues in harmonizing food safety systems. One participant stated, "Developing countries need to focus on building partnerships to solve problems." This study identifies key constraints to providing food safety

experts with a list of issues that need to be addressed. Very few research studies exist that explicitly view the constraints, mechanisms, and resources used or needed to create international food safety systems.

Objective 3 - To identify a list of mechanisms used in solving food safety issues in the Asia Pacific region and the United States.

This objective asked participants to identify relevant mechanism for solving food safety issues in both the United States and the Asia Pacific region. The comments from the participants provide a roadmap for developing and instituting mechanisms required in solving food safety problems in both developed and developing countries.

Those recommendations for mechanisms unanimously agreed to by all of the participants are:

- Risk analysis training is needed to ensure a systematic approach to science-based decision making.
- Review and adjust inspection systems, based on science, using methods that are consistent to the international community.
- Involve stakeholder participation (farmers, industry, retail, media, and consumers); include building partnerships.
- Validated risk communication research is needed to improve risk communication.
- Utilize relevant expertise from universities, professional groups, trade groups, and food safety writers when developing food safety systems.

- When developing food safety policy, risk assessments are followed by risk management actions.
- There is a need to educate/train all stakeholders (farmers, consumers, producers, media, and regulators) in a clear and consistent manner.

Risk analysis weighs relevant risk factors, using science-based practices. In the past century, science has added insight into food safety issues. As a result, governments are asked to regulate public exposure to contaminants/risks in food, water and the environment. It is necessary to have consistent application, using science-based principles and transparency of the results. The role of the local government is to protect its citizens and have a need to develop relevant food laws based on risk analysis data. In developing countries they may not have the capacity to adequately determine their science-based risks (Henson, 2003).

This study found that many countries have a need to change food safety requirements and add more science-based research capacity. Without epidemiological data policy makers have difficulty making food safety decisions. Many countries are shifting their resources to adopt risk assessment practices, as stated by a participant from Japan; "Last year, the Japanese government adopted Risk Analysis as a key food safety policy and established the Food Safety commission in the cabinet office." However, as several participants of this study stated, "Differing capacities to develop and implement regulatory programs and infrastructure are currently key constraints to harmonized food safety systems."

Furthermore, findings stress the need to involve stakeholder participation (farmers, industry, retail, consumers). There is an increasing appreciation of the

importance of involving interested parties in the decision making process. While the participants in this study see stakeholder participation as being necessary, how to gain participation was not addressed. The literature has begun to introduce more opportunities for participation and more research to understand how to obtain good stakeholder participation (Anex & Focht, 2002).

The advice of experts is usually sought as a means of gaining background information and insight from past experience (Starr, 2003). When a food safety problem arises, the participants in this study all favored working with developed countries, seeking experts who have experience. This may indicate a readiness to include regional work plans for countries. For example, New Zealand and Australia have developed a food safety authority for both countries and The European Union (EU) has created one Food Safety Authority for member nations. The U.S. food safety programs are committed to assist other countries in training or education. One participant from the National Food Safety and Toxicology Center on the campus of Michigan State University stated a willingness to work with any country in the Asia Pacific region to help develop targeted research, partner with international agencies and reach out to those interested in working with international food safety issues. Further the response included this comment, "There are enough similarities between the U.S. and most Asian countries in the area of food safety and food control that there can be joint projects, training and exchanges."

Objective 4 - To identify resources (websites, publications, and unpublished reports) available to address food safety issues in the Asia Pacific region and the United States.

The resources identified by the participants can be sorted into three major categories:

1) electronic; 2) government and regulatory functions; and 3) training.

Of all the identified resources, the participants unanimously listed training/workshops as being the most important resource to address food safety. Training is able to link food safety experts with those individuals and countries as a means of addressing constraints and establishing mechanisms for solving food safety problems in both the Asia Pacific region and the United States. Many food safety issues require opportunities to continuously gain new knowledge. A closer look at the results provide a picture of what the participants of this study are currently using for resources and professional development (Figure 3).

Figure 3. Three Categories of Food Safety Resources

Electronic: websites, food safety forums, publications, committee reports, research reports, newspapers, and magazines

Government and regulatory: national legislation and standards, inspection reports, Codex standards, government publications

Training: materials, workshops, experiences, consultants, NGOs, consultants, universities, international organizations training materials, and hands-on experience

For Further Research

Findings from this research and other studies have provided a wealth of information that can be used to improve the safety of global food systems. The following recommendations for practice and further research result form this study are:

1) Epidemiologist surveillance data is needed to construct a primary list of incidences of food borne illness. Risk assessment data is urgently needed in developing countries to validate food safety guidelines specific to each country; eating habits, religious food laws, environment, agricultural practices and food processing systems.

2) Responses from participants indicate eagerness to work together and share experiences with other food safety experts. One participant commented, "We should not wait for problems to arise before intensifying research." There is a tremendous amount of work to be done in the area of food safety. A more realistic approach could include regional centers of excellence and technical resources such as, human development and laboratories that are able to support regional food safety goals by sharing similar concerns.

3) The Delphi method proved to be effective in communicating with geographically diverse populations. Further use of this process would increase the ability to advance collaboration and offer a viable alternative for face-to-face meetings when cost and travel time is prohibited.

4) The results of this study support the need for education and training. As a next step, the participants in this study should be encouraged to continue to work together and develop plans for regional training. Common themes have been brought to light as a result of this study. The participants can begin by compiling a more detailed list of their national resources into a usable publication. There is an opportunity to utilize this already formed group of international participants to help build capacity in food safety. For example, interested members of the group could be invited to contribute to a unique global food safety handbook or advanced web-based site available as a source of support or help.

APPENDICES

APPENDIX A

E-mail to Identify Experts

E-mail to Identify Experts

My name is Cathy Pisano. I am a PhD candidate at Michigan State University and I currently work at the Institute of International Agriculture.

For my dissertation research, I would like experts in food safety to rank order barriers to a harmonized food system in the Asia Pacific region and the United States. The technique that I plan to use is the Delphi method, which will be administered via the Internet.

As part of the methods for this study, I need to identify international experts in the field of food safety. I am asking you for your help in identifying potential people. After I have a list of potential participants, I will ask each to formally participate in the Delphi study. Your participation is completely voluntary.

If you would please send me a list of 3-4 people (name and e-mail address) who you feel are experts in the field of food safety. I am specifically looking for a wide variety of people who are active in their current professional roles. I would like to contact people that have an ability to be futuristic in their thinking.

This is not a commitment to this study. If you have questions, please do not hesitate to contact me.

I will need these names no later than January 30, 2004. Thank you for your help and support.

Cathy Pisano

APPENDIX B

E-mail Instructions - Round I

E-mail Instructions - Round I

Dear,

Approximately two weeks ago a colleague suggested your name as a potential participant for this study. They indicated that you have expertise to share.

Because of this expertise-- you have been chosen to participate in an international Delphi study. This study seeks your unique insight to uncover key constraints to a harmonized food system in the Asia Pacific region and the United States. Your input is vital because of your experiences with food safety issues in your region.

This Delphi study is anonymous to allow diverse ideas to be introduced. The purpose of this study is to understand: Key constraints towards harmonized food safety in the United States and the Asia Pacific region. The Delphi sequence: Round (1) data is collected--Round (2) allow you to rate the issues---Round (3) refine/clarify the issues.

The overall time line: 10 days to complete each round - Participation in study completed in March.

You are free to change your opinion at anytime during the process. Participation is voluntary and you will receive the results of this study. By participating, your valuable input will benefit the international community.

To access the study, click on the link "Proceed to Delphi Study" and your Internet browser will be directed to the Delphi web page.

- The user name is **cathyp** and password is **aghall319**.
- You will need to enter your participant number
- **Your number is Participant Number is xxx**
- If you attempt to go "back" to this page once you have started, you may lose information.

Once again, thank you for taking the time to assist in this study.

Cathy Pisano
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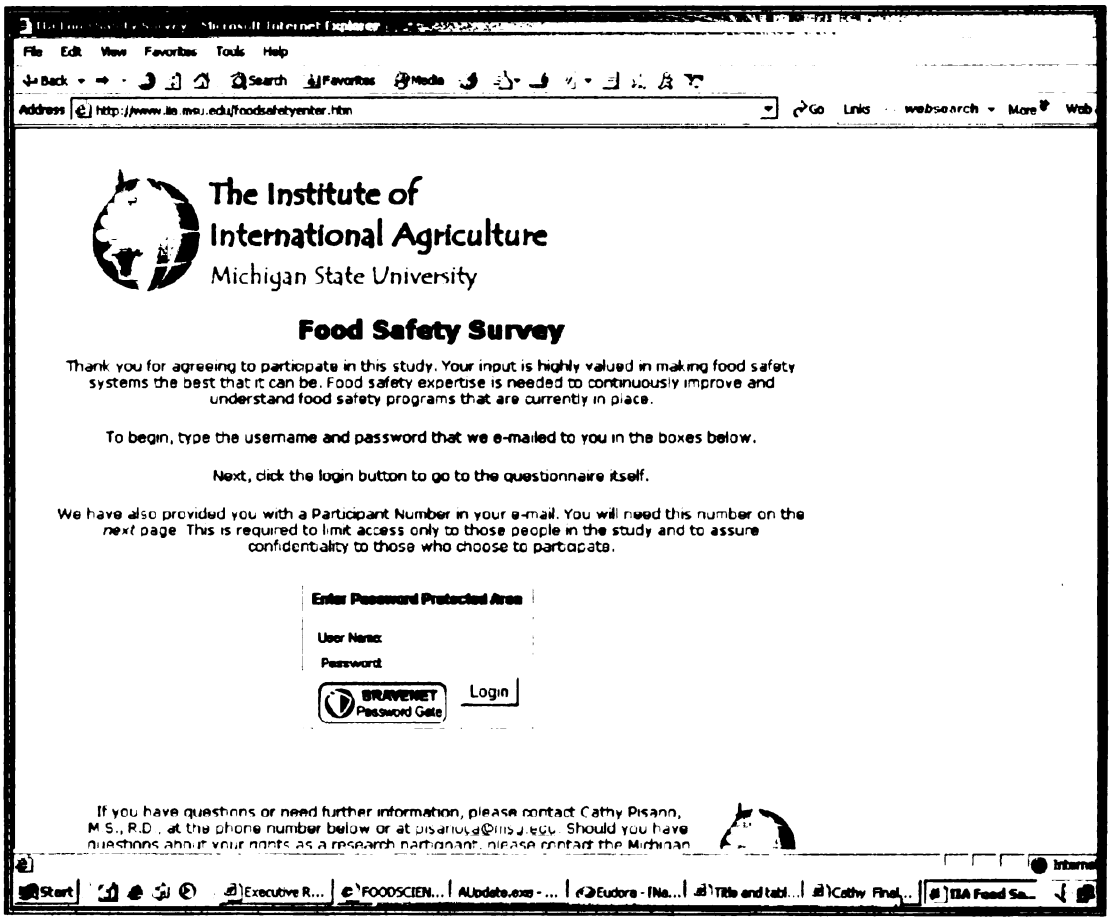
319 Agriculture Hall
East Lansing, Michigan 48824
Phone: (517) 432-8112
Fax: (517) 353-1888
E-mail: pisanoca@msu.edu

For questions or concerns regarding your participation in this study contact:

University Research Involving Human Subjects (UCRIHS)
Chair, Peter Vasilenko
Phone: (517) 355-2180
Fax: (517) 432-4503
e-mail: ucrihs@msu.edu

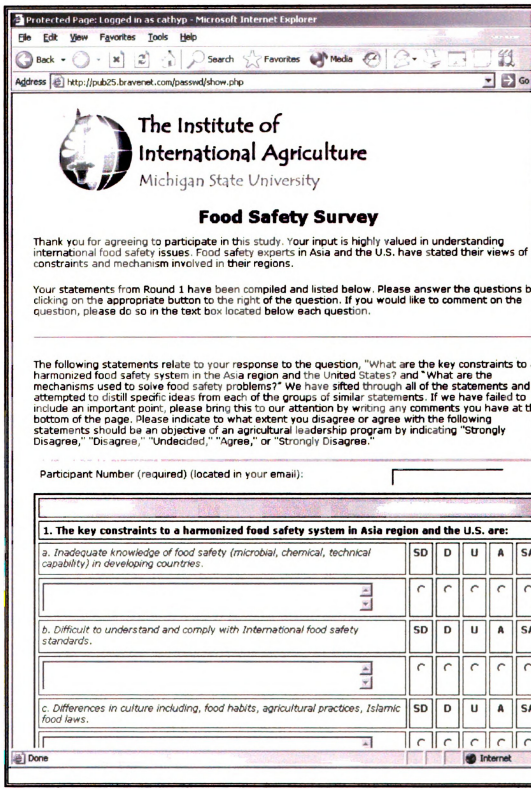
APPENDIX C

Sample of password protected Web-based survey


File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://www.ile.msu.edu/foodsafetycenter.htm
Go Links websearch More Web
The Institute of
International Agriculture
Michigan State University
Food Safety Survey
Thank you for agreeing to participate in this study. Your input is highly valued in making food safety systems the best that it can be. Food safety expertise is needed to continuously improve and understand food safety programs that are currently in place.
To begin, type the username and password that we e-mailed to you in the boxes below.
Next, click the login button to go to the questionnaire itself.
We have also provided you with a Participant Number in your e-mail. You will need this number on the next page. This is required to limit access only to those people in the study and to assure confidentiality to those who choose to participate.
Enter Password Protected Area
User Name:
Password:
BRAVENET Password Gate
Login
If you have questions or need further information, please contact Cathy Pisano, M.S., R.D., at the phone number below or at pisanocg@msu.edu. Should you have questions about your rights as a research participant, please contact the Michigan
Start
Executive R...
FOODSCIEN...
AUpdate.exe - ...
Eudora - [Ne...
Title and tabl...
Cathy Final...
IIA Food Sa...

APPENDIX D

Example of Web Based survey


Protected Page: Logged in as cathyp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://pub25.bravenet.com/passwd/show.php
Go
The Institute of
International Agriculture
Michigan State University
Food Safety Survey
Thank you for agreeing to participate in this study. Your input is highly valued in understanding international food safety issues. Food safety experts in Asia and the U.S. have stated their views of constraints and mechanism involved in their regions.
Your statements from Round 1 have been compiled and listed below. Please answer the questions by clicking on the appropriate button to the right of the question. If you would like to comment on the question, please do so in the text box located below each question.
The following statements relate to your response to the question, "What are the key constraints to a harmonized food safety system in the Asia region and the United States? and "What are the mechanisms used to solve food safety problems?" We have sifted through all of the statements and attempted to distill specific ideas from each of the groups of similar statements. If we have failed to include an important point, please bring this to our attention by writing any comments you have at the bottom of the page. Please indicate to what extent you disagree or agree with the following statements should be an objective of an agricultural leadership program by indicating "Strongly Disagree," "Disagree," "Undecided," "Agree," or "Strongly Disagree."
Participant Number (required) (located in your email):
1. The key constraints to a harmonized food safety system in Asia region and the U.S. are:
a. Inadequate knowledge of food safety (microbial, chemical, technical capability) in developing countries.
SD D U A SA
b. Difficult to understand and comply with International food safety standards.
SD D U A SA
c. Differences in culture including, food habits, agricultural practices, Islamic food laws.
SD D U A SA
Done
Internet

APPENDIX E

E-mail Instructions - Round II

E-mail Instructions - Round II

Dear,

Welcome to Round 2 of the Delphi International Food Safety Survey. We received a wealth of information from all of the responses, information that will help to make food safety better in the future. As you read each statement, please indicate your level of agreement by clicking on the appropriate radio button. When finished please click the "submit" button at the bottom of the page. This will submit your answers to our database.

Thank you for your continued participation in this study. Your input is vital as your experience with food safety issues will benefit the international community. We anticipate that it will take approximately 3-5 minutes to complete this round of the study.

To access the study, click on the link "Proceed to Delphi Study" and your Internet browser will be directed to the Delphi web page.

- The user name is **cathyp** and password is **aghall319**.
- You will need to enter your participant number
- **Your number is Participant Number is XX**
- If you attempt to go "back" to this page once you have started, you may lose information.

Once again, thank you for taking the time to assist in this study.

Cathy Pisano
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Phone: (517) 432-8112
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E-mail: pisanoca@msu.edu

For questions or concerns regarding your participation in this study contact:

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Chair, Peter Vasilenko
Phone: (517) 355-2180
Fax: (517) 432-4503
e-mail: ucrihs@msu.edu

APPENDIX F

E-mail Instructions - Round III

E-mail Instructions - Round III

Thank you for your participation in the international food safety survey. So far we have had 100%---everyone has responded to the previous Rounds of survey questions.

With you participation in this **final round of the study** the issues from Round I and Round II will be clarified. You input is valuable and will benefit the international community.

You are free to change your opinion at anytime during the process and participation is voluntary. You will receive the results of the study.

- To access the study, click on the link http://www.iia.msu.edu/foodsafetyenter.htmd" and your Internet browser will be directed to the Delphi web page.
- The user name is **cathyp** and password is **aghall319**
- You will need to enter you participant number – **Your number is 57**
- If you attempt to go "back" to this page once you have started, you may lose information.

Thank-you for taking the time to assist in this study.

Cathy Pisano
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East Lansing, Michigan 48824
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Fax: (517) 353-1888

APPENDIX G

Countries asked to Participate in this Study

Countries asked to Participate in this Study

Country represented in potential pool food safety expert	Developing/Developed Country	Number of participants
AUSTRALIA	O	12
CANADA	O	1
CHINA	X	3
INDIA	X	5
INDONESIA	X	5
JAPAN	O	14
KOREA	X	11
MALAYSIA	X	9
NEW ZEALAND	O	5
PAKISTAN	X	1
PAPUA NEW GUINEA	X	1
INDEPENDENT SAMOA	X	1
SINGAPORE	X	2
THAILAND	X	12
THE PHILIPPINES	X	8
TONGA	X	1
UK	O	2
USA	O	21
VANUATU	X	1
VIETNAM	X	3
Unknown	X	27
World Health Organization		2
Total: 21	14	Total: 147

Developing country = X, Developed Country =O

APPENDIX H

Countries Participating in Round II

Countries Participating in Round II

Country	Developing/Developed	Number of participants
AUSTRALIA	O	2
CHINA	X	1
INDIA	X	1
INDONESIA	X	2
JAPAN	O	1
PAPUA NEW GUINEA	X	1
PHILIPPINES	X	2
THAILAND	X	2
USA	O	7
World Health Organization		1

Developing country = X, Developed Country =O

APPENDIX I

Round II Comments from Participants: CONTRAINTS

Round II Comments from Participants: CONTRAINTS

a. Inadequate knowledge of food safety

Too sweeping an assumption.

True in various contests in various countries

Some developing countries do have the expertise, like India, but proper institutional set-up is not put in place for monitoring and implementation

b. Difficult to understand and comply with international standards

Either required to undertake trade or country may not recognize significance of referring/adopting international standards

There are new rules and regulations from so many different organizations with different limits.

Made by western Countries

Yes. Reasons are that some of the global food safety standards. Some food standards are based on issues having no relevance to safety measures, for example some standards are based on grading. Codex should take into account the data from developing countries.

If a developing country's standard is scientifically safe, why shouldn't Codex accept it as a global standard instead of searching for more stringent norms at the instance of the developed world?

If you mean international standard by referring to standards formulated by US and the European Union, I would say some of these standards are fixed arbitrarily stringent with a view to restrict imports.

Countries are allowed to fix their national standards for appropriate level of protection (ALOP), but this does not mean they should be arbitrary and politically motivated.

Round II Comments from Participants: CONTRAINTS (continued)

c. Differences in culture including, food habits

Yes, but this is an acceptable point of difference as it reflects different acceptable levels of protection

I strongly agree to this view.

There is a difference in culture and religion leading to difference in food habits and agricultural practices.

Differences in agricultural practices are on account of climatic, agronomic, and socio-economic considerations.

ONE THING IMPORTANT – World over there is a growing consumption of VEGETARIAN FOOD. I am strongly in favor of labeling of food items as VEG or NON-VEG. In India and in some Buddhist countries there is a large section of the people by culture, tradition and religion who consume Vegetarian diet.

In Islamic countries people do not consume pork, hence the food items should be labeled as containing `pork' or `no pork'

d. Political: Economic concerns before public health

Sometimes very clearly so, but not always no I believe most countries work on public health premise in the main; main hurdle is difference acceptable levels of protection.

This leads to different regulation measures and thus disharmony

Sometimes very clearly so, but not always so

Yes, political and economic concerns are at times placed before public health.

This should not continue. For example: The Pepsico and Cococola in India thinks they can continue to supply contaminated carbonated drinks in India and earn profit without investing much in technology up gradation. They think they can over-exploit groundwater and discharge untreated effluent - A recent instance in Kerala in India. These two companies have clout in the government (political consideration

Round II Comments from Participants: CONTRAINTS (continued)

e. Too many government agencies

Its not the number of agencies but their effectiveness and interaction that counts.

It's no good having just one agency if its ineffective. Overlapping agency roles in the USA (USDA, FDA, EPA) has helped ensure good track record in food safety, though doubtless some duplication is in inevitable.

Yes there are too many government agencies in India, may be in other developing countries, dictating food standards.

There is an urgent need for a common integrated food laws

f. SPS is being used to politically deter imports.

I'll let WTO decide that one

SPS is What?

This does occur in some situation but not on the whole. In fact quite the opposite

I strongly agree.

The frequent changing of food standards in the developed world without ensuring proper flow of information to the developing countries and not allowing reasonable time duration is an example of how the standards are being used politically to deter exports

g. SPS is being used to politically deter imports

I'll let WTO decide that one

h. Type of pathogens commonly found in the Asia Pacific and US.

Prevalence differs between countries as well as type so different control measures come into play, but most are common

Types of Pathogens found in Asia and US differ. To cite an example there are 381 pathogens on APPLE grown worldwide, out of which 11 are found in India, 184 in US, 119 in China, 95 in Australia and 119 in New Zealand. The figures show that many pathogens are exotic in respective countries and an issue of concern and hence calls for application of quarantine measures on imports

Round II Comments from Participants: CONTRAINTS (continued)

i. Data from industry considered propriety rights.

No this is secondary consideration

Industry data are, unfortunately, considered as proprietary rights. - BUT THIS SHOULD NOT BE THE CASE.

Industry should volunteer to give out data without any tag to research institutes and standard setting bodies

j. Pest control more complex in tropics

Some are not considered as pests but in the west it is.

Only because resource infrastructure is not possible because of economic constraints

I agree to some extent.

In Tropics humidity is more and hence incidence of pests becomes more related to humidity. But I do not think that the control of pests is complex. If we follow traditional organic practices and use of bio-agents and integrated pests management the issue becomes easier

k. Tolerances to be agreed on to reflect value of food trade between Asia Pacific region and U.S.

Need practicable effective measures, equivalencies and reciprocal arrangements that ensure safety not commercial expedients that could compromise food safety

This should be mutually settled on pure scientific consideration taking into account ground realities

l. Standards are based on detectable criteria, not on implementable criteria.

m. Limited government framework (enforcement, regulations, laws, resources) in developing countries

Sometimes yes, sometimes no

In some countries yes, but not all

Yes. This is reference to the national standards in countries in European Union, US, Japan and other developed countries. That is why I say they are made unnecessarily stringent with a motive to deter imports. The frequent change in standards are based on newer levels of detection

Round II Comments from Participants: CONTRAINTS (continued)

n: Difference in type of business –mechanized vs. small operations.

Yes, I agree, Yes I agree.

Let me give an example. Some people think that mechanized milking of cows is more hygienic. But let me tell you there are scientific case studies to show that blood traces are found in suck milk. The cow's udder gets swelled and blood-clotted. There are instances where small scale operations are hygienic than mechanized ones

Small operation can be just as effective in ensuring food safety as a large mech. One and vice-versa

o. Systems for monitoring greatly affected by politics

Too many other factors.

Not so much politics but resources constraints

Yes, more so in developed world when trade is concerned

p. U.S. has a highly sophisticated food safety infrastructure a

I totally disagree on the issue of genuinely meeting US requirements on food safety. US has sophisticated infrastructure. But the question is on food standards. US has separate standards on pesticide residues for Mangoes and Grapes. Why the limits of pesticide residues are different for these two fruits? What does it mean? It is nothing but political!

APPENDIX J

Round II Comments from Participants: MECHANISMS

Round II Comments from Participants: MECHANISMS

a. Food and Drug Agencies (government) control all food sold.

Food and Drug Agencies (government) control all food sold.

Rather I would say government monitoring of food safety measures

b. Goods must be registered

What do you mean registered? Don't know. Does this reflect that unless you need to trade with US general info is not readily communicated as to policy

c. Food laws - mandatory

Food safety laws are mandatory, not a free for all.

Regulations and law are often non-existent in developing countries.

d. Group of Ministers have been established to resolve issues.

Like setting up a committee--sometimes effective and sometimes futile

This is what often happens but it does not work

Let's hope for its outcome!

e. Technical assistance from developed countries.

YES, mutual interest and benefit--otherwise altruistic gestures

Yes in some situations but not all

Must be emphasized

f. Risk analysis training.

YES, yes.

Yes can assist but follow up needed to ensure enforcement/implementation

g. Building food recall systems.

Workable and not impractical-response in proportion to level of risk

Yes takes lots of resources though

h. Visit developing countries.

Comments from Participants: MECHANISMS (continued)

i. Ban agricultural products that may pose a risk to human health.

To put a ban on product, it should require strong scientific evidence.

In specific instances

This does occur, but often a result of perceived versus real risk-need for expertise in risk assessment

Be very careful--almost everything can pose a risk

j. Intensify research when problems arise.

Before problems occur-proactive rather than reactive

Should happen more

Use value judgment, experience and current standards

Before problems occur-proactive rather than reactive

Should happen more

I think we should not wait from problems to arises before intensifying research, we should tap all resources now before problem arises

k. When problems arise obtain expertise from other countries.

Developing countries need to do more of this-there is a cultural proudness that prevents their authorities directly asking for assistance

Yes but we also have to do our own research to solve our problems

Rather I would say one should always be open in seeking expert advice and for a public debate

l. Review and adjust inspection systems, based on science.

On practical methods that consistently attain the desired results

Comments from Participants: MECHANISMS (continued)

m. Involve stakeholder participation (farmers, food industry, retail, consumers).
Responsible stakeholder participation--avoid, political This is what developing countries need to do Focus on building partnerships to solve problems I strongly agree to this. Also involvement of writers of food safety issues in more important
n. Improve risk communication. Validated, researched and sound risk communication not just posturing
o. Test chemical and microbes in food-domestic and imported. selective basis where and when risk is most likely to occur, random samples--not enough resources More is needed here-resources implications.
p. Legislation lobbying Not an auto response Lobbying for genuine food safety concern without any political or trade benefits
q. Mass media. Sometimes very appropriate-can cause panic Involvement of mass media urgently needed
r. Food industry self-regulation. Were appropriate, not in areas with poor compliance... But not for high risk foods But government agencies should also have regulations
s. Utilize experts (universities, professional groups, trade groups). Relevant expertise, not just enabling self protection, also utilize writers on food safety issues

Comments from Participants: MECHANISMS (continued)

t. Voluntary standards.
Standards in FOOD SAFETY should be MANDATORY - There is no question of such standards being of voluntary compliance
I think we should have common standard
Mandatory standards for basic food safety, voluntary in excess of this.
Doesn't work for high risk foods
u. Risk assessments are followed by risk management actions.
Yes, what's the point of an RA otherwise, though one outcome maybe no action needed
v. Education and training of all stakeholders (farmers, consumers, producers).
But with balance, validated, clear and consistent.

APPENDIX K

Countries Participating in Round III

Countries Participating in Round III

Country	Developing/Developed	Number of participants
AUSTRALIA	O	2
CHINA	X	1
INDIA	X	1
INDONESIA	X	1
JAPAN	O	1
PHILIPPINES	X	2
THAILAND	X	2
USA	O	7
World Health Organization		1

Developing country = X, Developed Country =O

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BIBLIOGRAPHY

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