

# *Towards Harmonizing Food Safety Systems and Increasing Market Access in the Greater Mekong Subregion\**

## **1 Introduction**

The Greater Mekong Subregion (GMS), one of the fastest growing areas in Asia, comprises Cambodia, the People's Republic of China (PRC) autonomous regions of Guangxi and Yunnan, Lao People's Democratic Republic (Lao PDR), Myanmar, Thailand and Viet Nam. Economic growth in the Greater Mekong Subregion (GMS) countries over the past two decades has been remarkable, averaging 7.5% GDP per capita (at purchasing power parity) between 1992 and 2015 (ADB, 2016). During this period, the GMS nations have also achieved dramatic reductions in poverty and admirable increases in food security. However, while food security has improved in terms of availability and access to food, food safety hazards, infectious diseases and pests remain a core concern. Breakdowns in food safety systems in the GMS continue to occur.

In the past, food safety issues in the GMS were primarily the concern of exporters seeking access to markets in more advanced countries. However, domestic demand for safety assured products is increasing and the costs of food safety failures are increasingly well-recognized among businesses and policymakers. Reports of localized, sporadic and widespread acute and chronic foodborne illnesses grab headlines and impact consumer and retailer behavior, as well as national policy, regulation and legislation. In response, improving food safety is now enshrined in the agricultural development strategies of each GMS country. Meanwhile, market access for GMS agricultural products continues to be hampered by variable and often limited ability to demonstrate effective and equivalent risk assessment and control systems for foodborne hazards, infectious diseases and pests of importance to trade. This is particularly apparent among smaller players in food systems, who are hindered by high costs of certification, limited scale and availability and access to appropriate certification bodies.

Establishing harmonized food safety policies and effective surveillance systems that ensure consumers and producers are appropriately protected in an inclusive and sustainable manner is a major challenge for global food supply and a priority for the GMS countries. It is essential that producers and the wider business community work closely with policymakers, regulators and legislators to build optimal systems that protect both consumers and industries in a cost-effective manner. Furthermore, there are clear efficiency and efficacy advantages to the adoption of a regional approach to hazard management in GMS agricultural supply. Foodborne and production hazards rarely recognize land borders and

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the contiguous GMS countries are growing ever more connected through cross-border trade, which will undoubtedly continue with the advent of the ASEAN Economic Community (AEC).

Addressing food safety and food related hazards can support the creation of a more integrated, climate-friendly agricultural sector in the GMS that sustainably harnesses the competitive advantages and unique characteristics of the subregion's agricultural sector. Modernization of trading systems and linking of regional markets can help suppliers meet changing patterns of consumption while presenting opportunities to sustainably strengthen supply. GMS suppliers can compete for current and increasing regional demand while also developing supply chains capable of serving higher-value markets beyond the GMS. Opportunities exist to increase and diversify current lucrative, but restricted, exports from the region and establish the GMS as a recognized supplier of safe, high quality, environment and climate-friendly products in regional and global markets.

A candid assessment of current policy gaps and priorities for investment at national and GMS levels is needed to achieve the goal of establishing the subregion as a leading regional and global supplier of safe and environment-friendly agricultural food products (SEAP). Identifying the right investments and policies through the combined efforts of GMS governments, the private sector and development partners, can harness the considerable strengths of the subregion in agriculture and food production and build the capacity needed to protect domestic consumers and industries adequately while unlocking new markets.

This paper examines the food safety situation in the GMS in terms of risks, the current policy and investment environment and implications for public health and market access. It first provides a framework of key concepts relating to food development, the link between food safety and market access and the importance of risk analysis. Key drivers of food safety initiatives are then identified. Attention then turns to the GMS, beginning with an overview of the subregion, current agro-based value chains and the food safety situation at present. The paper then describes current food safety initiatives in the subregion and identifies key gaps and constraints. Finally, we provide a recommended 'way forward' and next steps to achieving improved food safety and market access for GMS agri-food products.

## **2 The Nexus of Food Development Issues**

### *2.1 Key Food Development Issues*

#### Food Security

In the aftermath of the 1997 global food price crisis, a number of fundamental food development issues became apparent. The abrupt rise in the price of cereals at that time, especially rice, a major food staple in Asia, highlighted the importance of food security. Food security is recognized as a fundamental human right. Despite international efforts to end hunger it remains a global challenge both in terms of availability and food preferences but also in terms of qualities such as nutritional value and food safety (ACIAR, 2017). Historically, substantial areas of the GMS have suffered from inadequate supply of food,

causing considerable hunger and malnutrition, particularly among more vulnerable households. Although the GMS countries have made admirable achievements in terms of food availability and access, challenges remain particularly in relation food safety and nutritional value of food.

The FAO defines food security as ‘when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life’ (FAO, 2017). The concept of food security is founded on the four related components of availability of food, access to food, utilization of food as a source of nutrition and overall health, and stability of food supply. Intrinsic in the four dimensions of food security is that food must be safe and nutritious, which may be viewed as the ultimate goals of food security. In this context ensuring food safety and nutritional value is a human right.

### Food safety and market access

Food safety has received heightened attention in recent years. Foodborne hazards arising from unsafe food are a major global public health and economic burden. At the same time, as food supply becomes increasingly globalized, food safety concerns have become multifarious and impacts on lives and society have magnified, affecting both developed and developing economies. The costs of food safety failures are manifold; they may include, for example, the direct costs of healthcare, lost labor, lost tourism and loss of consumer and retailer confidence in suppliers and food industries. Moreover, in export markets the presence of foodborne hazards can mean rejection of consignments and loss of confidence among trading partners, which may lead to higher regulatory burdens and/or loss of market access under the terms of the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary (SPS) measures. Companies and entire industries can become embroiled in food safety scandals taking years to recover, if they ever do. Note the continued impact of the Jack in the Box *E. coli* outbreak in 1993 on US food standards, Chipotle’s ongoing food safety crisis, the costs of the 2008 melamine scandal in the PRC—estimated to be in the tens of billions, and the multidimensional effects of the recent horsemeat and place of origin scandals in the EU.

It is estimated that there were over 600 million cases of foodborne illness globally in 2010, which came at a cost of over 5.5 million disability-adjusted life years (DALYs) (Havelaar et al., 2015). The WHO (2015a) estimated that foodborne illnesses account for 420,000 deaths worldwide each year. Pathogenic foodborne bacteria and viruses are the greatest contributors to total numbers of foodborne illnesses, costs and deaths (Figure 1). However, parasites and chemicals and toxins are also major contributors despite being less represented in surveillance data—they are typically harder to isolate and/or diagnose in terms of illness and long-term sequelae. Moreover, specific hazards may be more or less prevalent in different contexts and geographic regions, influenced by a multitude of factors including climate, human and animal density, level of development, the capacity of food safety systems, culture and politics among other influencing factors. In the GMS, both pathogens and toxins are major public health and economic concerns.

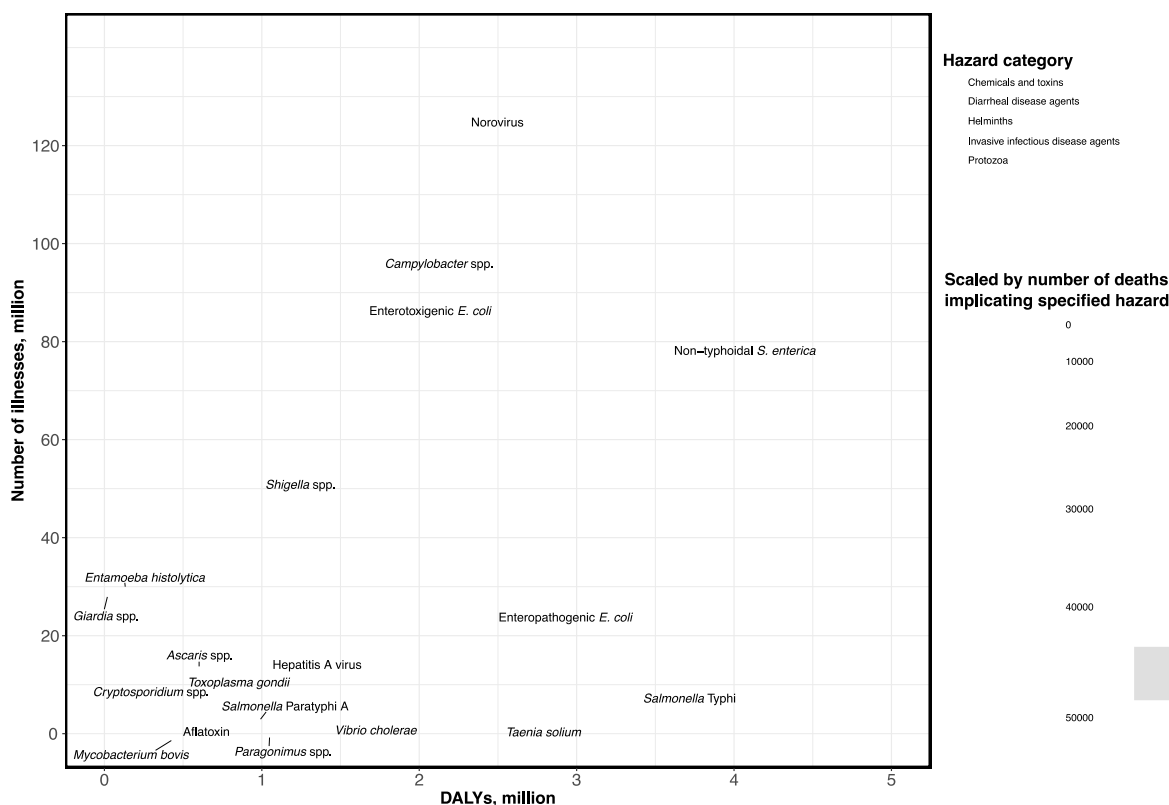


Figure 1. Global estimates of number of foodborne illnesses, cost of foodborne illnesses in disability-adjusted life years (DALYs) and number of deaths by hazard per year (based on estimates from 2010). Figure produced from supplementary data in Havelaar et al. (2015), less significant contributors to the global health burden (<600,000 DALYs per year, <2,000,000 illnesses per year, <10,000 deaths per year) have not been labelled.

In 1995, the SPS agreement established food safety, animal and plant health requirements for trade between countries. The SPS agreement ‘permits countries to take legitimate measures to protect the life and health of consumers, animals and plants provided such measures can be justified scientifically and do not unnecessarily impede trade’ (ARAC, 2017). This is founded on the principles and application of risk analysis and the demonstration of system equivalence in relation to hazards in food and agricultural products. Codex Alimentarius establishes standards, guidelines and codes of practices in relation to food and food safety, the OIE maintains the equivalent requirements for disease and zoonotic agents among production animals, and the IPPC manages the equivalent for plant-based hazards (FAO/WHO, 2003, FAO/WHO, 2001, FAO/WHO, 2009, FAO/WHO, 2010, FAO/WHO, 2012, FAO, 2013, FAO/WHO, 1995, OIE, 2016). These approaches rely on the adoption of effective risk management systems typically reliant on internationally, or bilaterally, accepted standards, which might include GLOBALGAP and process control systems such as HACCP and GMP in processing and distribution. However, standards are myriad and equivalence in design and implementation can vary considerably.

Beyond trading partner requirements, market access is also affected by business enabling environments including national policies, regulations and legislation in relation to exports. The value of trade facilitation and increased trade flows internationally is estimated to be in the hundreds of billions, and emerging economies are expected to gain the most. The GMS countries have made considerable advances in expediting transit at borders by reducing the

burden of documentation and times in transit (ADB, 2016). However, further gains are possible through initiatives such as strategic investment in infrastructure, human capacity, ICT-based systems, sharing of data G2G and B2G, and adjustment of requirements. As well as being economically advantageous, investment in trade facilitation can also improve food quality and safety standards while reducing food waste.

### Understanding the Complex Food Development Issues

The globalization of food supply has led to increasingly complex webs of food systems and supply chains at local, national, regional and global levels. Food security is influenced by productivity, distribution, sustainability and food safety and quality. Maintaining and increasing global food security will only become more challenging as the world's population grows towards nine billion by 2050. In addition, while global poverty levels show signs of decline, malnutrition—undersupply and obesity—continues to be a blight on the world's populations, and malnutrition in the form of poor diet is growing.

Reducing losses in food supply and food waste are part of the solution. So is the sustainable production of higher quality and more nutritious foods that minimizes damage to natural resources, primarily water, soil and air. Continued progress requires concerted efforts of the multitude of stakeholders involved in global food supply chains. These include actions that increase food system stability and build resilience and protection from unintentional and intentional food adulteration—so called food protection and food defense measures.

A typology and links of these complex food development concerns is illustrated in Figure 2.<sup>1</sup>

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<sup>1</sup> Annex 1 provides a definition of terms relating to food safety.

Figure 2. A typology of food development related concepts



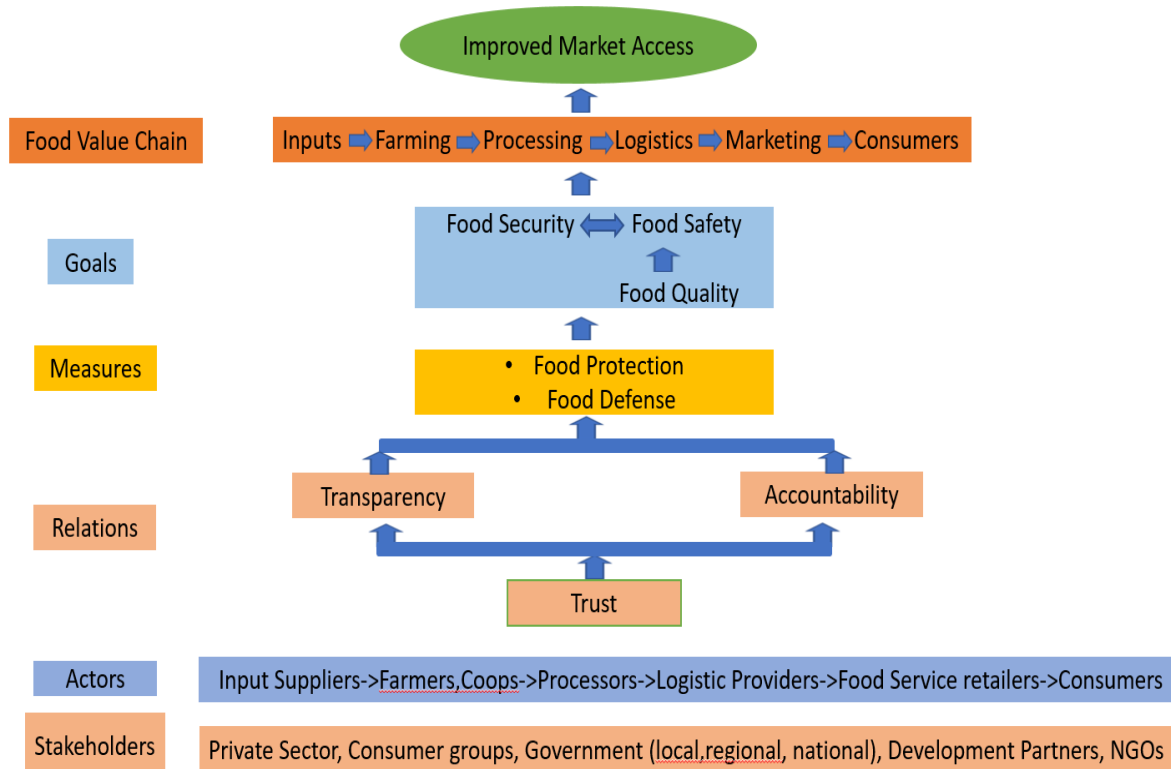
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Figure 2. Typology of Food Development Concepts

Of these multifarious food related concepts, this paper focuses on food safety, which, as noted, is an integral component of food security. Figure 3 depicts links between food safety,

food quality<sup>2</sup>, food protection and food defense, and the need to apply measures the length of food value chains. The effectiveness of these measures in protecting consumers and food industries hinges on the establishment of transparent and accountable relationships between key actors and stakeholders in food chains, which in turn are anchored on the development of trust between players. Harmonized food safety standards in the exchange of agro-based products at regional levels build trust among actors in value chains, which is essential to increase market access.

Figure 3: Interdependence of Food Safety and Improved Market Access of GMS with Organizational and Individual Relations of Different Stakeholders in the Food Value Chain



## 2.2 Drivers of food safety initiatives

### Increasing burden of foodborne diseases

The costs of foodborne diseases are considerable and appear to be increasing. Foodborne diseases can affect economic development; agriculture, food and tourism sectors are typically the most affected. For example, in the US economic losses from foodborne diseases increased from US\$35 billion in 1997 to US\$152 billion in 2010, prompting the passage of the Food Safety Modernization Act in 2011.

<sup>2</sup> Food quality is elaborated in the paper of Annovazi-Jakab, GMS Policy Forum at Thaifex 2017, 31 May 2017.

## Scientific advances

Scientific and technological breakthroughs are increasing our ability to detect and differentiate hazards, to attribute ultimate source and to accurately assess risk. Technologies are rapidly developing and becoming commercially viable, such as routine application of whole genome sequencing technologies, rapid on-site testing and GPS-based traceability systems, while innovative concepts, such as the use of unmanned aerial vehicle (drones), could have commercial applications to make food safer in the near future (Schroeder, 2015). Along with data analytics, these technologies can enable tighter controls along the entire length of supply chains, with the potential to improve risk assessment quality and efficiency considerably. Advances in risk assessment, outbreak investigation, source attribution and traceability systems will increase accountability and enable companies to execute fast better targeted responses, such as product recalls. Traceability combined with social media will give consumers unprecedented access to information relating to the origins and ingredients of food products. Though the potential for misrepresentation and false positives requires careful consideration.

## Global trade in food

Despite growing calls for local supply, food is being traded in greater and greater volumes internationally. Many food businesses now source inputs from low-cost suppliers located around the world. This globalization of food supply has the potential to increase food safety risk and quality issues, and is making traceability and control over supply chains increasingly challenging. In response, the regulatory and testing burden for food products traded internationally has continued to rise, often under the terms of the SPS agreement. This need for assurances has driven further integration of food supply chains, to improve safety and traceability, to protect consumers and suppliers and to meet importer requirements.

## High volume production/processing of foods and longer supply chains

The industrialization and globalization of food supply has changed the risk profile of many foods. The advent of large-scale production and processing has increased efficiency and uniformity of product but failure of a control step can lead to widespread risk of consumer exposure. Furthermore, responses are complicated by the geographic scope, level of exposure and longer shelf lives that risk consumers storing contaminated products for extended periods. Longer and/or more complex supply chains also increase the risk of poor food handling, in terms of temperature abuse and cross-contamination, which may allow hazard multiplication on product.

## Consumer awareness/demand

Global consumer awareness of foodborne hazards is increasing. This reflects changing eating habits, growing urban populations, increased ability to diagnose foodborne disease and attribute source, and increasing public access to information via the proliferation of information sources, notably via social media. The internet allows consumers access to vast quantities of information relating to food and health issues. At the same time, social media enables consumers to share and document their views on the quality and safety of food



products. Widely publicized food poisoning cases contribute to increasing consumer demand for safe food. High-profile food safety and food fraud scandals have triggered public outrage and damaged trust in food industries and governments around the world. With the ubiquity of social media and increasing public interest, a single lapse in food safety and quality control can quickly become a scandal that makes international headlines. Growing consumer awareness has, of course, been reflected in increasing demand for safer products. Furthermore, with growing populations and prosperity, it has been estimated that agricultural production will need to increase by 70% to feed the global population by 2050. Governments and food companies must secure resources to ensure sufficient food supplies in the future.

### Changing retailer requirements

The increasing consumer demand for choice and diversity and quick and convenient healthy food options have altered the food retail industries of many countries. Fresh produce is an increasingly important fixture of retail markets, driven by the desire of consumers to lead a healthy lifestyle. The food supply chain is pushing all food suppliers to apply due diligence and ensure that the safety and quality of fresh produce is not breached. Developing countries are becoming more integrated into the global food market, due to increased consumer demand in Western countries for a year-round supply of exotic products and global sourcing by food retailers. In this context, food industries from developing countries must adapt to the stringent safety and quality standards to gain access into these markets.

### *2.3 Importance of risk analysis*

Risk-based approaches are now widely applied as an objective basis for assessing and recommending policy and investment actions in relation to food safety, zoonoses, broader infectious diseases and pests. Hazards of importance to food safety and trade are numerous, examples include foodborne pathogens and residues, non-foodborne infectious agents including zoonoses, and pests (Table 1). While the primary objective of hazard control is to protect domestic consumers and industries, risk-based approaches are now often essential to access international markets for agricultural produce under the terms of the SPS agreement. Recognizing that demonstrating elimination of all hazards of importance to public health, industries and/or trade from all products is not feasible in practice, food safety systems and market access requirements typically require application of rigorous risk-based approaches. Conceptually, risk is probabilistic, therefore, in terms of food safety and market access related risk we seek to lower the probability of a negative outcome—illness or rejection of a consignment—to levels acceptable to stakeholders (Vose, 2008, Manning and Soon, 2013, Stärk et al., 2006). Ideally, this benefits stakeholders in terms of cost efficiency and efficacy of risk mitigation. To function optimally, risk-based systems require reliability, transparency, accountability and trust.

**Table 1. Examples of hazards of importance to food safety and trade in food products.**

	<b>Category</b>	<b>Type</b>	<b>Example</b>	<b>Disease</b>
Foodborne	Pathogen	Bacterial	Non-typhoidal <i>Salmonella enterica</i>	Salmonellosis
		Viral	<i>norovirus</i>	Enteritis
	Residue	Parasite	<i>Taenia solium</i>	Cysticercosis
		Toxin	Heavy metals	Various
Infectious agents	Non-foodborne zoonoses	Animal health product/growth promotant	Olaquinox	Various
		Production	Influenza A virus	Flu
Pests	Production	Arthropod	FMD virus <i>Sitophilus oryzae</i> (rice weevil)	

There has been considerable development in control systems for foodborne pathogens and other hazards. Food safety risk management has evolved from end-product control to whole chain systems. Early food safety initiatives employed heat treatment methods, the subsequent establishment of Codex Alimentarius outlined broader approaches, protocols and best practices, and nowadays there is increasing application of quantitative risk assessment and legislative and regulatory enforcement of Hazard Analysis and Critical Control Points (HACCP) and related process focused approaches. Designation of Food Safety Objectives (FSO) now seek to establish Appropriate Levels of Protection (ALOP), particularly in relation to microbial levels in food chains, and the International Standards Organization (ISO) has done a great deal to standardize testing protocols and food safety management systems globally (Zweitering, 2013, Doménech and Martorell, 2016, ISO, 2005).

Managing risks the length of food supply chains can reduce end-product risk. Residues and toxins require risk management steps throughout production, including pre-production, to ensure prescribed maximum residue levels (MRLs) are not exceeded. In the case of pathogens, no kill or dilution step is 100% effective and risks of (re)contamination or failure are heightened with higher hazard prevalence and/or burdens (De Busser et al., 2013, Alban et al., 2012, Snary et al., 2016). Ideally, risk management systems might address risk from inputs—e.g. feed safety, antimicrobials, dioxins; through production, in terms of diseases and residues; to post-harvest and the potential for (re)contamination of end-product.

Optimal risk management systems should set the objectives of managing risk so as to provide an adequate level of protection, while minimizing the burden on suppliers in terms of direct and opportunity costs and waste. However, the proliferation of private food standards and requirements for supply among modern distribution channels such as supermarkets, to differentiate or match competitors, continues to drive requirements upwards in terms of both safety and quality. This can be counterproductive, leading to unnecessary food waste and potentially exclusion of smaller suppliers unable to demonstrate compliance with distributor requirements due to the costs, their production-scale and/or limitations in access to accepted certification bodies.

A plethora of standards and guidelines have evolved internationally with the express objective of reducing food safety and disease risks, many of which are now employed in the GMS or have been adapted to the GMS context. In production, these include holistic

standards for good agricultural practices (GAP) at various levels, Global, ASEAN and national, and those that mitigate risk of residues on product such as organic and agro-ecological production methods. There is increasing application of risk-based programs post-harvest such as hazard analysis and critical control points (HACCP) and good manufacturing practices (GMP) in processing, which may be applied holistically under ISO 22000 standards. In addition, culturally driven food safety systems such as halal production and slaughtering provide food safety assurances particularly in relation to pathogens. Meanwhile various traceability systems are employed by private companies, and increasing numbers of public sector led systems that are designed to demonstrate origin, minimize risk of contamination and aid surveillance and responses. However, there remains considerable variability in enforcement of various safety and quality assurance systems, which has caused consumer trust to suffer.

The following sections introduce the Greater Mekong Subregion (GMS) and the current context in relation to agriculture, food safety and market access. The GMS is a subregion within Southeast Asia, which has the potential to become a hub for regional and global food supply. The discussion will center on the food safety environment in the GMS and will explore the food safety and market access related measures required to better protect domestic consumers and businesses and expand export market access for agro-based products from the subregion.

### 3 The Greater Mekong Subregion (GMS): an emerging hub for regional and international food supply

#### 3.1 GMS food production

The GMS is an area bound by the Mekong River Basin (Figure 4). The Subregion is comprised of Cambodia, the Chinese autonomous regions of Guangxi and Yunnan, Lao PDR, Myanmar, Thailand and Viet Nam. With the exception of the Chinese regions, these countries are members of ASEAN and, therefore, the recently established AEC. The ASEAN recognizes GMS and in the AEC blueprint for 2025 ensures close coordination with this subregion especially in terms of narrowing the development gap between the more prosperous and less developed economies in the subregion.

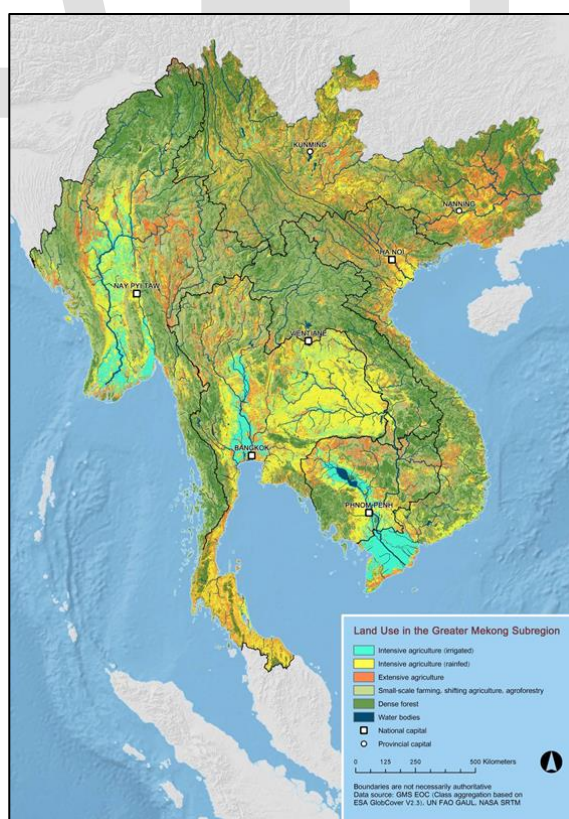


Figure 4. Map depicting land use in the Greater Mekong Subregion. Source: CEP (2017).

The GMS is a major food-producing region. The subregion has various unique and often unharnessed comparative advantages in specific food supply, built upon its abundant natural resources, good climate, low costs of production, proximity to large markets, and the unique food items produced in the region. However, despite the changes that are occurring in the sector, the bulk of current production continues to be consumed locally. The large majority of producers are operating subsistence or semi-commercial systems in fluid, often weakly connected market networks. The introduction of improved genetics, inputs, production practices and intensification and increasing mechanization of production has led to growing productivity in many areas. However, productivity has largely plateaued in the most productive regions.

New entrants and small-scale producers in the GMS often lack access to information, credit, inputs and the specific services necessary to engage fully in market value chains. This can limit access to the stable and/or lucrative markets enjoyed by more established players. They may also struggle to compete on price, due to limited scale, and lack the capacity to meet the volume or quality and safety assurance standards required by buyers. In addition, environmental concerns threaten production. Local environmental degradation threatens future productivity in densely populated and intensively farmed areas, such as the Mekong Delta. While the predicted effects of climate change may alter conditions to the extent that traditional production systems may no longer be viable in some areas.

### *3.2 Economic growth and trade*

The GMS has enjoyed remarkable economic growth over the past two decades, averaging 8.5% GDP PPP growth between 1992, when the GMS program was launched, and 2014 (ADB, 2016). This rapid economic growth resulted in remarkable increases in GDP, though CLM remain LDCs with GDP per capita of less than US\$ 2,000. Intra- and extra-GMS trade fueled the economic upsurge in the region (Figure 5).

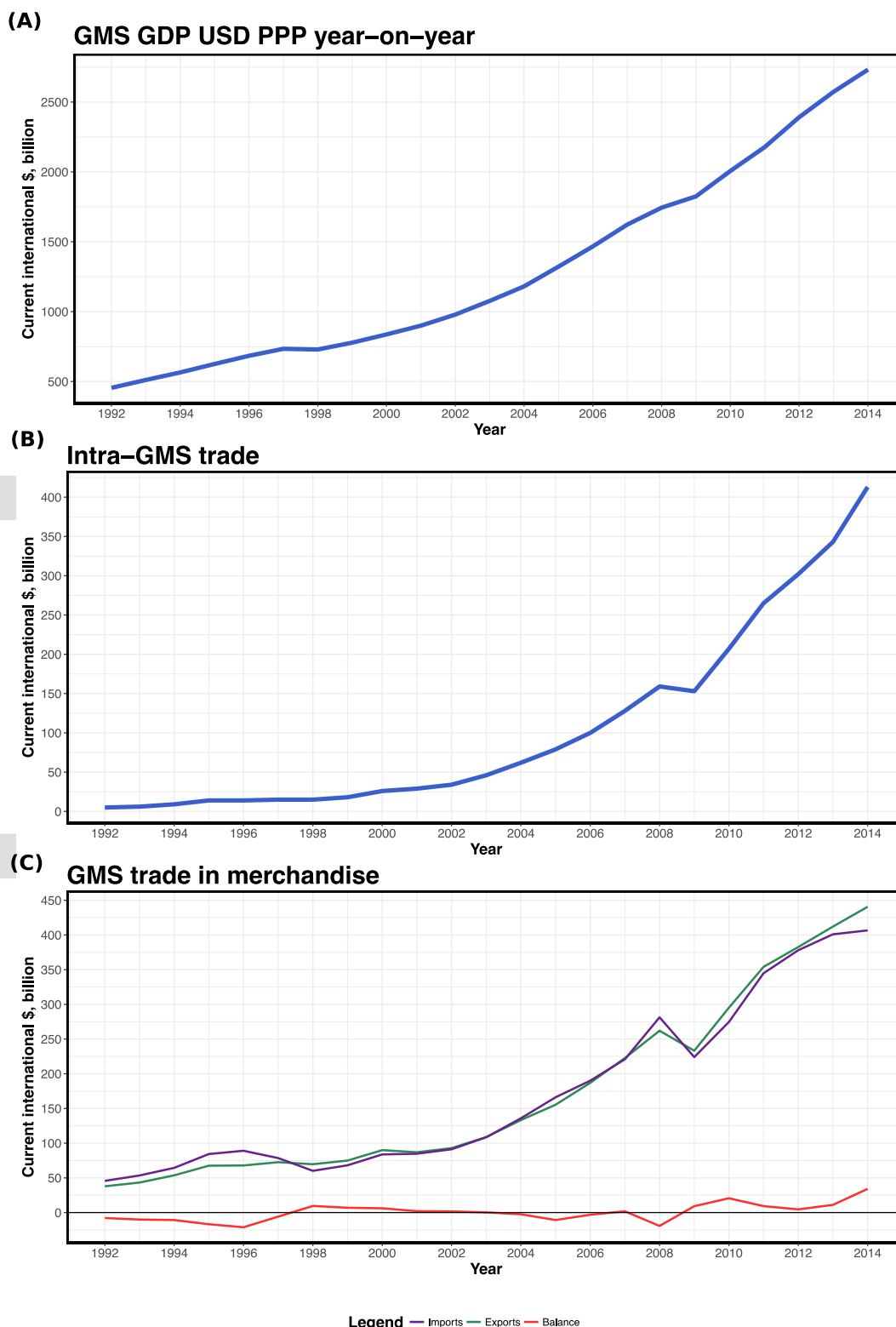


Figure 5. (A) GMS GDP (USD PPP) year-on-year. Data sourced from ADB estimates; ADB Statistical Database System (<https://sdfs.adb.org>); All PRC Data Center; and International Monetary Fund World Economic Outlook database, October 2015. (B) Intra-GMS trade 1992-2014. Source: ADB Asian Regional Integration Center (ARIC) Integration database. (C) GMS trade in merchandise. Data sourced from ADB estimates; ADB Key Indicators for Asia and the Pacific, 2005 and 2015; and All PRC Data Center. NB, scale of y-axis in Figure 3A differs from 3B and 3C.

Agricultural products represented only at most a quarter of the total exports and imports of GMS (Table 2; Annex 2). Among agri-food products, rice was a major export item for Cambodia, Myanmar, Thailand and Viet Nam while sugar and root crop products (cassava, arrowroot and salep) for Cambodia and Thailand. Meat products were a major export commodity of Thailand. Viet Nam had higher exports of coffee than rice; its other major export products were nuts, black pepper, starches and inulin. The PRC's other main export items were vegetable products. Export destinations were within and outside GMS. The EU, US and Japan were the main export destinations for Cambodia, the PRC, Thailand and Viet Nam. Cambodia also exported to Canada, while Myanmar also exported produce to Hong Kong and India. For intra-GMS export trade, Thailand was a major export destination for Myanmar while the PRC was preeminent for both Thailand and Viet Nam.

Table 2. GDP and Agriculture Trade of GMS

<b>Variable</b>	<b>GMS</b>
<b>GDP (billion, current US\$, 2015)</b>	11,552.68
<b>GDP per capita (US\$, 2012-2015)</b>	3,263.67
<b>Trade per capita (US\$, 2012-2015)</b>	1,483.17
<b>% of Agricultural export products to total values</b>	66.8
<b>% of Agricultural import products to total values</b>	33.5

N.B. Agriculture trade shares do not include Lao PDR.

Source: Annex Table 2.

The main imports included soybeans for the PRC, Thailand and Viet Nam; palm oil and its fractions for the PRC and Myanmar; grain sorghum and barley for the PRC; cereal grains and milk/cream products for Myanmar; other food preparations for Myanmar and Thailand; wheat and meslin for Thailand; and corn, coconuts, Brazil nuts and cashew nuts for Viet Nam. The PRC was a main origin of imported products for Cambodia, Myanmar, Thailand and Viet Nam; Thailand was the main origin for Cambodia and Myanmar; and Viet Nam for Cambodia. Main sources of imports originating outside GMS included EU and US for the PRC and Thailand; Korea for the PRC, Myanmar and Viet Nam; Chinese Taipei for China and Viet Nam; Japan for Thailand and Viet Nam; Hong Kong for Cambodia; and Singapore for Myanmar.

The increase in intra-GMS trade indicates rebalancing toward regional markets and suppliers. Exports of Cambodia, Lao PDR and Myanmar (CLM) to the rest of the world (excluding GMS countries) consist largely of low value-added goods. However, intra-GMS exports from the CLM consist mainly of primary commodities. Intra-industry trade in the GMS is largely between the PRC, Thailand, and Viet Nam, indicating that the export baskets of the three countries differ from those of the CLM and that the latter are not yet part of regional production networks. While there has been some rebalancing toward regional markets, the share of intra-GMS trade (except PRC) remains low and there is scope to increase this. Various studies have shown that countries that trade more have a higher income. Thus, policies promoting trade by lowering trade barriers or improving trade facilitation can have a positive impact on growth and poverty reduction.

Current agricultural exports from the GMS countries show the discrepancies within the subregion (Figure 6). There is considerable scope to increase the exports from all countries, and in particular, the CLM countries.

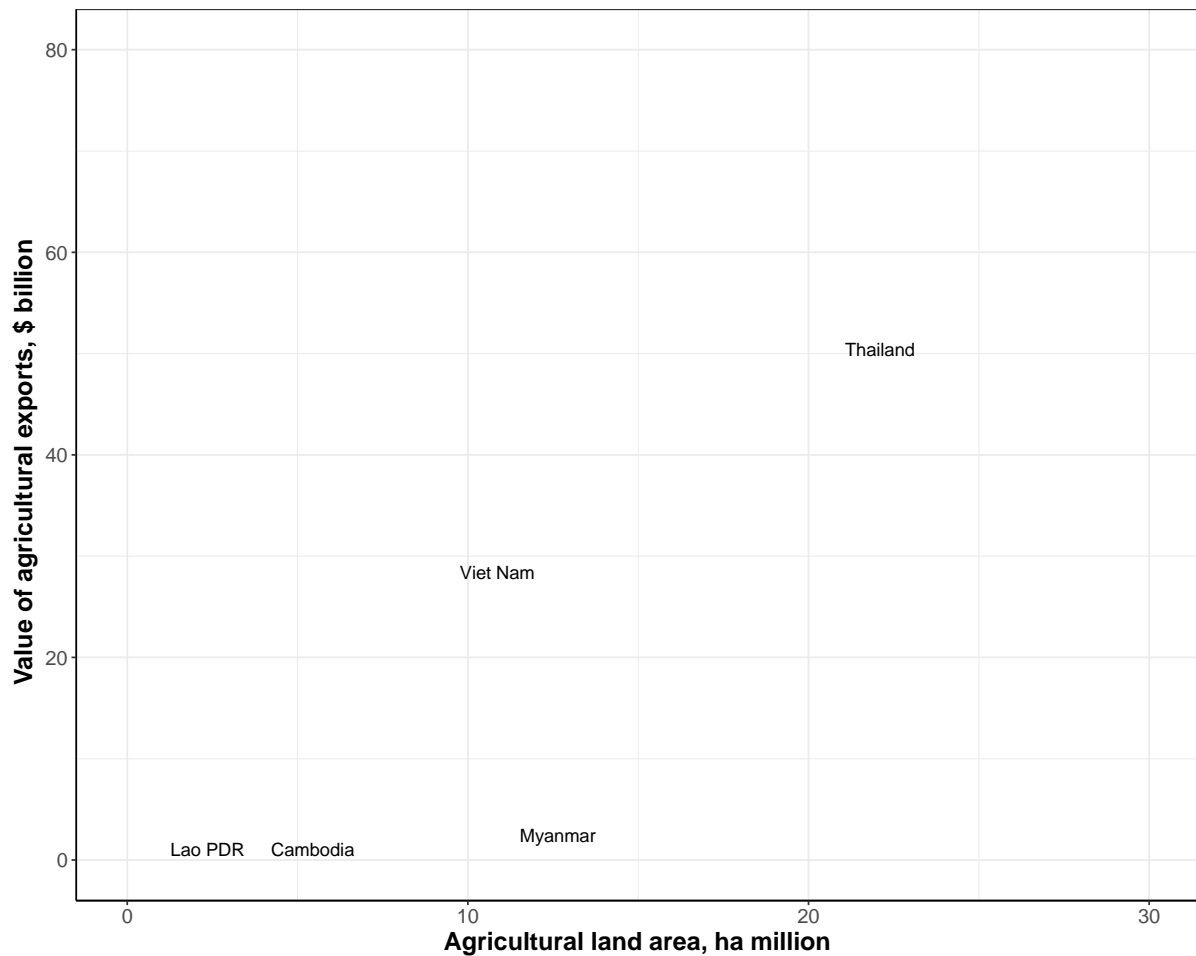


Figure 6. Value of agricultural exports from GMS countries, excluding the PRC autonomous regions of Guangxi and Yunnan (data not available). Bubble scale (linear) indicates total value of agricultural exports. Data sourced from Goletti (2016) and FAOSTAT (2017).

### 3.3 *Rising Intra-GMS agriculture trade and the risks to GMS' agriculture*

Intra-GMS agricultural trade is expected to continue to increase aided by the development of regional transport infrastructure, ICT, banking, and stable macroeconomic policy environment. Trade will be supported by two trends. First, the PRC, and to a much smaller extent Lao PDR and Cambodia, will remain net importers of agricultural goods and food products due to domestic constraints to production growth and the rise of incomes and, consequently, food demand. The PRC will be the main driver of agricultural trade in Asia. The country has become a key market for Thai and Vietnamese agricultural products. Second, the Mekong region is slowly establishing itself as an integrated supplier in the regional agribusiness space, with the upstream sector based in lower-cost producing countries (especially Cambodia), and processing activities located in countries with an

established food manufacturing sector or where the local consumption market is booming (Thailand and Viet Nam). Thailand's agricultural trade structure has evolved over the past decade and the country now imports lower-value raw agricultural products while exporting food preparations, made from meat, seafood, cereals, etc. Some large Thai conglomerates have already commenced expansion of their upstream activities in neighboring countries. For example, Khon Kaen Sugar Industry, the largest publicly listed sugar manufacturer in Thailand, has invested in plantations and mills in Lao PDR and Cambodia. Meanwhile, this sugar company's investments in downstream facilities and value adding continue to operate in Thailand.

There are risks that GMS agriculture and trade face. The Mekong River is a cornerstone behind the fertile lands of Thailand, Lao PDR, Cambodia and Viet Nam. The planned construction of multiple hydropower dams to meet the growing need for energy and the desire for economic growth will drastically change the river flow and, therefore, the ecosystems, irrigation and land profile of the regions along the river (Rasanen, et al., 2017). The Mekong River is a source of livelihoods and food security for about 60 million people; is one of the world's most productive inland fisheries, with an annual catch of 2.6 million tons estimated at US\$ 4-7 billion; its water is used for irrigating huge tracts of rice fields and farmlands; and its banks are farmed with vegetables.

Moreover, climate change is expected to cause a significant increase in average temperatures: southern inland Viet Nam, southern coastal and northern Myanmar, and almost all of Cambodia will see average maximum temperature to rise by around 4 degrees Celsius according to data published by ADB's GMS Core Environment Program. The impact of such a rise is difficult to assess, but may cause increased risks of heat stress and will affect increase pest and disease occurrences and will likely affect agricultural yields and suitability of crop and animal varieties and production methods (USAID, 2014b, USAID, 2014a). Climate change could also lead to a reduction in the agricultural land area of the Mekong delta through coastal erosion, rising sea levels and salination of arable land.

Rising protectionism also poses a risk to international trade prospects (ADB, 2016). The SPS agreement and Technical Barriers to Trade (TBT) measures are increasingly mainstreamed in national trade policies to guarantee the safety of food for consumers and prevent or limit the spread of pests, outbreak of diseases among plants and animals, and other health risks arising from residues (of pesticides or veterinary drugs), contaminants (heavy metals), toxins or disease-causing organisms in foods. Despite their legitimate applications, overly stringent SPS and TBT measures and delays in movement of product can harm trade flows by acting as nontariff barriers, due to high compliance costs for businesses and the perishable nature of some exported products. However, there is a dearth of knowledge on the impact of SPS and TBT measures on trade. SPS and TBT measures have been estimated to have negative impact on exports from developing economies, particularly on Asia's intraregional trade in agricultural products. This suggests policy makers in the region need to act more proactively in resolving nontariff barriers across borders, in particular, by focusing on SPS and strengthening regional cooperation. Adoption and compliance of food safety and quality standards would expand market opportunities for GMS products. The GMS countries have long been members of WTO, established in 1995,



and Codex Alimentarius, established in 1961. Cambodia, the PRC, Lao PDR, Myanmar, Thailand and Viet Nam became WTO members in 2004, 2001, 2013, 1995, 1995, and 2007, respectively, and Codex members in 1974, 1984, 1995, 1978, 1963 and 1989, respectively. The requirements of market access under the SPS Agreement and the overarching food safety principles of Codex are, therefore, well-known in the subregion.

## **4 The GMS Context: Food Safety and Market Access**

### *4.1 Drivers of Food safety in GMS*

As in the global arena, GMS food safety concerns have heightened the attention placed on food safety by consumers, food suppliers and public institutions. The economic development of the GMS nations also affects the drivers of food safety initiatives.

#### Increasing burden of foodborne diseases

The economic costs of illnesses caused by foodborne diseases in the GMS have not been adequately estimated. However, direct healthcare costs and lost labor, tourism and spending, are undoubtedly a considerable drain on these economies. Although notoriously difficult to estimate, due to the costs of effective surveillance systems and underreporting, the WHO (2015b) estimated 10-35 million cases of diarrheal disease alone occurred in Thailand in 2009. In the PRC, more than 300 million people are affected by foodborne disease annually, which is estimated to cost in the order of 0.5% of GDP in healthcare and lost productivity alone (ADB, 2007). In Viet Nam, foodborne disease costs are estimated to be in the order of US\$1 billion per year, in terms of healthcare costs, lost productivity and foregone markets. The high costs of food safety failures are evidenced by the frequent reports of large outbreaks of illness caused by foodborne pathogens, the many high-profile cases of food related health scares and ongoing concerns over quality, notably misrepresentation of products (ProMED-mail, 2016). There are also increasing concerns surrounding chemical residues in food products, primarily chemicals used for plant protection and antibiotics. Furthermore, the presence of hazards, both infectious agents and chemicals exceeding MRLs, all too frequently result in costly rejections of GMS produce in international markets. The US Food Safety Modernization Act enacted in 2011 is one example of food safety implications on food imports from GMS countries, among others.

#### Scientific advances

Technical and operational capacity of surveillance systems, in terms of design, human resources, laboratories and consumables, is improving throughout the GMS, but remains highly variable. Laboratories in Thailand, the PRC and, to a lesser extent, Viet Nam have the capacity and resources to effectively implement technically challenging surveillance systems. However, the CLM countries have little available expertise, infrastructure and budget to resulting in underperforming systems.

### GMS trade in food

Cross-border food supply chains are increasingly prevalent within the GMS and businesses within the subregion are increasingly seeking export markets. The development of common food safety standards benchmarked against international standards is a vital precondition for improving subregional (GMS), regional (ASEAN) and international trade flows. A framework for monitoring and managing these standards across a range of actors and national contexts is a basic necessity but extremely difficult. A common food safety system is still a distant prospect but there are enabling structures that provide the impetus for GMS countries to develop harmonized food safety systems to facilitate cross-border trade, such as the CASP2 (discussed below) and AEC strategic frameworks.

### Increasing presence of high volume food suppliers and longer supply chains

The GMS food sector has undergone considerable concentration due to resulting efficiencies and partly in response to growing urbanization, rising incomes and demand for more processed food products. Large-scale production of processed food products, often with long shelf lives, complicated food safety risk management and emergency responses. Furthermore, increased cross-border trade in raw and processed foods between GMS countries has increased risk of hazard movement between countries and failure of risk control steps. The increased time between product preparation and consumption provides more opportunities for contamination or hazard multiplication on product, increasing the risk of foodborne illnesses. Improper handling, particularly time-temperature abuse, of food is not uncommon in GMS countries due to poorly developed supply chains and logistics system exacerbated by the warm and humid climate. The humid tropics are high food safety risk area and favor proliferation of pests, microbes and the risk of contracting parasitic diseases. Thus, effective food safety systems are crucial to facilitate and diversify cross-border trade and investment in agriculture in the GMS.

### Consumer awareness/demand

Strong economic growth has been closely associated with rising household incomes and a growing GMS middle class. In 2015, the middle-class population of Asia-Pacific surpassed that of the US and Europe combined. The GMS population has also become increasingly urbanized over recent decades and better informed through the impacts of new sources of information and greater connectivity. These changes have contributed to increasing consumer awareness of, and demand for, safety and quality assured food products (Kharas, 2017).

Domestic demand, particularly for higher value and processed food products, has been growing rapidly in part reflecting increases in household incomes and rising consumer awareness. Safe, quality assured and ethically produced food products are gaining traction among GMS consumers and present an opportunity to successfully enter markets outside the region. The GMS is becoming increasingly open to imports, which brings increasing competition while presenting opportunities to establish robust and resilient regional trade.

### Changing retailer requirements

Demand for processed foods in the GMS has also increased enormously in recent years. Meanwhile, food supply chains and retailing are evolving quickly. Increasing concentration and integration of food industries is apparent with vertical integrators becoming more prevalent and influential and the number of supermarkets has proliferated. In this context, agricultural stakeholders in the GMS are under increasing pressure to demonstrably manage food safety risks so as to adequately protect domestic consumers, meet customer requirements, and to allow access to export markets beyond the GMS.

The GMS countries have each, to varying degrees, experienced concentration of agricultural industries over the past two decades. The rapid emergence of supermarkets across much of the GMS has also had a considerable impact on the subregion's food sector. The region's supermarkets have gained considerable power over suppliers in a short period of time, which is reflected in increasingly stringent requirements to supply in terms of product quality characteristics, safety assurances, packaging, volumes and so forth. The quality and safety requirements are often established by private standards, put in place to meet increasing consumer demand, to differentiate (or match) competitors, and to protect the retailer's reputation. These requirements are influencing upstream nodes in GMS food supply.

#### *4.2 Infectious diseases and other barriers to export*

##### Zoonoses

It is estimated that 75% of emerging infectious diseases in humans are zoonoses, and the GMS is among the highest risk areas in the world for emerging infectious disease events (Jones et al., 2008, Hill et al., 2015)(Taylor et al., 2001). Emerging infectious diseases are significantly correlated with socio-economic, environmental and ecological factors. The relatively high human, livestock and wildlife population densities in GMS make the region greater risk for an emergence event. The rapid spread of avian influenza A H5N1, so-called bird flu, and the high number of human cases in the GMS countries relative to other regions provides a compelling example of the rapid emergence and spread of an infectious pathogen in the subregion. Recent modeling by Hill et al. (2015) demonstrates the high human poultry contact rates in the GMS (Figure 7), which is also reflected in pig, ruminant and wild animal contact.

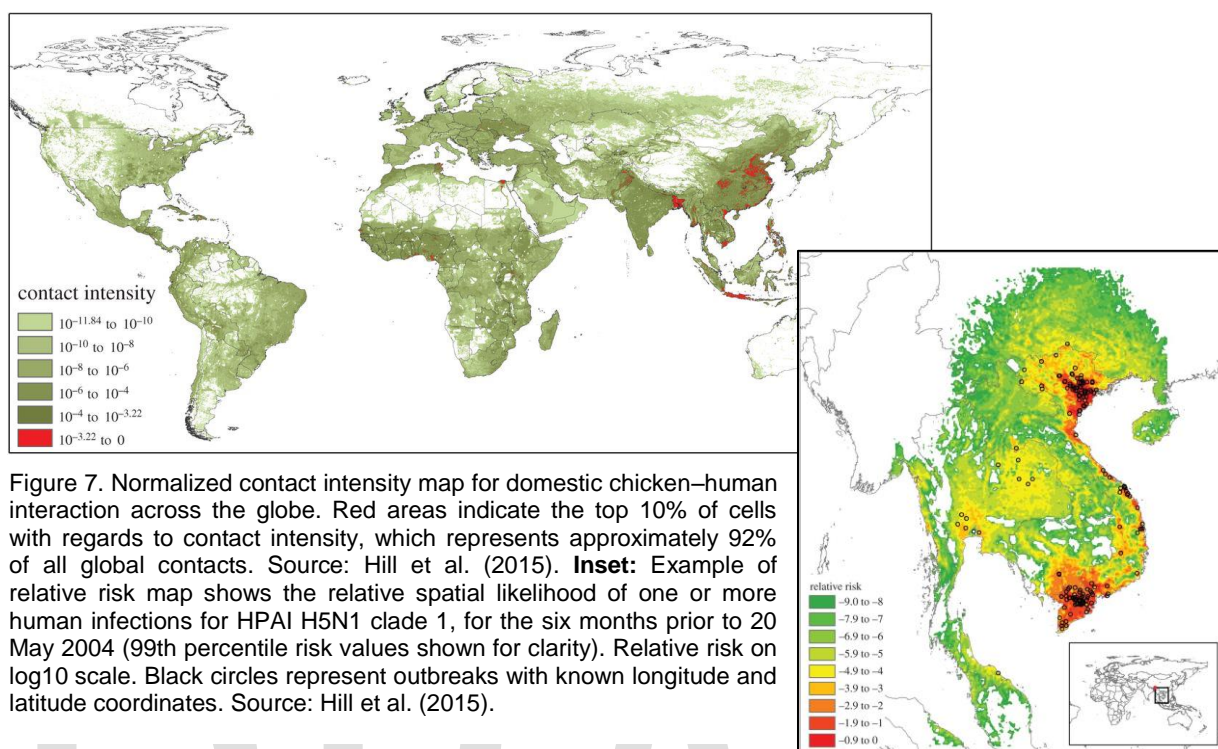


Figure 7. Normalized contact intensity map for domestic chicken–human interaction across the globe. Red areas indicate the top 10% of cells with regards to contact intensity, which represents approximately 92% of all global contacts. Source: Hill et al. (2015). **Inset:** Example of relative risk map shows the relative spatial likelihood of one or more human infections for HPAI H5N1 clade 1, for the six months prior to 20 May 2004 (99th percentile risk values shown for clarity). Relative risk on log<sub>10</sub> scale. Black circles represent outbreaks with known longitude and latitude coordinates. Source: Hill et al. (2015).

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High prevalence and frequent outbreaks of non-zoonotic pathogens also form barriers to trade. Regular outbreaks of pathogens such as foot and mouth disease virus and porcine reproductive and respiratory syndrome virus and a multitude of pests, primarily arthropods, present in food crops, hamper access to potentially valuable markets that are free of specified hazards under the terms of the SPS agreement.

#### Other barriers to GMS exports

Although the GMS is a major global exporter of a number of key agricultural commodities, such as rice, cassava, coffee, sugar, seafood, cashews and pepper, consignment rejections on the basis of contaminants occur more frequently than is desirable at considerable cost to exporters. Moreover, repeated rejections risk loss of market access. There are also many other products produced in the region that are barred from access to higher value markets in ASEAN, Asia more broadly, the EU and the US, such as animal products and many perishable food item from parts of the GMS. The main barriers to these markets are key hazards recognized under the SPS agreement, such as infectious diseases and pests which potential high-value exports are demonstrably free of, such as foot and mouth disease, porcine reproductive and respiratory and syndrome and various arthropods and toxins identified in grains, fruits and vegetables.

The potential for global exports of food from the region is constrained by the limited adoption of demonstrably equivalent and/or globally recognized risk analysis strategies and systems, and standards for food production, food processing, and food distribution. Governments in the region are aware of the need for improving their standards and recognize their weak capacity in establishing assurance systems both internally for domestic trade and externally for regional and global trade.

### *4.3 Current food safety policy, legislation and regulation*

National agricultural development strategies in each of the GMS countries identify upgrading food safety as a key priority. New or revised food safety laws and related legislation, regulations and policies, such as veterinary laws, have been passed or are in the process of being passed in each GMS country. Although variable, progress is being made in enforcing these laws and regulatory systems. Surveillance systems are continually improving in terms of design and implementation. The ongoing development of certification systems, risk-based or other, provides an increasing number of alternatives to food suppliers and consumers. Beyond public sector systems many larger private interests in food systems have adopted or established their own more stringent requirements, based on standards such as ASEANGAP, GMP, HACCP and other international third party certifications, that meet and often surpass national, regional and global systems. The demand for products certified variously for safety and quality in the GMS is growing rapidly, particularly in urban centres (Castella and Kibler, 2015). Private sector systems are developing apace, which may benefit consumers and wider stakeholders but can negatively affect food waste and exclude smaller suppliers.

Each of the GMS countries has prerequisite legislative and regulatory frameworks, quality assurance systems (GAP, GMP, GHP, HACCP), dedicated implementing agencies and resources, and food safety education and information systems in place to a greater or lesser degree (Table 3). Thailand, the PRC and, to a lesser extent, Viet Nam, have established solid food control systems and have adequate capacity in risk analysis, SPS handling, laboratory services, and surveillance and response mechanisms, at least in parts of each country. They have competent human resources, world-class infrastructure, and public-private sector support to continue to strengthen their capacity. However, this is not the case for the CLM countries, where support from neighboring countries would likely prove very valuable.

Table 3. Status of food safety legislative and regulatory frameworks in GMS countries

Food safety provisions	Cambodia	Lao PDR	Myanmar	Viet Nam	Thailand	China
Enabling legislation	√	√	√	√	√	√
Strategic and regulatory framework	√	√	√	√	√	√
Food control system	X	X	X	√	√	√
Dedicated implementing agencies	√	√	√	√	√	√
Good Agricultural Practices (GAP)	√	√	√	√	√	√
Good Hygienic Practices (GHP)	√	√	√	√	√	√
Good Management Practices (GMP)	√	√	√	√	√	√
Hazard Analysis & Critical Control Points (HACCP)	√	√	√	√	√	√
Risk analysis capacity	X	X	X	√	√	√
SPS capacity	X	X	X	√	√	√
Laboratory capacity and accreditation	X	X	X	√	√	√
Surveillance and response capacity	X	X	X	√	√	√
Food safety education and information	√	√	√	√	√	√

√ - existing; X – needs strengthening

Sources: various food safety legislative and regulatory measures of the GMS countries

### Progress towards comprehensive food safety laws

Each of the GMS countries is departing from fragmented food safety legislation toward a comprehensive, overarching legal framework that is aligned with ASEAN food safety policies and frameworks (Table 4). A Food Safety Law has been enacted or is in the final draft stage for legislation in each country. These laws align with the core principles of the ASEAN Food Safety Policy (ASEAN, 2016). The GMS countries have also developed food safety regulatory and strategic frameworks that operationalize the National Food Safety Policy or serve as the precursor to a National Food Safety Law (e.g. the PRC). In addition to the overarching food safety law, other legislations specific to commodities, food safety issues, and institutional functions have been created (Annex Table 3).

Table 4. Alignment of GMS country food safety policies and frameworks to ASEAN frameworks

ASEAN food safety legal framework provisions	GMS country legal framework					
	Cambodia	Lao PDR	Myanmar	Viet Nam	Thailand	China
ASEAN Food Safety Policy 2016 (AFSP) and its core principles <sup>1</sup>	New Food Safety Law (draft #2, 2017) <sup>3</sup>	National Food Safety Policy 2009 <sup>5</sup>	National Food Law 1997; Amended National Food Law 2013; New Food Safety Law 2017 (for enactment) <sup>7</sup>	Law on Food Safety 2010 <sup>8</sup>	National Food Committee Act 2008 & National Strategic Framework for Food Management 2012 <sup>10</sup>	Food Safety Law 2015 <sup>11</sup>
Integrated 'Food Chain' Approach	✓	✓	✓	✓	✓	☐
Systematic Risk Analysis	✓	✓	✓	✓	✓	✓

Framework						
Science-based, Independent Risk Assessment Process	✓	☐	✓	☐	✓	✓
Primary Responsibility of Food Business Operators	✓	✗	✓	✓	✓	✓
Consistency with ASEAN Trade in Goods Agreement (ATIGA) and WTO's SPS and TBT Agreements	✓	☐	✓	✓	✓	☐
Equivalence and Mutual Recognition	✓	☐	✓	✓	✓	✗
Harmonization with International Standards	✓	✓	✓	✓	✓	☐
Reliable Traceability System	✓	✗	✓	✓	✓	✓
Strengthening and Harmonization of Regional and National Food Control Systems	✓	☐	✓	☐	✓	✓
Transparency	✓	✗	✓	☐	✓	✓
ASEAN Food Safety Regulatory Framework which operationalizes the AFSP (drafting stage in 2016) <sup>2</sup>	Inter-Ministerial Prakas 868 on Implementation of Food Safety, 2010 <sup>4</sup>	MOH Ministerial Regulation 518, 2009 <sup>6</sup>	No counterpart	Food Safety and Agricultural Health Action Plan, 2006 <sup>9</sup>	National Strategic Framework for Food Management, 2012 <sup>10</sup>	National Food Safety Regulatory and Strategic Framework, 2007 <sup>12</sup>

✓ - specified; ☐ - specified with some modifications; ✗ - not specified

<sup>1</sup>Association of Southeast Asian Nations (ASEAN). 2016. ASEAN Food Safety Policy.

[http://www.aseanfoodsafetynetwork.net/Food\\_safety\\_policy/bk/foodsafetypolicy/9f1er-2016-11-04.pdf](http://www.aseanfoodsafetynetwork.net/Food_safety_policy/bk/foodsafetypolicy/9f1er-2016-11-04.pdf)

<sup>2</sup><http://asean.org/storage/2016/08/ASEAN-Food-Safety-Regulatory-Framework.pdf>

<sup>3</sup>Personal communication, DDG Camcontrol, Cambodia.

<sup>4</sup>[http://www.camcontrol.gov.kh/userfiles/file/Inter-Ministerial%20Prakas%20no\\_%20868\\_From%20farm%20to%20table%20for%20Food%20Safety\\_English%20Version\\_20101022.pdf](http://www.camcontrol.gov.kh/userfiles/file/Inter-Ministerial%20Prakas%20no_%20868_From%20farm%20to%20table%20for%20Food%20Safety_English%20Version_20101022.pdf)

<sup>5</sup><https://laosfoodsafetylaws.files.wordpress.com/2011/03/laos-law-food-safety-13jan2009.pdf>

<sup>6</sup><https://laosfoodsafetylaws.files.wordpress.com/2011/03/laos-law-sanitary-technical-18mar2009.pdf>

<sup>7</sup>Zaw, T. 2015. Food safety in Myanmar. Symposium on Ensuring Food Safety: An Important Challenge Today. 30th CMAAO General Assembly & 51st Council Meeting, 23-25 Sept 2015, Yangon, Myanmar.

<sup>8</sup>[https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Food%20Safety%20Law%20and%20Guiding%20Decree%20Released\\_Hanoi\\_Vietnam\\_6-12-2013.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Food%20Safety%20Law%20and%20Guiding%20Decree%20Released_Hanoi_Vietnam_6-12-2013.pdf)

<sup>9</sup>[http://siteresources.worldbank.org/INTVIETNAM/Resources/vietnam\\_sps\\_report\\_final\\_feb\\_06.pdf](http://siteresources.worldbank.org/INTVIETNAM/Resources/vietnam_sps_report_final_feb_06.pdf)

<sup>10</sup>Thailand Food Committee. 2012. Strategic Framework for Food Management in Thailand.

[http://tnfc.fda.moph.go.th/file/fileDoc/2015-04-20\\_5469.pdf](http://tnfc.fda.moph.go.th/file/fileDoc/2015-04-20_5469.pdf)

<sup>11</sup>[https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Amended%20Food%20Safety%20Law%20of%20China\\_Beijing\\_China%20-%20Peoples%20Republic%20of\\_5-18-2015.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Amended%20Food%20Safety%20Law%20of%20China_Beijing_China%20-%20Peoples%20Republic%20of_5-18-2015.pdf)

<sup>12</sup><https://www.adb.org/sites/default/files/project-document/65508/37599-prc-tcr.pdf> (ADB-TA completion report)

The ASEAN Common Principles for Food Control Systems (ASEAN, 2015) provides a potential guide for developing and harmonizing food control systems across the GMS. The key principles include: integrated, farm-to-table, approaches; risk analysis; transparency; and regulatory impact assessment. The current situation requires further assessment. This can be achieved through improved data collection, analysis, interpretation and

communication and development of a national food control strategies and systems. Strategies should employ risk-based approaches in determining priorities. Voluntary compliance and mandatory actions must be clearly identified, and timeframes established. The need for human resource and infrastructure development must also be considered, which will be influenced by each country's stage of development, the size of its economy, and the level of sophistication of the food industry.

At the subregional level, the Core Agriculture Support Program Phase 2 (CASP2) for 2011-2020 targets a more integrated, climate-friendly agricultural sector in the GMS by enhancing market access for safe and environment friendly agriculture products (SEAP), in particular certified products using reduced agrochemicals as well as organic agri-based products. The program builds on the GMS's considerable strengths in food supply by promoting regional approaches to joint marketing, market access, cross-border trade, risk management, and enhanced productivity and value creation in food value chains. To address the program's objectives CASP2 and the WGA are developing a Strategy and Action Plan for Promoting Safe and Environment-Friendly Agro-Based Value Chains in The GMS (2018-2022) for Ministerial endorsement. The Strategy has been informed by the ongoing work of the program, including various studies and policy events such as those hosted at the THAIFEX World of Food Asia 2017. Its focus is two-pronged: (i) moving toward harmonizing food safety, and (ii) intensifying environment friendly and inclusive food value chains.

#### Aligning standards

Given the national and regional policy/legislative developments, food control systems can be sharpened, aligning with regional and global standards. Regional harmonization of food safety standards is a priority action in CASP2 and AEC strategies. In ASEAN, regional work to harmonize food safety standards are carried out by a number of ASEAN Technical Working Groups, such as the Prepared Foodstuff Product Working Group (PFPWG), ASEAN Expert Working Group on MRLs of Pesticides (EWG-MRL), ASEAN Task Force on Codex (ATFC), ASEAN Sectoral Working Group on Livestock (ASWGL), ASEAN Sectoral Working Group on Fisheries (ASWGFi), ASEAN Sectoral Working Group on Crops (ASWGC), ASEAN Working Group on Halal (AWG Halal), Ad-hoc Working Group on Food Irradiation (AWGFI) and ASEAN Expert Group on Food Safety (AEGFS).

There is variability in food safety standards and regulations, and the approaches employed in their development, among GMS countries. Existing food safety standards of GMS countries are largely derived from either Codex Alimentarius or national standards of other countries. Countries with less developed food control systems (e.g. Cambodia, Lao PDR, Myanmar and Viet Nam) have taken Codex as the starting point for establishing majority of standards and regulations. Countries with more developed food safety systems (e.g. Thailand) have existing national standards and regulations in place but are increasingly adopting Codex to align with regional and international systems. Older food standards and regulations were frequently developed on a hazard-by-hazard basis, due to varying risk tolerance between countries (Teoh, 2016). In some cases, risk-based approaches have been adopted but have insufficient capacity and adequate prevalence and likelihood of exposure data for quantitative risk assessment. This can result in inconsistencies in advice



to decision makers between countries. Hazard-based approaches limit the ability to harmonize food safety standards and regulations due to a lack of common foundations for common food safety standards. In contrast, risk-based approaches can facilitate harmonization of food safety standards and regulations. The ASEAN Risk Assessment Centre, established in September 2014, serves as a regional risk assessment body for harmonizing food safety standards in ASEAN.

### Roles and responsibilities and chains of command

Multiple agencies are involved in the implementation and enforcement of food safety laws and food control systems, which vary between GMS countries. Annex Table 3 lists these agencies alongside the relevant food safety-related laws, and their main functions. In all GMS countries except the PRC, the ministries of health and agriculture are among the main food safety agencies, if not the main agencies, as in the case of Thailand. The ministries of industry, trade and commerce are also important in food safety in Cambodia, Lao PDR, Myanmar and Viet Nam. Additionally, the Ministry of Economy and Finance is engaged in food safety in Cambodia and the Ministry of Education plays a considerable role in Myanmar. Other ministries in Thailand serve as support agencies, including the ministries of industry, finance, commerce, interior, and university affairs, as well as the Prime Minister's Office. Various relevant departments or units within these ministries handle food safety matters. Inter-ministerial committees on food safety have been created to coordinate the activities of the different ministries. The committee is headed by the Ministry of Health except in Cambodia, where the Ministry of Commerce takes the lead. Whereas, in the PRC, two ministerial-level agencies are responsible for food safety – the Food and Drug Administration (FDA) and the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). The FDA is responsible for food safety management, risk assessment, formulation of standards, information dissemination, establishment of codes of practice for food testing organizations, and the investigation of major food safety incidents. The agency oversees food manufacture, distribution and consumption, and manages regulation processes for food and drug safety. It works closely with AQSIQ, which is in charge of national quality, metrology, entry-exit commodity inspection, entry-exit health quarantine, entry-exit animal and plant quarantine, import-export food safety, certification and accreditation, standardization and administrative law enforcement.

Ideally national food safety agencies should work closely with local authorities and enforcement officers to ensure food laws are applied throughout food supply chains. In this situation, a clear chain of command is required in terms of the operation of surveillance systems and emergency responses. Implementation and enforcement of food safety standards in less developed CLM countries have not yet reached the level of efficiency that the developed economies (e.g. Thailand) have achieved, presenting an opportunity for the former to learn from the latter's experience.

### The need for further investment

Inadequate investment in food safety and food control systems is a challenge in the GMS countries, particularly the less developed economies. However, GMS governments are

strengthening national food safety capacities and tapping support from development partners and donors. For example, the ADB-supported Regional Trade Facilitation on Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion Trade project has hardware and software investments. The Cambodia and Lao PDR components of this project established and enhanced surveillance and inspection systems for plant health, animal health, and food safety, improved training of specialists, and promoted regional cooperation and harmonization of SPS measures. The Cambodia component established a new Microbiology Laboratory inside the campus of the Royal University of Agriculture in Phnom Penh dedicated to food safety concerns. In Lao PDR, the first Food Safety Laboratory equipped with state-of-the-art facilities was constructed in Vientiane with support from Mérieux NutriSciences, managed by the Ministry of Health, and dedicated to safeguard local populations against foodborne diseases by analyzing and certifying the quality of imported, exported and domestic food, as well as ensuring safety across the food chain. The Viet Nam component of the project supported the design and implementation of food safety surveillance systems, improved import handling, grading of restaurants in high tourism areas, and strengthened food testing laboratories. Myanmar is also building laboratory capacity with the first FDA's Medical Testing Laboratory in Nay Pyi Taw accredited to ISO/IEC 17025:2005 by the US-based ANSI-ASQ National Accreditation Board (ANAB) in late 2016. The Pharmaceutical Chemistry Laboratory supported by USP UNOPS and the Food Microbiology Laboratory (Yangon/Nay Pyi Taw) supported by UNIDO will seek forms of recognized accreditation in 2017. Of course, the effectiveness of laboratories hinges on the people manning them. Other investments are soft infrastructure are presented under 'National Initiatives'.

Investments in food safety and broader risk management can benefit from public-private partnership development. There are win-wins for industry and governments in sharing data and forming policies and regulatory environments that protect consumers, brands and businesses, and market access.

#### Improving the business environment

Despite the enactment of enabling food safety legislation, the CLM countries face considerable difficulty in mainstreaming food control systems due to unfavorable business environments in comparison with neighboring Thailand, Viet Nam and the PRC. In terms of ease of doing business, Thailand is highest ranked of the GMS countries, global rank 46 among 190 countries, followed by the PRC and Viet Nam, global ranks 78 and 82, respectively (World Bank, 2017a) (Figure 8). By comparison, conducting business is difficult in Cambodia, Lao PDR and Myanmar, global ranks 131, 139 and 170, respectively. The rankings are similar in terms of ease of trading across borders. This presents opportunities for the CLM countries to learn from neighbors in establishing more conducive environments for small and medium sized enterprises.

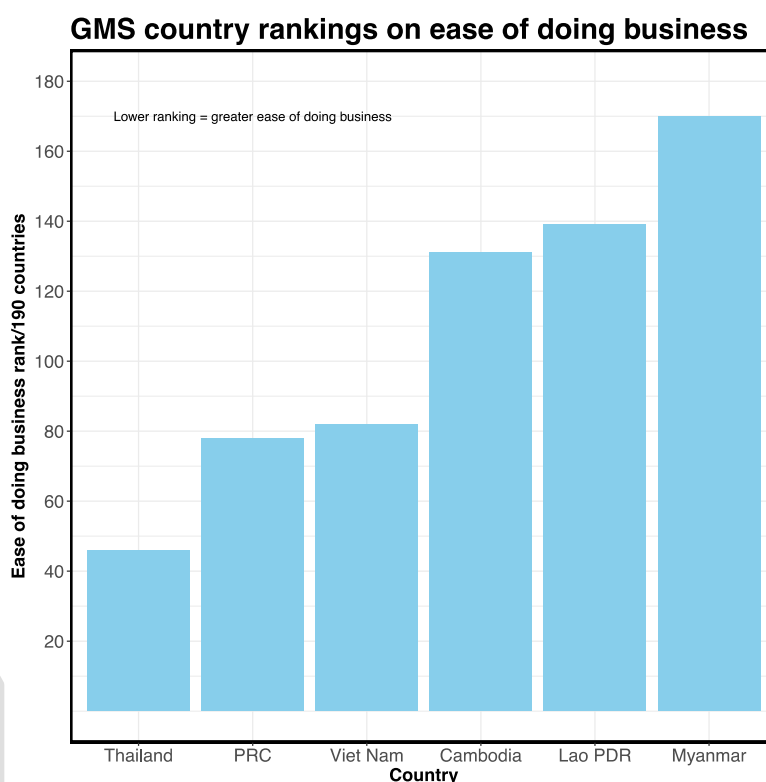


Figure 8. GMS country rankings (out of 190 countries) for ease of doing business. Data sourced from World Bank (2017)

## 5 GMS food safety initiatives and Gaps

### 5.1 Initiatives

#### Strategic planning and prioritization – potential areas for harmonization

Food safety development plans and programs are embedded in a number of existing GMS strategic frameworks, such as Viet Nam’s National Strategy for Food Safety 2011-2020, Thailand’s National Strategic Framework for Food Management, and the PRC’s 13<sup>th</sup> Five-Year Plan for Food Safety for 2017-2020 implementation (Table 5). In the CLM countries, these plans and programs have been developed during planning and consultation workshops between key national players and development partners, including the Mekong Institute (MI). The six GMS countries have agreed to the pursuit of six development activities, which can be potential areas for harmonization at subregional level. These activities are: strengthening the legal and regulatory environment and the enforcement mechanisms, continuing the development of standards that are harmonized with ASEAN and international standards, improving food safety capacities including human resources and laboratory facilities, promoting the application of GAP and other food safety and quality assurance systems for food chains, increasing consumer awareness through various food safety education/information programs, and promoting international cooperation in food safety. A key activity in Cambodia and Myanmar for increasing consumers’ food safety awareness is to develop and strengthen consumer organizations. Food safety database development is a

priority activity in Cambodia, Vietnam, and the PRC. Strengthening food control systems is a priority of Thailand and the PRC, but interestingly not for the less developed Cambodia, Laos, Myanmar and Viet Nam. PRC puts priority on a review of the food safety regulatory system of importing countries considering the rising food imports of the country.

Table 5. Priority food safety activities for GMS countries

Food safety activities	Cambodia	Lao PDR	Myanmar	Viet Nam	Thailand	PRC
Develop/revise a national food safety policy, food safety law and implementing rules and regulations, and strengthen implementation	√	√	√	√	√	√
Develop national standards harmonized with regional and international standards	√	√	√	√	√	√
Review food safety regulatory system of importing countries						√
Develop/Strengthen food safety database	√			√	√	√
Strengthen risk management/food control systems					√	√
Promote GAP and other food safety mgt systems; upgrade and certify food chains	√	√	√	√	√	
Develop/strengthen knowledge and capacity in food safety management (human resources, lab capacity, target groups)	√	√	√	√	√	√
Develop and strengthen consumer org.	√		√			
Promote food safety education and community awareness	√	√	√	√	√	√
Promote international cooperation	√	√	√	√	√	√
Reference	Consultations with MI and other devt partners	Consultations with MI and other devt partners	Consultations with MI and other devt partners	National Strategy for Food Safety 2011-2020	Strategic Framework for Food Management	13 <sup>th</sup> 5-year Plan for Food Safety 2017-2020

The GMS countries are actively engaged in the ASEAN Food Safety Network and INFOSAN initiatives, which have developed regional goals and knowledge sharing systems (WHO, 2013, ARAC, 2017). They provide important portals for data and knowledge sharing and technical capacity building for the GMS countries, through initiatives such as the ASEAN

Expert Group on Food Safety and the ASEAN Risk Assessment Centre for Food Safety (ARAC, 2017).

### Donor-led initiatives

A number of multi-country and national food safety initiatives have been implemented to further the realization of food safety development strategies and plans, mainly with support from donors, but these need additional funding on the forward measures (Annex Table 3). The MI and FAO have been the main implementers of multi-country projects, the former with funding from the New Zealand Aid Programme (NZAP) while the latter with funding from the governments of Sweden and Japan. Other multi-country projects have been supported by the ADB, the EU, GIZ and the Asian Productivity Organization (APO). A private sector-led public-private partnership project to promote safe food and increase market access of SMEs is currently underway in Cambodia. In Lao PDR, Myanmar, Viet Nam and the PRC, several national initiatives have been completed; these include policy and strategy development, standards development, and institutional capacity building for food safety compliance and international market access. Brief descriptions of these initiatives are provided (Annex Table 3). In Thailand, the Food Quality and Food Safety Strategy is embedded in the Strategic Framework for Food Management. The strategy has six components: 1-Standardize Food Safety and Promote Implementation; 2-Improve the Production of Primary Food Products to Meet Quality and Safety Standards and Increase Their Nutritional Value; 3-Support and Oversee Food Production at The Community Level to Prevent Losses and Increase Product Value; 4-Support and Oversee Food Production at all Industrial Levels; 5-Promote the Trade and Marketing of Standard Products from Community and Industrial Levels; and 6-Strengthen Control and Monitoring of National Food Quality and Food Safety.

The ADB has food safety related investments within the subregional CASP2 (ADB, 2013). Other investment programs may also include food safety components, such as the 'Climate Friendly Agri-Business Value Chains in GMS', 'Agri-Tourism Value Chains Development' and 'Enhancing Food Security by Building Resilient Food Production System in GMS' projects and programs. The proposed follow through technical assistance for CASP2 will jumpstart the implementation of the soon-to-be-endorsed GMS Regional Strategy and Action Plan for 2018-2022 which will provide support for policy and regulations leading to the harmonization of food safety and quality assurances, hard and soft infrastructure that are essential to upgrading the subregion's food safety measures at par with the ASEAN and globally recognized standards, knowledge and innovations for promoting food safety and increased market access, and building the GMS reputation as hub for safe and environment friendly agro-based and food products.

### SPS and Codex Alimentarius initiatives in the GMS

Lower economic development among the CLMV countries presents the main obstacle for upgrading systems and demonstrating equivalence for the purpose of market access; thus, the rationale for continued external support in terms of funding and technical, management and operational capacity development. A number of donor-supported SPS/Codex initiatives have been pursued in the CLMV countries (Annex Table 4). The ADB support, through both

loan and grants, to the CLV is the largest donor investment for the improvement of SPS handling for trade facilitation and regional integration. The FAO, through funding from the Japanese government, coordinates a multi-country capacity building project in the CLMV countries for the development and implementation of international food safety standards. The FAO has also implemented a project in Lao PDR to assist the development of an SPS related legal framework and a project in Viet Nam to strengthen SPS capacity. GIZ funded two food safety projects in the CLM countries with a primary focus on harmonization of standards. In Thailand, initiatives include the revision of the Codex system and strengthening of existing standards to conform to international standards. Initiatives in the PRC relate to national standards development benchmarked against international standards aligned with Codex.

### Regional and global private sector driven initiatives

#### **The Global Food Safety Initiative (GFSI)**

The GFSI is a non-profit foundation that includes a number of the world's leading food retailers. It was formed in 2000 in response to growing food safety challenges. The foundation employs a collaborative approach that brings together international food safety experts, with specializations in all components of food supply chains, to numerous international events. The GFSI promotes a harmonized approach with a shared vision of 'safe food for consumers everywhere' and a goal of 'once certified, accepted everywhere'. GFSI has a number of regional programmes worldwide implemented with UNIDO. The Global Food Market Theme (FMT) is a GFSI initiative that establishes methods for small and less-advanced food companies can effectively address food safety challenges. The FMT addresses: standards, harmonization and mutual recognition agreements; trade and market access; sustainability and rural development; and services, logistics and distribution channels. In the GMS, two GFSI initiatives have been conducted – one in Myanmar under the GFSI Market Program to build food safety capacity in a fisherwoman's processing business and allow access new markets, the other in the PRC where a GFSI Focus Day China event is conducted annually to raise awareness about GFSI.

#### **Participatory Guarantee Systems (PGS)**

The PGS is a locally focused quality assurance system for the supply of food products produced using organic methods. The approach is participatory and peer-based, certifying producers on the basis of trust, social networks and knowledge exchange between peers. PGS initiatives now serve thousands of small organic farmers and their consumers globally, with numbers increasing annually. Numerous PGS initiatives have been conducted in the GMS (Annex Table 5)(FAO, 2017).<sup>3</sup> Viet Nam, Thailand and the PRC have a longer history of PGS application than the CLM countries. GMS-wide, there are about 48 PGS groups with more than 2,500 participating farmers. Thailand has the highest number of PGS initiatives (16) with more than 1500 farmers engaged, while the Guangxi autonomous region has two PGS groups with more than 100 farmers. PGS is typically initiated by the private sector with government support. Lao PDR has an existing project on inclusion of small organic farmers through the PGS system. Viet Nam has an advanced PGS system, which it is scaling up.

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<sup>3</sup> Refer also to the ADB Technical Assistance 8163 Annual Report for 2016.

### **Geographical indications (GI)**

GI identifies products as originating from a particular location and produced using particular materials and methods, which convey a special quality, reputation or other characteristic. Typically, GI registration includes food safety assurances among the requirement of elements of production and supply. GI can be protected by a specific law or under trademark law. All GMS countries, except Myanmar, have *sui generis* system, a form of intellectual property protection, regulating GI protection; Myanmar has allowed GI protection through the Trademark Law. The PRC has more than 3,000 GI products, with 83 foreign certified GIs. Viet Nam has 48 local products and 173 foreign products registered as GIs and Thailand, 61 local products and 11 foreign products. Cambodia currently has two GI registered products while Lao PDR and Myanmar have not yet registered GI products, but there are plans to process the first GI product registrations in 2017. Several donor-supported projects on GI are currently being implemented (Annex Table 8).

### **Other private sector initiatives**

Production and marketing of organic and safe foods (vegetables, fruit, and meat products) are being pursued by private firms or groups in Cambodia, Lao PDR and Viet Nam, while various other support systems to the food industry are operating in Myanmar and Thailand (Annex Table 6). In addition, the private sector is actively involved in developing and mainstreaming food safety standards, such as the ThaiGAP system in Thailand, initiated by the Thai Chamber of Commerce. Private sector initiatives are largely based on industry codes of practice or private standard schemes and may include HACCP, GMP, halal among other assurance systems and requirements. While these schemes are voluntary, increasingly meeting private standards are a requirement of key market sectors. Private food standards play an important role in determining market access in international trade. They can also be set by standard setting coalitions to facilitate supply chain management within an increasingly globalized and competitive international food market. The potential drawbacks of increasingly stringent private standards include: their scientific basis and consistency with Codex; the appropriateness of the prescriptive detail of standards in developing country contexts; the cost of certification; the impact of the standards on market access and public health; the potential to contribute to unnecessary food waste; the scope for stakeholder participation; and the potential to undermine official food safety authorities.

## **5.2 Gaps in GMS food safety systems and barriers to market access**

Although the GMS countries have made progress in establishing risk-based surveillance systems, the upgrading of specific and broader food safety systems, and in the facilitation of trade, further improvements are possible. Further reliance on evidence-based national and regional policy, legislative and regulatory environments and systems, and strategic investment in infrastructure and human and operational capacity are needed to develop more reliable, robust systems that build trust. Furthermore, risk communication initiatives can be strengthened to build awareness among stakeholders and facilitate optimal responses.

Current priority foodborne hazards of importance to consumer health in the GMS include a wide variety of foodborne pathogens and chemical residues, such as antibiotics, hormones, pesticides and heavy metals. In addition to food safety hazards, various zoonoses, infectious diseases of animals, pests and residues limit market access for GMS products. Individual countries have suffered from specific food safety failures, such as melamine in the PRC, antibiotic and hormone residues in livestock and fishery products in Myanmar, Viet Nam and Thailand. The nature of GMS agricultural supply is such that food safety issues in neighboring countries can readily affect domestic food supply. Risk-based approaches that address priority hazards the length of value chains are needed to ensure product safety and to meet requirements of current and potential export markets in accordance with the SPS agreement.

Gaps in food safety risk assessment, management and communication capacity and implementation continue to hamper GMS food safety efforts. Key constraints to the supply of safe, quality assured food and access to markets are summarized in Table 6.<sup>4</sup>

Table 5. Bottleneck areas on the supply of safe, quality assured food and market access

Bottleneck Area	Details	Cam-bodia	Lao PDR	Myan-mar	Viet Nam	Thai-land	PRC
Foodborne hazards	Chemical hazards						
	Pesticide residues	√	√	√	√	√	√
	Heavy metals	√			√	√	√
	Biotoxins (e.g. aflatoxin)	√	√	√	√	√	
	Antibiotic/hormone residues			√	√	√	
	Melamine						√
	Others (histamines, nitrite, dioxin)			√	√		
	Microbiological hazards						
	Pathogenic bacteria	√	√	√	√	√	√
Parasites (fluke)				√			
	Others (toxic plants and animals)						√
Supply chain management	Lack of technology and skilled manpower	√	√	√	√		
	Lack technical trainings	√	√	√			
	Poor infrastructure/logistics	√	√	√			
	Weak traceability system	√	√	√	√		
	Lack of access to reliable electricity & water	√					
	Weak enforcement of food laws		√		√		
	Poor value chain coordination/linkage			√	√	√	
	Poor market access	√	√	√			
	Improper processing					√	

<sup>4</sup> Annex Table 7 provides a list of the policy, investment (hard and soft), and capacity gaps for each segment of the food value chain and by GMS country that directly impact on production and productivity of safe and quality food.



	Wasteful use of natural resources					√	
	Lack of responsibility to protect consumers and the environment					√	
Business environment & availability of business services	Lack of knowledge on marketing, applying technologies and enforcing or applying food safety laws/regulations	√	√	√	√	√	
	Lack of specialist in food safety works and research	√	√	√	√	√	
	Low interest to apply food safety system		√	√			
	Lack of incentives for applying food safety system		√				
	Company failure to inform correct pesticide use			√			
	Delays in custom processing			√			
	Large volume of low-value products (no value addition)				√		
	Lack of options to sustain competitiveness				√		
	Improving safety of domestic and export products				√		
	Insufficient support					√	
	Availability of technical services (certification bodies, laboratory capacity, etc.)	Inadequate lab capacity (no central lab, limited number of testing lab, no ISO)	√	√	√		
Limited technical specialist		√	√	√			
Limited capacity in risk analysis		√	√	√	√		
Insufficient ICT system					√		
Delays in harmonization and adoption of food safety standards					√		
No independent consumer organization					√		
Insufficient support from universities and research institutes						√	
Lack of inter-ministerial coordination addressing food safety issues			√				
No food safety database			√				

### 5.3 Policy, legislative and regulatory gaps

Considerable progress has been made in strengthening current policies in relation to food safety and hazards of importance to trade in agricultural products in the GMS countries; however, there is considerable variability within the subregion. There are efficiencies that can be gained by harmonizing policies across the GMS. The more advanced economies with higher standards, more effective systems and better infrastructure can help build systems in neighboring countries for mutual benefit. Current gaps include variation in surveillance system design and success in establishment of zones and compartments for

agricultural production to facilitate surveillance and control and demonstrate freedom of key hazards for domestic and export markets.

There is currently variation between GMS country standards such as national GAPs, which also differ from ASEANGAP. Internationally recognized risk management systems, such as GMP/HACCP, are generally confined to the few larger processors or export-oriented suppliers. Harmonizing current standards, guidelines and systems through benchmarking can facilitate application and demonstration of equivalence to potential export markets.

Food safety and market access related policymaking in the GMS requires further emphasis on including or integrating smaller players into current systems. Government support is needed to increase the availability and access to appropriate systems for smaller players and in communicating risks and best practices to stakeholders in diverse agricultural value chains.

Each of the GMS countries has overarching national food safety policies and laws. These include the commodity-specific laws (e.g. fishery and veterinary laws), legislation relating to inputs (e.g. feed safety, seed and propagation materials, pesticides and fertilizers), food standards laws and trade laws, among others. However, older legislation needs review to ensure coherence and relevance to present and future realities, such as increasing economic integration.

Equally importantly, review the regulatory systems is needed to ensure adequate protection without overburdening suppliers in terms of direct costs and/or opportunity costs. This requires greater transparency and improved communication of requirements and increased accountability predictability in enforcement. Excessive regulatory systems can push players towards informal economy and hamper business development and economic growth. Poorly designed regulations may impose overly high transaction costs and hamper productivity and access to finance.

The wealthier countries in the subregion generally have more efficient and effective regulatory systems, presenting opportunities for sharing approaches and system design to bridge current gaps (World Bank, 2017) (Table 7). However, the picture appears complex; the more developed economies can also gain from their less developed neighbors in terms of regulatory system structures. The World Bank (2017) presents some surprising findings, for example, Viet Nam ranks higher than Thailand, a more developed economy, in six of the eight sectors, i.e. 'fertilizer', 'machinery', 'markets', 'transport', 'water' and 'ICT'. Thailand is also ranked lower than Cambodia and Lao PDR in 'markets', 'transport' and 'water' regulatory quality.

Table 6. World Bank ranking of regulatory quality of agriculture-related parameters of GMS

Parameter	Cambodia	Lao PDR	Myanmar	Viet Nam	Thailand
<b>Seed</b>	38 (3)	59 (5)	34 (2)	43 (4)	32 (1)
<b>Fertilizer</b>	26 (3)	27 (4)	30 (5)	12 (1)	16 (2)
<b>Machinery</b>	44 (3)	59 (4)	62 (5)	10 (1)	24 (2)
<b>Finance</b>	48 (4)	47 (3)	61 (5)	30 (2)	29 (1)
<b>Markets</b>	46 (3)	35 (2)	53 (5)	31 (1)	52 (4)

<b>Transport</b>	34 (3)	26 (2)	51 (4)	7 (1)	53 (5)
<b>Water</b>	37 (2)	40 (3)	62 (5)	27 (1)	60 (4)
<b>ICT</b>	43 (4)	59 (5)	37 (3)	12 (1)	31 (2)

Number of countries = 62, with 1 as highest rank; values in parenthesis are rankings of 5 GMS countries. (World Bank, 2017b)

Due to the complexity of agricultural value chains and the cross-sectoral aspects of food safety and trade inter-ministerial actions and delegation of roles and responsibilities are needed to optimally manage food safety hazards and hazards of importance to trade. For example, the responsibility for managing and implementing food safety systems is typically shared between Ministries of Agriculture and Health but Ministries of Commerce, Trade and Science may also have important roles to play. However, duplication of regulatory activity, poor enforcement and surveillance, and lack of coordination are common, problems in the GMS, particularly in the CLM countries. The GMS countries have considerable data gaps in relation to key data such as prevalence estimates, consumption volumes and consumer behavior; these data are vital to develop evidence-based policies, to set requirements and target food safety regulations appropriately, and to allocate resources. Research institutes and the private sector must be engaged in the establishment of standards, guidelines and policy and regulatory systems for them to be effective. These institutions have a key role to play in providing technical expertise in developing effective data gathering and analytical systems and, along with public and private stakeholders, establishing appropriate regulatory and surveillance requirements in terms of sampling frames and cutoffs for detection.

Creating an enabling policy environment for food safety in the agri-food industry is a prerequisite to realizing the sector's potential to boost economic growth, reduce poverty and inequality, provide food security and deliver environmental services (World Bank, 2017). Government policies and regulations play a key role in shaping the business environment through their impacts on costs, risks and barriers to competition for various players in value chains. By setting the right institutional and regulatory framework, governments can help increase the competitiveness of farmers and agricultural entrepreneurs, enabling them to integrate into regional and global markets.

#### 5.4 Investment gaps

Current food safety and market access investment gaps in GMS agricultural value chains are apparent the length of value chains (Table 6). Investment is required in developing safer, higher quality, more transparent input supply including seed, plant protection, feed safety and veterinary laws. In production, further investment in on-farm surveillance systems is needed. Moreover, communication of best practices and risk mitigation and risk management strategies are needed. Post-farmgate, process control systems are in their infancy in some GMS countries and varying widely between actors of different scales. Again, best practices, assurances and risk communication initiatives are needed. Ease of transport and storage capacity and quality vary widely across the GMS, which is hampered by improving but suboptimal requirements for movement within countries and across borders. Investments in expediting consignment movement through further reductions in red-tape, increased availability and quality of cold chains, transport hub services such as weighing stations and truck parking and improved access to deep-sea ports, can reduce losses in transit and minimize the likelihood of contamination and/or multiplication of hazards in

product. Food handling by retailers may be improved by employment of better practices and risk communication initiatives. Promoting safer consumer steps in the handling and preparation of foods so as to minimize the risk of hazard consumption is also needed. Finally, systems to alert stakeholders of food safety and other hazard risks are generally underdeveloped. Systems for identifying a problem early and addressing it via alerts, product recalls, movement bans, vaccination campaigns, culling, and the like, are required.

In the least developed economies of the CLM, the common constraints are technological and in relation to skilled manpower, lack of technical training and weak surveillance and traceability systems. Viet Nam also suffers from deficient technical capacity and underperforming or nonexistent traceability systems. The enforcement of food laws, forgeries and poor value chain coordination also hamper food safety throughout the GMS. Improper processing, inefficient use of natural resources, including overfishing and dumping of waste in rivers, and uncertain responsibility for the protection of consumers and the environment among GMS suppliers and public authorities also negatively impacts food safety. Limited SME interest in the application of food safety management systems, associated with suboptimal policies and uncertain incentive structures, are particularly apparent in Cambodia, Lao PDR and Myanmar. Improper use of agrichemicals is exacerbated by the failure of pesticide companies to provide recommendations on optimal use of products, which is particularly notable in Myanmar. Delays in customs processing also contribute to difficulties encountered. A key Thai constraint is insufficient support to food businesses that mainstream food safety management systems, which is not yet adequately rewarded in the domestic market. Limited value addition in various food chain segments can also be addressed to increase competitiveness and improve food safety and quality of products for national and export markets.

#### Infrastructure gaps

Various infrastructure gaps create bottlenecks in food supply systems in the GMS, specific needs vary between and within countries, between products and at different points in supply chains as indicated above. Food testing laboratories and transport and logistics related infrastructure highlight typical infrastructural gaps. There are few food testing laboratories and those that exist lack accreditation by relevant international bodies. Some GMS countries do not have laboratories that meet international standards in detection of key hazards, meaning suppliers either remain uncertified or must send samples outside their country. This typically incurs additional expenses as well as considerable opportunity costs and potential for waste with perishable products. Storage facilities, cold chains, weigh stations, truck parking and to forth also hamper efficient movement of product, causing waste and increased risk of contamination or hazard growth in transit. Other key gaps include disease control infrastructure, such as quarantine facilities.

#### Human and operational capacity

Effective risk management requires considerable leadership, technical and operational capacity, which is currently highly variable within the GMS. Current chains of custody for

sample handling and chains of command in decision making in relation to risk management initiatives need clarification and harmonization.

Capacity to effectively implement risk analysis remains limited among the GMS countries. Surveillance systems vary in design, implementation and reliability, ICT systems are suboptimal, and harmonization and adoption of standards and technical regulations frequently suffer delays. Traceability systems also require considerable upgrading in most cases. The main technical constraints are commonly amplified by a lack of coordination with universities and research institutes and transfer knowledge in relation to food safety risk management, this is the case in all GMS countries, including Thailand, where technical capacity in food control systems is considerably more advanced.

At present, emergency response plans for food safety hazards, zoonoses and broader infectious diseases of importance to production and trade are varied in their level of elaboration and in national capacity to implement responses in a timely, efficient and effective manner. There are opportunities to harmonize emergency response plans at the GMS level and incentives for countries to aid control beyond their borders, thereby reducing risk of incursion within their own countries.

Effective food systems also require considerable maintenance and operating budgets. How these costs are covered will also require inputs from all stakeholders. For example, surveillance and traceability systems inevitably require ongoing investment in staff, vehicles and fuel, consumables, data management and broader ICT services. Furthermore, risk communication is an essential component of risk analysis in relation to both food safety and hazards of importance to trade. Current data sharing and risk communication initiatives within and between GMS countries can be improved. Awareness raising initiatives, in terms of priority hazards, risk and best practices for risk mitigation, must be dynamic, timely and target consumers, retailers and suppliers to be effective.

## **6 The Way Forward and Next Steps**

Addressing gaps in relation to food safety standards and hazards of importance to trade in agricultural products in the GMS requires holistic value chain approaches that include all stakeholders. The increasing adoption of risk-based approaches to hazards in agriculture in the GMS shows the way forward toward. Adoption of improved risk-based approaches can upgrade food safety systems and help to unlock market access in a cost-effective manner. Effective implementation will also increase transparency and accountability of food safety measures which can increase trust between customers, suppliers and regulators. The following discussion provides suggestions of the strategies needed to improve the application of risk-based approaches in relation to food safety and market access in the GMS.

## 6.1 Risk assessment

Harmonizing national risk assessment systems can benefit all GMS countries and facilitate demonstration of equivalence in relation to hazards of importance to trade as per the SPS agreement. Sharing of surveillance system design and expertise between countries will encourage harmonization of systems and will aid identification of potential problems early and the targeting of responses. Current residue and pathogen testing methods likely require review to ensure comparability between laboratories. Further investment in laboratory capacity is needed. Upgrading and benchmarking of national food reference laboratories and food testing laboratories on the basis of proficiency testing is also needed, ideally in line with ASEAN and international food reference laboratory standards. In the interim, facilitating transfer of samples to accredited laboratories within the GMS will help in the identification of priority hazards and assessment of risk. Given the close ties and shared borders between the GMS countries it is in the interest of each nation that risk assessment data be shared between countries in a timely fashion. Continued active engagement in platforms such as the ASEAN Risk Assessment Centre for Food Safety (ARAC) and the voluntary ASEAN Rapid Alert System for Food and Feed (ARASFF) offer methods of sharing data, knowledge and technical expertise and building GMS risk assessment capacity to regional standards across the subregion (ASEAN, 2017).

## 6.2 Risk management

Investment in physical risk management infrastructure is needed. Transport infrastructure such as road quality, transport hubs, storage facilities and cold chains can mitigate risks, particularly in perishable products. Investment in risk management infrastructure, such as quarantine stations, product handling facilities and zone infrastructure will also be needed to progress risk management in the subregion. Policies that encourage the establishment and accreditation of sustainable, accessible certification bodies are likewise required. Adequate budget and cost coverage mechanisms for operating and maintaining risk management systems are also essential. Various modes of cost coverage may be considered, typically government investment or public-private partnership models might be considered for investment in key infrastructure and the private sector may fund operational costs, though subsidies for smaller actors may also be required, particularly for new businesses.

The roles and responsibilities of the various government and private sector interests and chains of command in emergency responses must be established in accordance with best practices (FAO, 2012). Moreover, investment in technical and management training is needed to build system capacity. Food safety, zoonotic and wider infectious disease emergency response plans need to be established and/or revised in the GMS countries, and should be harmonized between the closely associated countries of the subregion. Joint simulation exercises present an opportunity to strengthen collaboration between regional stakeholders through sharing of knowledge, technical expertise and data and to build harmony in systems which will provide mutual benefits to the GMS nations.

Risk management systems should adopt inclusive whole chain approaches to be effective. Various public-private partnership models can be effective in building mutual interests and

establishing effective and fair risk management systems. Collaboration between public sector, private sector and research interests in terms of information sharing, standard setting system design and testing requires knowledge and data sharing between stakeholders.

### *6.3 Risk communication*

Current communication channels between risk assessors and risk managers can be strengthened to improve efficiency and efficacy in response to food safety breakdowns and outbreaks of hazards of importance to trade. The communication of data and protocols relating to the operation of risk assessment and food control systems to all stakeholders and between GMS countries is of great importance. Moreover, it is essential that the GMS countries risk communication activities present unified, or at least consistent, messages to all stakeholders including consumers. Current risk communication is variable, which can lead to confusion among target audiences. Clear messages will encourage adoption of better practices and greater transparency in food supply. Moreover, clarity of message can help to build trust among consumers, retailers and agricultural product suppliers and will reassure export markets, thereby benefitting all interests.

Continued GMS engagement with regional food safety initiatives can bolster current GMS food safety systems. Some examples are the Regional Food Safety Strategy outlined in 2012 as endorsed by the GMS member countries and ongoing engagement with International Food Safety Authorities Network (INFOSAN), through national focal points and Codex committees and focal points for the OIE and IPPC in relation other hazards of importance to international trade (WHO, 2013, WHO, 2012). The GMS countries, with the exception of the Chinese autonomous regions, are also active members of ASEAN and therefore contribute to and engage in the ASEAN Food Safety Network (AFSN) for which Thailand is a coordinator (ASEAN, 2017). This platform provides an essential point for knowledge transfer, upgrading and benchmarking of current GMS food safety systems with those of other ASEAN countries, to demonstrate equivalence. The AFSN is also an excellent resource for GMS nations with less well-developed food safety systems through mechanisms such as the ASEAN Expert Group on Food Safety, who provide support to member countries on food safety related issues including infrastructure investment and systems design and in the facilitation of trade.

### *6.4 Next step*

The second GMS Agriculture Ministers meeting will be held in Siem Riep, Cambodia, on the 8-9 September, 2017; one decade after the first meeting. During this meeting, the Ministers will endorse the GMS Strategy and Action Plan for 2018 to 2022. One key aspect of the policy agenda will be the harmonization of food safety standards in the subregion. The action plan includes country-level technical assistance and associated infrastructure investment. However, at this stage, it is not yet clear what the specific recommendations to lay the groundwork for increased coordination and harmonization of food safety and SPS related hazards at the GMS level should be. The way forward identifies some broad areas in relation to risk-based approaches, with refinement they can become recommendations for immediate endorsement at the second Agriculture Ministerial Meeting.

Integral to the refinement process for recommendations will be the deliberations of the participants in the GMS Policy Forum events at THAIFEX World of Food Asia 2017. The outcomes of the forum discussions will form the basis of the Issues Paper that will contribute into the Joint Statement of the Ministers during the Ministerial Meeting.

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## List of Acronyms

ACFS	Agricultural Commodity and Food Standard
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
ADDA	Agricultural Development Denmark Asia
AEC	ASEAN Economic Community
AEGFS	ASEAN Expert Group on Food Safety
AFSP	ASEAN Food Safety Policy
ALiSEA	Agro-ecology Learning Alliance in South East Asia
ANAB	ANSI-ASQ National Accreditation Board
APRIS	ASEAN-EU Programme for Regional Integration Support
APO	Asian Productivity Organization
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine
ASEAN	Association of Southeast Asian Nations
ASSIST	Asia Society for Social Improvement and Sustainable Transformation
ASWGC	ASEAN Sectoral Working Group on Crops
AWGFI	Ad-hoc Working Group on Food Irradiation
ASWGL	ASEAN Sectoral Working Group on Livestock
ATIGA	ASEAN Trade in Goods Agreement
AWG Halal	ASEAN Working Group on Halal
ASWGFi	ASEAN Sectoral Working Group on Fisheries
ATFC	ASEAN Task Force on Codex
CAMCONTROL	Cambodia Import-Export Inspection and Fraud Repression Directorate General
CASP	Core Agriculture Support Program
CCTF	China Children and Teenagers' Fund
CEDAC	Cambodian Center for Study and Development in Agriculture
CFSA	Food Safety Risk Assessment
CLM	Cambodia, Lao PDR and Myanmar
CLMV	Cambodia, Lao PDR, Myanmar and Vietnam
DAE	Department of Agricultural Extension
DCA	Department of Consumer Affairs
DDC	Department of Disease Control
DEG	Deutsche Investitions-und Entwicklungsgesellschaft mbH
DFDA	Department of Food and Drug Administration
DFT	Department of Foreign Trade
DLD	Department of Livestock Development
DMS	Department of Medical Sciences
DoA	Department of Agriculture
COD	Center for Organic Development

DoF	Department of Fisheries
DoH	Department of Health
DoR	Department of Rice
DRI	Department of Research and Innovation
EU	European Union
EWG-MRL	Expert Working Group on MRLs of Pesticides
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration
FIA	Food Industry Asia
FMT	Global Food Market Theme
FPDI	Food Protection and Defense Institute
FSOC	Food Safety Operation Center
GAP	Good Agricultural Practices
GDA	General Directorate of Agriculture
GDP	Gross Domestic Product
GDCE	General Department of Customs and Excise
GFSI	Global Food Safety Initiative
GHP	Good Hygiene Practices
GI	Geographical Indication
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit, GmbH
GPS	Global Positioning System
GMP	Good Manufacturing Practices
GMS	Greater Mekong Sub-region
GRET	Groupe de Recherches et d'Echanges Technologiques
HACCP	Hazard Analysis Critical Control Point
HRD	Human Resource Development
ICT	Information and Communication Technology
IPM	Integrated Pest Management
ISO	International Standard Organization
JICA	Japan International Cooperation Agency
LDC	Least Developed Country
MAC	Ministry of Agriculture and Cooperatives
MAF	Ministry of Agriculture and Forestry (Lao PDR)
MAFF	Ministry of Agriculture, Forestry and Fisheries (Cambodia)
MARD	Ministry of Agricultural and Rural Development
MEF	Ministry of Economy and Finance
MHS	Ministry of Health and Sports (Myanmar)
MI	Mekong Institute
MIC	Ministry of Industry and Commerce (Lao PDR)
MIH	Ministry of Industry and Handicraft
MOALI	Ministry of Agriculture, Livestock, and Irrigation (Myanmar)
MoC	Ministry of Commerce (Cambodia)

MoE	Ministry of Education
MOGPA	Myanmar Organic Grower and Producer Association
MoH	Ministry of Health
MOIT	Ministry of Industry and Trade
MPH	Ministry of Public Health
MRLs	Maximum Residue Limits
NFC	National Food Commission
NFI	National Food Institute
NHC	National Health Commission
NNS	National Nutrition Strategy
NORAD	Norwegian Agency for Development Cooperation
NZAP	New Zealand Aid Programme
NVA	Natural Agriculture Village
OCPB	Office Consumer Protection Board
PFPWG	Prepared Foodstuff Product Working Group
PGS	Participatory Guarantee Systems
PPP	Public-Private Partnership
SAFE	Structured Program to Achieve Food Safety Excellence
SAEDA	Sustainable Agriculture & Environment Development Association
SPS	Sanitary and Phyto-sanitary
STDF	Standards and Trade Development Facility
TBT	Technical Barriers to Trade
TISI	Thai Industrial Standards Institute
TOAF	Thai Organic Agriculture Foundation
UAV	Unmanned Aerial Vehicle
UCLA	University of California, Los Angeles
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office for Project Services
VECO	Vredes Eilanden Country Office
VOAA	Vietnam Organic Agriculture Association
WHO	World Health Organization
WTO	World Trade Organization

## 8 Annexes

Table 1. Definition of Key Terms

<b>Term</b>	<b>Definition</b>
<b>Burden of disease</b>	combines quantification of morbidity, disabling complications such as long-term sequelae and mortality, which is typically expressed in the summary figure disability-adjusted life years (DALYs). The DALY is a 'health gap measure that combines the years of life lost due to premature death (YLL) and the years lived with disability (YLD) from a disease or condition, for varying degrees of severity, making time itself the common metric for death and disability. One DALY equates to one year of healthy life lost (Havelaar et al., 2015).
<b>Foodborne disease</b>	a disease commonly transmitted through ingested food. They comprise a broad group of illnesses, and may be caused by microbial pathogens, parasites, chemical contaminants and biotoxins (Havelaar et al., 2015)
<b>Food defense</b>	the sum of actions and activities related to prevention, protection, mitigation, response, and recovery of the food system from intentional acts of adulteration (FPDI, 2017). This includes intentional adulteration from both terrorism and criminal activities. Criminal activities include economically motivated adulteration, as well as acts by disgruntled employees, consumers, or competitors intending to cause public health harm or business disruption.
<b>Food protection</b>	a term that combines both food safety and food defense
<b>Food safety</b>	the prevention of consumer exposure to foodborne hazards, which may be biological, chemical or physical in nature
<b>Foodborne Hazard</b>	A biological, chemical or physical agent in food, or condition of food, with the potential to cause adverse health effects (European Commission Scientific Committee for Food, 1997). For these purposes, risk is defined as a combination of the likelihood of an adverse health effect on pigs and/or humans and the severity of the effect as a consequence of the hazard (Manning and Soon, 2013).
<b>Risk</b>	a combination of the likelihood of an adverse health effect and the severity of the effect as a consequence of the hazard (Manning and Soon, 2013)
<b>Risk analysis</b>	the development of an understanding of risk in a given context (Manning and Soon, 2013). The process of risk analysis is composed of hazard identification, risk assessment, risk management and risk communication (ISO, 2009).

<b>Risk assessment</b>	the evaluation of the likelihood and the biological and economic consequences of entry, establishment, or spread of a pathogenic agent within the territory of an importing country
<b>Risk communication</b>	the interactive exchange of information on risk among risk assessors, risk managers and other interested parties
<b>Risk management</b>	the process of identifying, selecting and implementing measures that can be applied to reduce the level of risk
<b>Zoonosis</b>	any disease or infection, which is naturally transmissible from animals to humans (OIE, 2016)

Table 2. GDP and trade scenarios in GMS countries (WTO, 2016).

Particulars	Cambodia	PR China	Lao PDR	Myanmar	Thailand	Viet Nam
GDP (billion current US\$, 2015)	18.05	10,866.44	12.33	66.98	395.28	193.60
GDP per capita (US\$, 2012-2015)	1,093	7,503	1,756	1,203	6,003	2,024
Trade per capita (US\$, 2012-2015)	771	1,677	557	220	3,918	1,756
Trade (% GDP, 2012-2015)	70.5	22.3	31.7	18.9	65.3	86.7
Commodity exports (billion current US\$, 2014-2015)	11.96	2,274.95	2.34	5.95	214.38	162.11
Agricultural products (%)	4.9	3.2	ND	26.5	17.0	15.2
Fuel and mining products (%)	0.1	2.4	ND	43.8	5.0	3.4
Manufactures (%)	66.1	94.3	ND	29.5	74.6	81.4
Others (%)	28.9	0.1	ND	0.3	3.4	
Main export destinations (% , 2010-2015)			ND			
EU	38.5	15.6			10.3	18.6
US	25.0	18.0			11.2	19.1
Japan	6.7	6.0			9.4	9.8
Canada	6.5					
Hong Kong		14.6		21.1		
Thailand				41.7		
India				12.6		
China				6.2	11.1	9.9
Others	23.3	45.8		18.4	58.1	42.6
Top agricultural exports (million US\$, 2010-2014)			ND			
Rice	231			156	4,544	2,937
Sugar (cane or beet)	28				2,628	
Cassava, arrowroot, salep	23				1,543	
Cigars, cheroots, cigarillos	16					
Preparations of a kind used in animals	15	1,599			1,214	
Dried vegetables, whole or cut		2,812				
Plants' parts otherwise preserved		2,572				
Onions, shallots, garlic, leeks		2,385				
Other vegetables, not frozen		1,878				
Dried leguminous vegetables				890		
Other oil seeds, oleaginous fruit				69		
Meat and edible meat offal, salted				16		
Other prepared or preserved meat					2,187	
Maize (corn)				12		
Coffee						3,311
Coconuts, Brazil nuts, cashew nuts						2,050
Pepper of the genus Piper						1,206
Starches, inulin						739

Commodity imports (billion current US\$, 2015)	14.40	1,681.95	3.86	15.92	202.65	166.10
Agricultural products (%)	7.3	9.5	ND	4.9	7.9	11.2
Fuel and mining products (%)	1.7	21.3	ND	12.3	18.5	8.0
Manufactures (%)	60.8	64.4	ND	75.1	69.6	75.0
Others (%)	30.2	4.8	ND	7.6	4.0	5.7
Main import origin (% , 2010-2015)			ND			
China	36.8			27.1	20.3	29.5
Thailand	14.6			11.4		
Vietnam	8.7					
Hong Kong	6.7					
EU		12.4			8.9	
Korea		10.4		6.1		14.7
US		9.0			6.9	
Singapore				27.0		
Chinese Taipei		8.6				7.5
Japan					15.4	8.7
Others	33.2	59.6		28.1	48.5	39.6
Top agricultural imports (million US\$, 2010-2014)			ND			
Cigars, cheroots, cigarillos	395					
Malt and malt extract	169	2,896		8.4		
Preparations of a kind used in animals	101					
Waters containing sugar	72					
Soybeans		34,895			1,117	873
Solid residues from soyabean mill					1,235	1,860
Palm oil and its fractions		3,705		168		
Grain sorghum		2,971				
Barley		2,859				
Cereal grains otherwise worked				58		
Milk and cream, concentrated				49		
Other food preparations				16	517	
Wheat and meslin					1,132	
Cotton, not carded or combed					532	1,423
Maize (corn)						1,216
Coconuts, Brazil nuts, cashew nuts						651

**GDP (gross domestic product)** is the sum of output within the economy's territory minus the sum of intermediate consumption (increased by taxes net of subsidies on products). It is measured in nominal terms and with market exchange rates; **GDP per capita** is estimated as an economy's GDP divided by the population. It is calculated on the basis of data for the three latest years available; **Trade per capita** is estimated as an economy's trade in goods and commercial services (average of exports and imports, balance of payments basis) divided by the population. It is calculated on the basis of data for the three latest years available; **Trade to GDP ratio** is estimated as an economy's trade in goods and commercial services (average of exports and imports, balance of payments basis) divided by GDP, on the basis of data for the three latest years available; **Agricultural products** refer to food and raw materials; **Fuels and mining products** include ores and other minerals, fuels and non-ferrous metals; **Manufactures** refer to iron and steel, chemicals, other semi-manufactures, machinery and transport equipment, textiles, clothing and other consumer goods. Please note that due to the products not classified in the three main product groups, the sum of the shares may not add up to 100; **Agricultural products, top exported products and top imported products** are the top five traded agricultural goods of an economy at the HS 4-digit level. According to the definition of the WTO Agreement on Agriculture, agricultural goods refer to HS chapters 1 to 24 (excluding fish and fish products) and a number of manufactured agricultural products (for further information, see "The Legal Texts: The Results of the Uruguay Round of Multilateral Negotiations", WTO). This definition does not correspond to the definition of agricultural products above; ND – no data



Table 3. Food safety laws and regulations and implementing agencies in GMS countries

Country	Laws and Regulations	Agencies and main functions
Cambodia	Law on the Management of Quality and Safety of Products and Services (2000) - covers inspection procedures to ensure quality and safety of products, goods, and services as well as guidelines on production and commercialization, consumers' rights and economic operators' obligations, labeling, commercial fraud repression, etc.	Ministry of Agriculture, Forestry and Fisheries - take charge of the registration and/or permission to establish and operate food business at primary production and primary processing will be carried out by the Competent Authority of MAFF.
	Law on Standards of Cambodia (2007) - seeks to improve the quality of products and services to (a) raise production efficiency, (b) ensure fair and simplified trade, (c) rationalize product use, and (d) enhance consumer protection and public welfare.	Ministry of Industry and Handicraft (MIH) - monitor food safety compliance of large-scale production of processed food products and handicrafts especially those for export
	Law on Management of Pesticides and Fertilizers (2012) - aims to enhance public awareness on the implementation of standard requirements of pesticides and fertilizers .	Ministry of Commerce (MOC), General Department of CAMCONTROL - ensure consumer protection, implement a framework for crossborder market surveillance activities, work on custom-related services with General Department of Customs and Excise of Cambodia (GDCE) and other concerned agencies, and lead the inter-ministerial committee on food safety
	Prakas on Good Agricultural Practices (2010) - promotes GAP rules on fruit and vegetable production to promote food safety, minimize environmental impact, protect health, safety, and well-being of producers, and improve the quality of agro-products.	Ministry of Health (MOH) - implement policies and programs promoting compliance to hygiene and sanitation requirements
	Prakas on the Implementation and Institutional Arrangements of Food Safety Based on the Farm-to-table Approach (2010) - aims to improve the implementation of a food safety system that will protect consumer health, enhance Cambodian food export competitiveness, and set up institutional arrangements.	Ministry of Economy and Finance (MEF), GDCE, - provide effective and efficient coordination in food safety inspection at the international checkpoint
Lao PDR	National Food Safety Policy (2009) - aims to protect and promote better health by ensuring people consume safe, hygienic, and nutritious food as well as promote safe food production and trade.	Ministry of Health (MOH) - develop national food safety plans and policies and coordinate intersectoral linkages in implementing regulations
	Food Law (2013) - defines the principles, regulations, and measures to manage, monitor, and inspect food and food businesses ensuring quality, effectiveness, safety, and nutrition as well as protecting consumers' health and contributing to the country's development.	Ministry of Agriculture and Forestry (MAF) - monitor food safety practices from primary production, processing, and preservation, as well as implementation of codes of practices
	Food Inspection Regulation 297, MOH (2012) – provides guidelines in food inspection	Ministry of Industry and Commerce (MIC) - inspect factories and other industrial establishments
Myanmar	National Food Law (1997) - regulates production, import, export, storage, distribution, and sale of food as well as enables public to consume food of genuine quality and free from danger.	Ministry of Health and Sports (MHS), Department of Food and Drug Administration (DFDA) - take charge of the registration, licensing, and quality control of registered drugs, processed food, and food for import/export
	Consumer Protection Law (2015) - seeks to protect rights of consumers by forming Consumer Complaint Committee to receive complaints regarding food quality and safety.	Ministry of Agriculture, Livestock, and Irrigation (MOALI), Department of Agriculture (DOA) - promote GAP and regulate use of chemical inputs in agricultural products
	Public Health Law (1972) - aims to control the quality and cleanliness of food and drugs, maintain environmental sanitation, and prevent epidemics.	Ministry of Education (MOE), Department of Research and Innovation (DRI) - ensure compliance to international standards and regulations
	Pesticide Law (1990) - regulates the use and trade of pesticides and other toxic substances.	

		Ministry of Commerce (MOC), Department of Consumer Affairs (DCA) - establish consumer dispute settlement groups at regional, state, and township levels
Vietnam	Food Safety Law (2010) - outlines conditions for food safety from food production, testing, labeling, trading, and consumption.	Ministry of Health (MOH)- manage food safety from production, processing, and retail of pre-packed and processed food, food additives, and other substances
	Decree No.163/2004/ND-CP (2004) - regulates the implementation of some articles of the Ordinance on Food Hygiene and Safety in detail.	Ministry of Agricultural and Rural Development (MARD) - monitor food safety compliance on cereals, egg, meat, seafood, fruits, vegetables and other related by-products and produce
	Decree No.79/2008/ND-CP (2008) - stipulates the organization, management, inspection, and testing of food hygiene and safety system.	Ministry of Industry and Trade (MOIT) - regulate production, processing, and retail of alcoholic beverages, processed milk, vegetable oil, etc
	Resolution No. 34/2009/NQ-QH12 (2009) - promotes the implementation of policies and legislation on the management of food quality, hygiene, and safety.	
	Decree No. 38/2012/ND-CP (2012) – guides interagency coordination to implement the Food Safety Law.	
Thailand	<p>Agricultural Commodity Standards Act BE2551 (2008) (ACFS)</p> <p>Fertilizer Act BE2518 (1975) amended 2550 (2007) (DA)</p> <p>Plant Quarantine Act BE2507 (1964) amended 2551 (2008) (DA)</p> <p>Fisheries Act BE2490 (1947) (DF)</p> <p>Control of Animal Slaughter &amp; Sale of Meat Act BE2535 (1992) (DLD)</p> <p>Animal Feed Quality Control Act BE2525 (1982) amended 2542 (1999) (DLD)</p> <p>Animal Epidemics Act BE499 (1956) amended 2542 (1999) (DLD)</p> <p>Dairy Cattle and Milk Product Act BE2551 (2008) (DLD)</p>	<p>Ministry of Agriculture and Cooperatives (MAC)</p> <ul style="list-style-type: none"> <li>-National Bureau of Agricul Commodity &amp; Food Standard (ACFS)</li> <li>-Dept of Agriculture (DOA)</li> <li>-Dept of Fisheries (DOF)</li> <li>-Dept of Livestock Devt (DLD)</li> <li>-Dept of Rice (DOR)</li> <li>-Dept of Agricul Extension (DAE)</li> </ul> <p>MAC is responsible for safety and quality of food at farm production for domestic and export market and food (fresh and processed) through standard setting and control of using the standard; controls import of living plants and animals, meat, tuna, shrimp, animal feed, agro-chemicals and agro-hazardous substances.</p>
	<p>Food Act BE2522 (1979) (FDA)</p> <p>Communicable Disease Act BE2523 (1980) (DDC)</p> <p>Public Health Act BE2535 (1992) (DH)</p> <p>Natl Food Commission Act BE2551 (2008) (ACFS &amp; FDA)</p>	<p>Ministry of Public Health (MPH)</p> <ul style="list-style-type: none"> <li>-Food &amp; Drug Admin (FDA)</li> <li>-Food Safety Opns Center (FSOC)</li> <li>-Dept of Health (DH)</li> <li>-Dept of Medical Sciences (DMS)</li> <li>-Dept of Disease Control (DDC)</li> </ul> <p>MPH is responsible for safety and quality of food (fresh, processed and cooked food) and import of food for domestic consumption through standard setting and control of using the standard of food, labeling, advertisement and its packaging; consumer education; foodborne disease prevention and control for both domestic and export food.</p> <ul style="list-style-type: none"> <li>-National Food Commission (NFC)</li> </ul> <p>NFC is responsible for the formulation of</p>

		national policy direction and strategies covering all dimensions of food, which includes food quality, food safety, food security, and food education. All policies and strategies will guide all national agencies throughout the food chain to move in the same direction, to have more coordination and integration in order to achieve the highest possible level of national food management.
	<p>Industrial Product Standards Act BE2511 (1968) amended 2548 (2005) (TISI)</p> <p>National Standardization Act BE2551 (2008) (TISI)</p> <p>Hazardous Substances Act BE2535 (1992) amended 2544(2001) (MI)</p> <p>Hazardous Substances Act BE2535 (1992) amended 2544(2001) (MI)</p> <p>Export and Import of Goods Act BE2522 (1979) (DFT)</p> <p>Consumer Protection Act BE2522 (1979) amended 2541 (1998) (OCPB)</p> <p>Liability for Damages Arising from Unsafe Products Act BE2551 (2008) (NHC)</p> <p>National Health Act BE2550 (2007)</p>	<p>Support ministries: Industry (Thai Industrial Standards Institute-TISI, standards; National Food Institute-NFI, upgrading food industry to intl standard, lab services, R&amp;D); Finance (Customs Dept-coordinate with FDA at major ports for import test); Commerce (Foreign Trade Dept-control import/export of controlled goods); Interior (provincial governors as head of food safety activities at local level); Univ Affairs (Knowledge Network Institute of Thailand and Institute of Nutrition-Mahidol Univ – R&amp;D); Prime Minister’s Office (Consumer Protection Board-OCPB; Natl Health Commission-NHC)</p>
PRC	<p>Food Safety Law 2009 (repealed Food Hygiene Law 1997)</p> <p>Revised Food Safety Law 2015, imposing more stringent controls on food safety risks and ensuring greater government accountability towards consumers.</p> <p>Food and Drug Administration Law 2013 – establishes FDA Drug Administration Law 2001</p>	<p>Food and Drug Administration, a ministerial level agency, is responsible for food safety management, risk assessment, formulation of standards, information dissemination, establishment of codes of practice for food testing organizations, and the investigation of major food safety incidents; it oversees food manufacture, distribution and consumption, and manages regulation processes for food and drug safety. It works closely with the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ)</p> <p>AQSIQ is a ministerial-level agency under the State Council of China that is in charge of national quality, metrology, entry-exit commodity inspection, entry-exit health quarantine, entry-exit animal and plant quarantine, import-export food safety, certification and accreditation, standardization, as well as administrative law enforcement</p>

Table 4. Food safety initiatives in GMS countries, 2011-2017

<b>GMS Country</b>	<b>Initiative</b>	<b>Brief description</b>
All GMS	Towards a Non-Toxic Environment in South-East Asia (Sweden/FAO)	This project develops sustainable pest and pesticide management policies, strengthens the regulatory framework for controlling the distribution and use of pesticides, and enhances the capacity for implementing these policies and enforcing pesticide legislation.
CLMV	Mekong Institute Food Safety Project (NZAP)	The goal of the project is for policy makers in Cambodia, Lao PDR, Myanmar and Viet Nam (CLMV) responsible for developing and implementing food safety regulations create an enabling food regulatory environment connected to private sector, their needs and market
CLMV	Capacity Building and International Food Safety Standards in ASEAN (Japan/FAO)	This project focuses on strengthening national capacity to develop national food safety standards in line with Codex standards, implementation of standards and contribution to international standards setting process.
CLMV	Pesticide Risk Reduction by Policy and Capacity Building (Sweden/FAO)	The overall objective is to promote sustainable, safe, profitable and environmentally-sound intensification of agricultural production through the development, promotion and practice of Integrated Pest Management
CLM	Food Safety Control Measures in Developing Asian Countries (GIZ)	This project strengthens the food safety standards in order to protect and promote consumer health by controlling the entire food chain and strengthens the role of COs in monitoring and carrying out market surveillance.
CLV	Improving Food Safety Management in CLV (NZAP)	The project provides trainings to small and medium sized enterprises, food handlers and market places about basic food hygiene, food regulations and quality assurance systems such as GAP, GHP, GMP and HACCP).
CLV	Regional: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in GMS Trade (ADB)	The project conducts due diligence in the following aspects: (i) the capacities pursued and methods introduced need to be compliant with principles/ obligations under the WTO and ASEAN. They need also to be tailored to the needs of individual countries as identified in national SPS Action Plans and ADB's own analysis; (ii) financial and economic viability will be assessed for the project investment, in particular cost-benefit, least cost and alternative analysis. Moreover, fiscal impacts of the investments and recurrent costs will be assessed to ensure that the developing member countries (DMCs) can sustain the Project operation; (iii) public financial management, procurement, policy, legal and institutional issues which are important for project implementation and cost-effectiveness of SPS services will be examined; (iv) poverty and social impacts assessment; (v) detail project implementation
CLV	ASEAN-EU Programme for Regional Integration Support – Phase II (APRIS II)	The objective is to provide training on and audit the implementation of HACCP methods, GMP, GHP and risk analysis and management among SMEs in the agro-based sector in three (3) selected ASEAN Member States, namely: Cambodia, Lao PDR and Vietnam (CLV).
CL	Standards in South-East Asian Food Trade (GIZ)	The project improves the food standards that will not only benefit to the health of people but also boost food to regional or international market
CL	Demonstration Company Project on Modern Food Safety Management Systems in Cambodia (APO)	This is a demonstration company project aimed at establishing sophisticated FSMS such as HACCP or ISO 22000 in food-processing companies that introduced good manufacturing practices (GMP) in previous projects. The project also educates NPCC staff to develop their consultancy ability on FSMS. Modern food FSMS will be promoted in the entire Cambodian food industry.
Cambodia	Structured Program to Achieve Food Safety Excellence in Cambodia (SAFE Cambodia) (ASSIST, TUV Rhineland, DEG)	This PPP project helps local SMEs adopt international standards to help them reduce operational inefficiencies and increase business opportunities on a larger scale. By collaborating on implementing the internationally approved practices, SMEs will be able to share their knowledge and create a valuable network to guarantee long-term success.
Lao PDR	Technical assistance to	The purpose of this project is to reduce the spread of H5N1 in poultry

	strengthen emergency preparedness for Highly Pathogenic Avian Influenza (FAO)	in the country, thus minimizing the risk of contagion to other mammals and humans and the possibility of a pandemic.
Lao PDR	Lao Organic Agriculture Promotion Project (JICA)	The project builds knowledge and human resource capacity to ensure organic agriculture systems are fully functional..
Lao PDR	Laos Pilot Program (LPP) for Narrowing the Development Gap Towards ASEAN Integration (ASEAN Secretariat, JICA)	The LPP aims to balance development growth with environmental conservation, to create harmonization of development. The LPP has agriculture component to introduce GAP for safe and quality agricultural production promotion.
Lao PDR	National Nutrition Strategy (NNS) to 2025 and Plan of Action 2016-2020	This project employs a multi-sectoral convergent approach with common focus points, common goals, and common timeframes while boosting resources and increasing support from development partners and the relevant stakeholders to the greatest extent possible to reduce all forms of malnutrition among women, children and disadvantaged groups, to achieve success, and meet the set targets.
Myanmar	Improving Food Safety Compliance with SPS to Increase Export in Oilseeds (WTO STDF)	This project improves food safety and compliance with SPS measures for market access to increase export revenues of farmers, processors and exporters along the oilseed value chain.
Myanmar	Food Safety Regulation & Enforcement (NY Wagner; New York University)	This project identifies the main challenges in food safety, its regulations, and enforcement.
Myanmar	Strengthening National Quality Infrastructure for trade (NORAD)	This project strengthens Myanmar's national capacity to provide internationally recognized laboratory testing services to food producers and exporters.
Myanmar	Enhancing of Food Safety (Japan Grassroots)	The project aims to enhance the quality of local agro-products and protect Myanmar people from contaminated food with excessive use of harmful chemicals.
Vietnam	Livestock Competitiveness & Food Safety Project (World Bank)	The project aims to increase the production efficiency of household-based livestock producers, reduce the environmental impact of livestock production, processing and marketing, and improve food safety in livestock product supply chains (mainly meat) in selected provinces.
Vietnam	Canada funds food safety project in Vietnam	Canada will soon provide an aid package of about CAD15 million (US\$11.3 million) for a food safety project in Vietnam.
Vietnam	Strengthening Vietnamese SPS Capacities for Trade - Improving safety and quality of fresh vegetable through the value chain approach (FAO UN)	The project develops vegetable value chain; GAP training manual; pilot model with VIETGAP; information exchange WS/forum; linkages between growers and vendors
Vietnam	Outbreak Mechanisms and Development of a Surveillance Model for Multi-drug Resistant Bacteria	The projects establishes the mechanism of multi-drug resistant bacteria, develops a comprehensive monitoring system for antibiotics residue and antibiotic resistant bacteria over the process from food production to intake; and trains researchers and technical staff related to food safety monitoring.
Vietnam	Strengthening International Health Regulations Core capacity on Food Safety (WHO)	The project reviews MOH legislation documents (review food safety law); strengthens national capacity for foodborne disease surveillance and response; and strengthens national and international network and collaboration/ coordination to respond to foodborne hazards (e.g., development of emergency response plan; and active participation in the platform)
Vietnam	Veterinary Intervention for Anti-microbial Reductions in Chicken Production (ViParc)	The project develops diagnostics for poultry diseases; investigates antimicrobial resistance; and conducts cost-benefit analyses.
Vietnam	Supporting small-scale pig production in Viet Nam through reducing disease risk, enhancing productivity and upgrading value chains (ACIAR)	The project improves the livelihoods of rural and urban poor in Viet Nam through improved opportunities and incomes from pig value chains as a result of reduced risks associated with pork-borne diseases.
Thailand		(Huge investment in hard and soft infrastructures to develop modern and world-class food safety management systems for domestic market and export engagements fueling rapid economic growth, with the food industry contributing 23% to GDP, US\$ 27 billion exports, and more than 20 million people employed)

China	China Food Safety Initiative (UCLA School of Law)	The Initiative aspires to enhance food governance in China, with the ultimate aim of ensuring safe and healthy food for consumers. Through events as well as research development, discussion among leaders in China on addressing food safety challenges is facilitated.
China	13th Five-Year Plan on Food Safety (State Council)	The Plan sets forth the following primary objectives: Enhance sample testing to cover all types of food; Effective governance of resource contamination; Reinforce on-site inspections: Establish a professional inspector team and standardized enforcement procedures and documentation; and Align Chinese food safety standards with international standards.
China	China National Center for Food Safety Risk Assessment (CFSA)	CFSA, established in Oct 2011, is a public health organization and national technical institution in charge of food safety risk assessment in the entire food chain; advises government on risk management matters; provides public information and science-based education on food safety issues for all stakeholders; addresses scientific needs of innovative industries.
China	National Food Safety Standards Project	The Ministry of Health processes 83 national food safety standards in four categories: Basic Standards-4 standards; Food additives-45 standards; Good production practice-7 standards; Method of inspection-27 standards
China	Asia-Pacific Smart Agriculture & Food Safety Industry Demonstration Zone (SAFS) (UNOPS)	UNOPS assists the Government of Changchun to establish a 10 square-kilometer zone that showcases smart & sustainable agriculture, food safety innovation, and health management.
China	EU China Trade Project II	The project supports the Chinese government's trade and investment reform agenda by working under the EU-China economic and trade dialogues to promote fair competition and value for consumers; facilitate harmonization with international standards and promote safe products; improve food safety and quality; modernize customs; encourage a more transparent legal environment, and work towards transparency, good governance and equitable trade and investment policies.
China	National Institute of Nutrition and Food Safety	The Institute conducts studies on health-related nutrition and food hygiene problems and trains nutrition and food hygiene specialists. The ultimate goal is to improve nutritional status, prevent foodborne diseases, and strengthen the physical fitness of the people.
China	China - Jilin Food Safety Project (World Bank).	The project improves the legal and regulatory environment and the institutional capacity in both the private and public sector to manage agricultural product safety and quality in Jilin Province.
China	GLOBALGAP Farm Assurer Capacity Building Program (GlobalGAP)	The project establishes the GLOBALGAP Farm Assurer as a universally recognized brand that communicates a high level of competence and integrity.
China	Walmart Food Safety Collaboration Center	Walmart Foundation funded three projects An initiative with CCTF focused on educating children and parents across China by increasing knowledge of safe handling of food in the household; A collaborative research project bringing together U.S. and Chinese academics and Chinese poultry producers to study safety in poultry supply chains; and a collaborative research project bringing together the Massachusetts Institute of Technology, Zhejiang University and Tsinghua University that will use supply chain analytics and state-of-the-art technology to rapidly predict and detect those areas of greatest vulnerability for food adulteration in food supply chains.

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Table 5. SPS/CODEX initiatives in GMS countries

<b>Cambodia</b>	<b>Lao PDR</b>	<b>Myanmar</b>	<b>Vietnam</b>	<b>Thailand</b>	<b>China</b>
Capacity Building and International Food Safety Standards in ASEAN (Japan/FAO)	Capacity Building and International Food Safety Standards in ASEAN (Japan/FAO)	Capacity Building and International Food Safety Standards in ASEAN (Japan/FAO)	Capacity Building and International Food Safety Standards in ASEAN (Japan/FAO)	Amended the Codex system in 2004 by a ministerial decree	National Food Safety Standards Project
Regional: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in GMS Trade (ADB)	Regional: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in GMS Trade (ADB)	Food Safety Control Measures in Developing Asian Countries (GIZ)	Regional: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in GMS Trade (ADB)	Continuing strengthening of existing standards (e.g. Q GAP and ThaiGAP) to conform with international standards	13th Five-Year Plan on Food Safety (State Council)
Food Safety Control Measures in Developing Asian Countries (GIZ)	Food Safety Control Measures in Developing Asian Countries (GIZ)	Improving Food Safety Compliance with SPS to Increase Export in Oilseeds (WTO STDF)	Strengthening Vietnamese SPS Capacities for Trade - Improving safety and quality of fresh vegetable through the value chain approach (FAO UN)		
Developing SPS action plan for Cambodia -ADB-SPS Standards Management Systems Phase 2	Technical Assistance for Further Devt of SPS related Legal Framework in Lao PDR (FAO)				
Standards in South-East Asian Food Trade (GIZ)	Standards in South-East Asian Food Trade (GIZ)				



Table 6. Private sector-driven initiatives in food safety in GMS countries

Initiative	Cambodia	Lao PDR	Myanmar	Vietnam	Thailand	China
PGS	<p>- started 2014 - 13 PGS groups - &gt;180 farmers -Agencies involved: GDA, CEDAC, Caritas, COD, NAV -Pilots operating effectively -Products now at markets; restaurants are interested; farmers felt ownership &amp; proud to be part of PGS</p> <p>Next steps: prepare national logo; complete the national organic standard; adopt PGS for national standard/ certification system; increase number of PGS groups; capacity building; national campaign; form “green show network”</p>	<p>-started 2015 -3PGS groups -&gt;250 farmers -Agencies involved: DOA, GRET, SAEDA -PGS as certification tool and option in DOA program -PGS can be used for organic or GAP certification (separate standards &amp; labels) -National/local structures set -No govt funding; local initiatives supported by NGO(GRET, SAEDA)</p> <p>Next steps: organize workshops to improve the system; establish National Platform/ Task Force that works on the action plan and national guidelines</p>	<p>-started in 2014 -9 PGS groups -&gt;100 farmers -Agencies involved: MOGPA -PGS is already known -first certificates soon to be issued for 8 groups - Govt shows positive attitude but recourses limited -Main communication channel- Facebook -At domestic market, tea and coffee are available organic (PGS and 3rd party), rice, fruits, mushrooms and vegetables are starting now</p> <p>Next steps: provide technical support; collaborate with govt; capacity building; develop a national PGS network and market linkage; info campaign</p>	<p>-started in 2008 -5 PGS groups -&gt;350 farmers -Agencies involved: ADDA, VOAA -Now more resilient with strong links to Hanoi markets -no regulation or recognition -Relevant govt agencies now interested -Build the PGS bottom-up with strong market links</p> <p>Next steps: continue policy lobbying re govt adoption of PGS guidelines and standards; capacity building; upscaling and awareness raising; improve traceability (smartphone/apps)</p>	<p>-16 PGS groups -&gt;1,500 farmers -Agencies involved: Earth Net, Lemon Farm, TOAF, POAA -Government supports PGS as a development tool -Lemon Farm is the success model from private sector-led PGS with strong market facilitation (14 shops in BKK) -Mainstream markets: TOPS supermarket</p> <p>Next steps: consolidate PGS movement; create platform for exchange and networking “Thai PGS Movement”</p>	<p>-2 PGS groups (rice &amp; vegetables); Guangxi province -&gt;125 farmers mostly female -Agencies involved: Farmers Seed Network, OXFAM HK -Marketing thru local &amp; farmer’s markets, consumer associations, online thru rural e-commerce (set up by Alibaba). -branded as PGS; Chinese regulation does not allow products to be called organic</p> <p>Next steps: conduct national PGS workshop to strengthen with govt representation; upscaling; lobbying; awareness raising; market strengthening; target PGS recognition at central level by 2020</p>
		Small-Scale Farmer Inclusion in Organic Agriculture (OA) thru PGS - addresses certification and marketing issues thru PGS & raising awareness on benefits of OA & PGS for envt, health and livelihoods in rural areas		Scaling up PGS among smallholder farmers, consumers and private actors in Viet Nam(VECO) -The project supports the PGS groups to strengthen their production, marketing and management skills		

GI	<ul style="list-style-type: none"> <li>-2 GI products (Kampot pepper and Kampong Speu palm sugar)</li> <li>-3 GI pending in EU</li> <li>-Promotion of Rural Devt thru Devt of GI at Regional Level in Asia-CLVT (FAO)</li> <li>-Law on GI in Cambodia</li> </ul>	<ul style="list-style-type: none"> <li>-no GI product</li> <li>-Promotion of Rural Devt thru Devt of GI at Regional Level in Asia-CLVT (FAO)</li> <li>-Implementing GI under the Intellectual Property Law Oct 2016</li> <li>-Establishment of Trademark and GI Division, Ministry of Science and Technology to coordinate GI registration</li> </ul>	<ul style="list-style-type: none"> <li>-1 foreign GI product</li> <li>-GI protection under Trademark Law, Sept 2014</li> <li>-Formulation of a GI regulatory framework</li> <li>-GI trainings</li> <li>-Awareness raising events</li> <li>-Plan to enact GI law</li> <li>-1st GI product Ywangan Coffee for processing in 2017</li> </ul>	<ul style="list-style-type: none"> <li>-48 GI products with 39 in EU &amp; 2 pending in Thailand</li> <li>-4 foreign GI products</li> <li>-169 GI from EU protected with FTA</li> <li>-Promotion of Rural Devt thru Devt of GI at Regional Level in Asia-CLVT (FAO)</li> </ul>	<ul style="list-style-type: none"> <li>-61 GI products with 5 in EU (3 pending), 1 in Vietnam</li> <li>-11 foreign GI products</li> <li>-Promotion of Rural Devt thru Devt of GI at Regional Level in Asia-CLVT (FAO)</li> <li>-GI products: Khao Hom Mali Thung Kula Rong (2013 EU registered), Isan Indigenous Silk Yarn (2014 Vietnam registered); 3 EU applications Kafae Doi Chaang (Coffee), Kafae Doi Tung (Coffee) and Khao Sungyod Muang Phattalung (Rice)</li> </ul>	<ul style="list-style-type: none"> <li>-2984 GIs with 83 foreign GIs</li> <li>-Agencies involved: State Admin for Industry &amp; Commerce/ Trade-mark Office, General Admin of Quality Supervision, Inspection and Quarantine, Ministry of Agriculture</li> <li>-EU-China GI-10 plus 10 project</li> <li>protection of 10 famous EU food names in China with GI. In parallel, EC examined and registered 10 Chinese food names with GI status</li> <li>-EU-China Trade Project II providing support to ongoing bilateral negotiations on GI</li> </ul>
Private company	<ul style="list-style-type: none"> <li>-Natural Garden Safe and Organic produce</li> <li>-Green-O Farm chemical free produce</li> <li>-Amarak Veggie Store</li> <li>-Happy Farm</li> <li>-Aliment Organic Foods</li> </ul>	<ul style="list-style-type: none"> <li>-Lao Fresh Meats</li> </ul>	<ul style="list-style-type: none"> <li>-Myanmar Food Processors and Exporters Association-lab testing; training on food quality</li> <li>-Myanmar Consumer Union-awareness raising,, advocacy, consumer seminars</li> <li>-Shan Maw Myae-form and promote organic groups</li> </ul>	<ul style="list-style-type: none"> <li>-Binh Dinh Safe Vegetable</li> </ul>	<ul style="list-style-type: none"> <li>-Public-Private Collaborative Committee: New Sustainable Growth Path 2016-“Community Product to Modern Trade” standardizes cash crop production under “Thai GAP” and “Primary GAP”</li> </ul>	

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Table 7. . Gaps along the food chain in GMS countries

Stage	Gaps	Cambodia	Lao PDR	Myanmar	Vietnam	Thailand	China
Input supply	Lack of quality inputs especially seeds	√		√			
	Lack of seed storage facility			√			
	No plant variety protection			√			
	Contamination of animal feed					√	
	Limited access to capital to acquire inputs			√			
Production	Lack production and marketing plan; no system					√	√
	Misuse of pesticides, hormones, antibiotics, fertilizers	√	√	√	√	√	√
	Limited capacity on proper production (IPM, GAP, irrigation, food safety control, optimum input use)	√	√	√	√	√	
	Low quality downstream water					√	
	Heavy metal pollution of soils						√
	Waste from industries near farms						√
	Weak food safety inspection; no border quarantine	√					
	High production cost & difficulty in farm supervision						√
	Low incentive to apply food safety control		√				
	Small-scale, scattered, seasonal production			√	√	√	√
	Lack of affordable credit			√			
Processing	Misuse/illegal use of food additives	√					√
	High energy and freight cost	√					
	High postharvest losses	√		√			
	Limited knowledge and capacity; insufficient science and technology inputs	√	√	√	√		√
	Limited support to SMEs to upgrade processing	√	√				
	Lack of processing facilities & limited processed items			√			
	Lack of interest to apply food safety standards		√				
	Lack of accrediting organizations for export foods			√			
	Lack of control over small processors				√		
	Lack of responsibility to protect consumers & envt.					√	
	Loss of public confidence on regulatory system						√
Storage and transport Retail	High cost of transport/logistics	√		√			
	Lack of facilities for proper temperature control	√	√	√	√	√	√
	Lack of technical knowledge	√	√	√			
	Underdeveloped distribution channel				√		
	Lack of food safety and hygiene capacity	√	√	√	√		√
Retail Consumer	Lack of incentive to apply food safety regulations		√	√			
	Lack of responsibility to ensure food safety		√				
	Lack of systematic data storage and analysis						√
	Lack of awareness of food safety and good	√	√				√

	practices						
	Lack of representation of consumer organization	√					
Consumer	No national consumer protection committee			√			
	Lack of differentiated products				√		
	Lack of effective and trusted certification				√		
	Poor risk communication				√		
	Lack of rapid response to consumer issues						√

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