

Assessment of Good Regulatory Practices for Food Safety and Implications for China's New Legal Regime

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I. Executive Summary

Over the past several years, China has pursued ambitious legal and institutional reforms to boost food safety, with an amended Food Safety Law (2015) (FSL) as the centerpiece of the reform. As enforcement of the new legal system moves forward, three primary challenges will impact its speed and effectiveness: 1) China's market is fragmented, with a predominance of small- and medium-sized entities (SMEs) which have scarce resources and little financial incentive for compliance; 2) human, technological, and financial capacities are lacking in local jurisdictions; and 3) there is a disconnect between the one-size-fits-all legal requirements and wide variations among public and private stakeholders across the country to implement these requirements.¹

To help tackle these challenges, this paper highlights relevant best practices both within and outside of China that could be leveraged and tailored to the Chinese context. The assessment covers several substantive areas, all of which are central to food safety and have considerable reform momentum in China: food standards, inspection, certification, storage, packaging, traceability, and recall systems. Much of the analysis is focused on fruits and vegetables, due to their central role in food security, market development, and nutritious diets. Four cross-cutting themes arise across the different substantive areas included in the assessment, which hold significant promise for a robust food safety regime.

First, China could enhance private governance and public-private partnerships, including through adopting widely-used private international standards, promoting knowledge of good storage practices through industry associations, and innovating within traceability systems. The public sector could use policy and law to enable greater private sector involvement and institutionalize feasible private best practices and private standards.

Second, international cooperation, harmonization, and benchmarking against international standards could be intensified. Of particular significance are the Global Food Safety Initiative (GFSI) for international private standards and GS1 for traceability. Also, international

¹ See Kuhlmann, Katrin, Wang, Mengyi, and Zhou, Yuan. *China Food Safety Legal and Regulatory Assessment*. Syngenta Foundation for Sustainable Agriculture, publication forthcoming; See also Kuhlmann, Katrin, Wang, Mengyi, and Zhou, Yuan. *China Horticulture Case Study*. Syngenta Foundation for Sustainable Agriculture, publication forthcoming.

cooperation covers international platforms and initiatives designed to facilitate dialogue and coordination, such as the Global Cold Chain Alliance (GCCA) for cold chain logistics and the International Food Safety Authorities Network (INFOSAN) for recall.

Third, the government and private sector should address the capacity constraints of SMEs that prolong legal implementation challenges, particularly in more costly areas such as cold chain logistics and traceability. Possible mechanisms would include promoting equitable contract farming arrangements that incorporate training and resource support for SMEs (including through adherence to standards) or increasing the capacity of cooperatives, both more generally and with to enhance ability to conduct trainings on food safety.

Fourth and finally, the Chinese government should adopt differential and phased implementation of food safety reforms. Differential and phased implementation – staging commitments based on priority and capability – will be crucial to address the variations among public and private stakeholders across the country. For example, the United States (U.S.) Food Safety Modernization Act (FSMA) follows such a model and sets out different requirements with staggered compliance dates based on the size of the facilities/businesses.² As China establishes and reconfigures more focused implementation of regulations and standards, approaches should be tailored to private sector and government need, with a prioritization of rules and effective phase-in periods designed around the capacities of different actors. The paper’s findings and recommendations are summarized in Table 1 below.

This paper is part of an ongoing series developed by the Syngenta Foundation for Sustainable Agriculture (SFSA) and New Markets Lab (NML) focused on China’s legal and regulatory system for food safety, which has included several Case Studies and a China Food Safety Legal and Regulatory Assessment.³ In particular, the case studies in this series will focus on implementation of China’s food safety regime, exploring in detail application of some of the market infrastructure and regulatory approaches identified in this paper.

Table 1: Summary of Good Food Safety Regulatory Practices and China’s Context

Regulatory Issue	Global Good Practice	China Context
Standards	<ul style="list-style-type: none"> Private governance in standard setting and enforcement, especially among large retailers Institutionalized private standards at different levels (public-private and private with public institutionalization) Enhanced public-private partnerships Structured arrangements with farmers (e.g. contract farming) to promote standards throughout value chains 	<ul style="list-style-type: none"> Continuous release of new standards Ongoing consolidation and revision of existing standards Growing alignment with international standards Contract farming model more prevalent in certain value chains (e.g. fruits and vegetables)
Inspection	<ul style="list-style-type: none"> Optimization of limited public capacity for inspection via public-private partnerships (e.g., authorization of private 	<ul style="list-style-type: none"> Government-led inspection and self-inspection required; private sector inspection limited (e.g. testing labs)

² Grocery Manufacturers Association, Reference Sheet for FSMA Compliance Dates. Web. 1 October 2017.

³ *Id.*

	inspectors) and information sharing	<ul style="list-style-type: none"> • Insufficient local capacity to conduct inspections • Insufficient awareness of need for self-inspection among SMEs and some retailers
Certification	<ul style="list-style-type: none"> • When certification fills a necessary role, programs are streamlined and promote confidence in market stakeholders and government capacity 	<ul style="list-style-type: none"> • Proactive benchmarking against international standards; equivalence, harmonization, and international cooperation promoted • Waning consumer confidence due to poor oversight and reports of counterfeit labels
Storage	<ul style="list-style-type: none"> • Training on relevant standards through industry associations • Public sector investment in infrastructure Promotion of technology to reduce cost of cold storage • Active use of international platforms that facilitate dialogue among diverse stakeholders and help tailor storage infrastructure to market needs 	<ul style="list-style-type: none"> • Rising demand but insufficient supply for cold chain infrastructure • Mandate to construct a national cold chain system
Packaging	<ul style="list-style-type: none"> • Enhanced private standard setting; training through industry associations; and certification (e.g. SQF Food Safety Code for Manufacture of Food Packaging) 	<ul style="list-style-type: none"> • Food packaging materials regulated as “food-related products” and therefore subject to additional scrutiny such as risk assessment and inspection
Traceability	<ul style="list-style-type: none"> • Comprehensive guidance and handbooks on traceability (e.g. guidelines prepared by the Japanese government) • SMEs assisted through structural reforms and specialized market services (e.g. FarmForce) • Standards benchmarked against international standards (e.g. GS1) • Development and diffusion of information technology (e.g. blockchain technology) • Institutionalization and scaling up of successful private examples (e.g. GrapeNet Initiative) 	<ul style="list-style-type: none"> • Private and public traceability systems required • Mandated to establish a national system by 2020 • Government pilot projects in different sectors • Innovations from private actors and local governments • Lack of awareness, understanding, or resources for SMEs to comply with traceability requirements
Recall	<ul style="list-style-type: none"> • Public-private collaboration during design and implementation of recalls • Automated or rehearsed communication for recall with a variety of tools such as applications and email lists • Global platforms used to expedite international food recalls 	<ul style="list-style-type: none"> • Mandate to construct a national recall system • Various actors required to conduct food recalls and report to authorities • Recall requirements classified by risk levels

II. Regulation of the Value Chain: Global Food Safety Practices and Implications for China's Regime

Food safety regulatory systems cover a number of distinct and interrelated aspects along the supply chain. For instance, a robust traceability systems paves the way for accurately retrieving products that do not comply with food safety standards during a recall. The following areas are undergoing major transformations due to China's new legal regime and could benefit from global best practices: food standards, inspection, certification, storage, packaging, traceability, and recall. In each area, the sections below describe the landscape in China and survey relevant global best practices, highlighting possible pathways for implementing the best practices are highlighted wherever possible.

A. Food Standards

Between 2009 and 2016, the Chinese Government significantly revamped the national food standards system. During this period, China consolidated and harmonized approximately 5000 existing standards, released 1224 new standards, and reviewed and modified 1293 standards.⁴ Additionally, the 13th Five-Year Plan on Food Safety sets out the main directions of continued reform: 1) formulating additional national standards; 2) benchmarking against international public standards, including through a database of standards developed by Codex Alimentarius (Codex) and developed countries for comparative research; and 3) encouraging private entities to adopt more stringent standards than national and local standards.⁵ The second and third prongs speak to the existing focus on public standards and the largely untapped capacity of the private sector to maintain and enforce standards.

Globally, there has been a shift from public to private governance in food safety, exemplified by the systems in both the European Union (EU) and the US; this paradigm shift is reflected in China's FSL.⁶ In the areas of standardization and enforcement, private governance can complement public governance in three ways. First, private actors can fill the gap left by public standard-setting and law enforcement institutions. This could be particularly beneficial in China, where inadequate local capacity has been found to impede the development and implementation of relevant standards.⁷ Second, the private sector brings expertise and adaptability to address new risks and is thus more adept at development and diffusion of technology.⁸ Third, private

⁴ Junshi Chen, *China Food Safety Regulatory Framework*, Regulatory Affairs Professionals Society. Web. 25 August 2016;

我国建立食品安全标准体系 涵盖 1200 多个国家标准, *Xinhuanet*, 10 July 2017. Web. 1 October 1 2017.

⁵ More specifically, by 2020, at least 300 additional national standards and 6600 maximum residue limits (MRL) for pesticides will be developed, updated, or assessed. China Food and Drug Administration, *国务院关于印发“十三五”国家食品安全规划和“十三五”国家药品安全规划的通知*, 14 February 2017. Web. 1 October 1 2017. Susan Reidy, *China's Food Safety Plan Includes Alignment With International Standards*, *World-Grain*, March 22, 2017. Web. 1 October 1 2017.

⁶ The primacy of private responsibility is codified in FSMA, Title I and EU Council Regulation 178/2002, Article 17.

See Mengyi Wang & Ching-Fu Lin, *Towards a bottom-up SPS cooperation: An analysis of regulatory convergence in food safety regimes* 8(1) *TRADE L. & DEV.* 117 (2016). See also Ching-Fu Lin, *Public-private interactions in global food safety governance*, *Food Drug Law J.*

2014;69(2):143-60 (2014); China Food and Drug Administration, *国务院关于印发“十三五”国家食品安全规划和“十三五”国家药品安全规划的通知*, 14 February. Web. 1 October 1 2017.

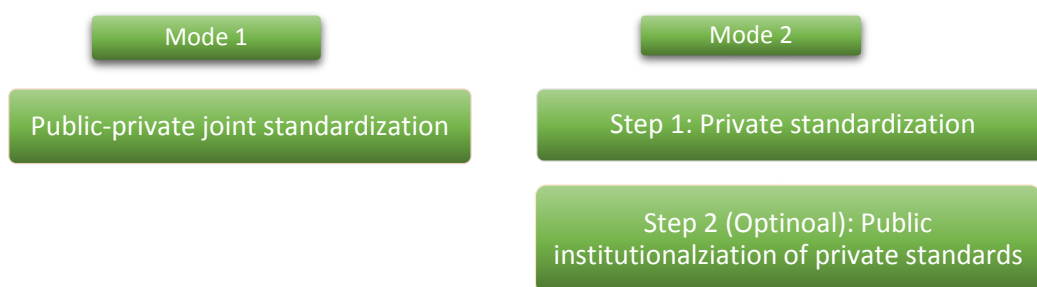
⁷ Kuhlmann, Katrin, Wang, Mengyi, and Zhou, Yuan. *China Food Safety Legal and Regulatory Assessment*. Syngenta Foundation for Sustainable Agriculture, publication forthcoming.

⁸ Timothy D. Lytton, *Competitive Third-Party Regulation: How Private Certification Can Overcome Constraints That Frustrate Government Regulation*, *Theoretical Inquiries in Law* 15.2 (2014); Yesim Yilmaz, *Private Regulation: A Real Alternative for Regulatory Reform*, *Cato Policy Analysis* No. 303 (April 20, 1998)

standards, generally stricter and more prescriptive,⁹ lay the ground for higher levels of protection of human health and safety.

More concretely, private actors can take on a key role in standard setting through two main modes. The first mode is the *joint development* of standards with the government. The second mode is standard-setting *solely* by the private sector, enhancing existing or enacting otherwise absent standards. Once private standards have been enacted, the government can institutionalize private standards, such as through complete or partial adoption. Diagram 1 illustrates these two modes of private sector participation in standard setting.

Diagram 1: Modes of Private-Sector Participation in Standard Setting



Source: *New Markets Lab (2017)*

Mode 2 has become prevalent in global agri-food value chains, particularly in developed countries. Private product and processing standards enacted or adopted by large retailers have proliferated and cover a large share of the global market. These private standards fall under two categories: collective standards (e.g. Global Good Agricultural Practices) and retailers’ specific standards (e.g. Tesco Nurture).¹⁰ The coordination of existing private standards continues to further consolidate the market influence of the group of equivalent or mutually recognized standards. For instance, a large group of retailers introduced the GFSI, which then established an “equivalency framework” GFSI Guidance Document.¹¹

Under mode 2, the public sector can choose to institutionalize private standards, depending on the feasibility of their implementation within a given jurisdiction. Public institutionalization of private standards could be general (e.g. partial incorporation of the text of private standards) or granular (e.g. adoption of detailed implementation of private standards); both examples exist. As an example of general institutionalization, the U.S. FSMA mandates covered entities to conduct Hazard Analysis and Risk-Based Preventive Controls (HARPC), a variant of Hazard Analysis Critical Control Point (HACCP). As an example of the granular institutionalization, local health inspectors and food safety officials from numerous states in the US have adopted Costco’s

⁹ Ching-Fu Lin, Public-private interactions in global food safety governance, *Food Drug Law J.* 2014;69(2):143-60 (2014).

¹⁰ Jan Mei Soon and Richard N. Baines Laws, *Public and Private Food Safety Standards: Facilitating or Frustrating Fresh Produce Growers?* 2013, 2, 1-19; doi:10.3390/laws2010001 (2013).

¹¹ Some widely adopted private standards, such as British Retail Consortium (BRC) Global Standard Issue 6 and International Food Standard (IFS) Version 6, have been deemed compliant with the GFSI Guidance Document. *See Id.*

training and educational (SSOP/HACCP) programs.¹² Table 1 lists examples of widely used private standards, large retailers that have adopted them, and governments that have institutionalized them.

Table 1: Examples of Private Standards

Standards	Large Retailers	Governments
Global Good Agricultural Practices (GlobalGAP)	COOP, Migros, Metro, and Safeway	China ¹³
Hazard Analysis Critical Control Point (HACCP)	Walmart and Costco Wholesale ¹⁴	United States
British Retail Consortium (BRC) Global Standards	Retailers and branded manufacturers in the European Union and North America ¹⁵	
International Food Standard (IFS)	Almost all French and German retailers ¹⁶	
Costco	Costco Wholesale	
Nurture/Nature's Choice	Tesco	
Global Food Safety Initiative (GFSI) Guidance Document	Walmart	

Source: *New Markets Lab (2017)*

As China looks to leverage the private sector to upgrade and complete its standard system, modes 1 and 2 could operate in tandem. For mode 1, industry actors can take an active role throughout the development and revisions of standards. Their provision of data points is integral to risk assessment, a core ingredient of standard setting.

For step 1 of mode 2, the government could foster an enabling environment for development and dissemination of private standards. Policy instruments could include tax, subsidies, provision of services or a platform of coordination, and supervision. Critically, large retailers could be natural leaders of private standard setting and enforcement.¹⁷ After all, large retailers have the economic clout to impose higher standards on their upstream suppliers. In China, retailers of considerable market power include hypermarkets, supermarkets, and convenience and specialty stores (some with over 10,000 outlets nationwide), all of which could help make standards more stringent, better tailored, or more widespread.¹⁸ Of note, retailers operating through e-commerce channels can also diffuse private standards. Indeed, the transformation of retailers from traditional to e-commerce channels is a salient feature of China's retail landscape.¹⁹ An estimated 10 to 30

¹² *Costco Wholesale: Food Safety from the Top Down*, Food Safety Magazine, October/November 2012. Web. 1 October 2017.

¹³ *ChinaGAP*, GlobalG.A.P Scheme Profile. Web; Pascal Liu, *A Practical manual for Producers and Exporters from Asia Regulations, Standards and Certification For Agricultural Exports*, FAO, 2007. Web. 1 October 2017.

¹⁴ *Costco Wholesale: Food Safety from the Top Down*, Food Safety Magazine, October/November 2012. Web. Pascal Liu, *A Practical manual for Producers and Exporters from Asia Regulations, Standards and Certification For Agricultural Exports*, FAO, 2007. Web. 1 October 2017.

¹⁵ *BRC global standards – Food*, International Trade Centre (2011).

Pascal Liu, *A Practical manual for Producers and Exporters from Asia Regulations, Standards and Certification For Agricultural Exports*, FAO, 2007. Web.

¹⁶ Pascal Liu, *A Practical manual for Producers and Exporters from Asia Regulations, Standards and Certification For Agricultural Exports*, FAO, 2007. Web. 1 October 2017.

¹⁷ Thomas Reardon, C. Peter Timmer, and Julio A. Berdegue, *The Rise of Supermarkets and Private Standards in Developing Countries: Illustrations from the Produce Sector and Hypothesized Implications for Trade*, Paper for presentation at the International Conference,

“Agricultural Policy Reform and the WTO: where are we heading?” June 2003;

Jan Mei Soon and Richard N. Baines Laws, *Public and Private Food Safety Standards: Facilitating or Frustrating Fresh Produce Growers?* 2013, 2, 1–19; doi:10.3390/laws2010001 (2013).

¹⁸ United States Department of Agriculture Foreign Agricultural Service, *Annual Retail Foods Report – China*, January 2017. Web. 1 October 2017.

¹⁹ *Id.*

percent of imported food and drink products are sold through e-commerce channels; partnerships between e-commerce platforms and their traditional counterparts, such as the one between Walmart and JD.com, have strategically advanced their market positions.²⁰ Another important reason for large retailers to lead private standard setting is their ability to promote supply chains integration, such as through contract farming arrangements, which can train, monitor, and reward standard-compliant farmers.²¹ More integrated supply chains help mitigate the structural challenges posed by inadequate resources and financial incentives on the part of SMEs and the fragmented market.

For step 2 of mode 2, as the public sector institutionalizes private standards, the national government could add international private standards to the database of international and foreign public standards. Due to their positive impact on exports, standards that are widely used or meet the GFSI's equivalence framework could be priorities of institutionalization. Subnational governments could also adopt private standards at a faster pace than the national government.

B. Inspection and Certification

Once standards have been enacted, inspection and sometimes certification are often part of an effective monitoring and compliance infrastructure. In the case of inspection, movement towards private inspection is considered a global good practice and lessens the burden on governments to enforce complex food safety regimes. With respect to certification, both private and public certification schemes are becoming more prevalent, although it is important to consider whether new certification schemes are the best tailored food safety response. While China's latest reform has sharpened the focus on inspection and certification, challenges have also surfaced.

Inspection

China's latest reform has strengthened government-led inspection and requires self-inspection and reporting for food producers, distributors, and wholesale market operators.²² Implementation challenges include insufficient public sector resources to undertake regular inspections and lack of awareness of the self-inspection requirement for the private sector.²³

To beef up inspection and nudge private actors to comply with relevant standards, governments have applied innovative approaches such as public-private partnerships and publication of inspection records. The use of public-private partnerships is exemplified by the Canadian Food Inspection Agency (CFIA). CFIA forms food safety partnerships and inspection and compliance programs with international, provincial, and territorial governments, nongovernmental organizations, industries, and trading partners.²⁴ Further, publication of government inspection records strengthens the utility of inspection, arming consumers with information and revealing strengths and weaknesses of different practices, which can then boost industry-wide

²⁰ *Id.*

²¹ Jensen H.H., Zhou J. *Food Safety Regulation and Private Standards in China*. In: Hammoudi A., Grazia C., Surry Y., Traversac JB. (eds) *Food Safety, Market Organization, Trade and Development* (2015).

²² Kuhlmann, Katrin, Wang, Mengyi, and Zhou, Yuan. *China Food Safety Legal and Regulatory Assessment*. Syngenta Foundation for Sustainable Agriculture, publication forthcoming Kuhlmann, Katrin, et. al. *China Horticulture Case Study*. Syngenta Foundation for Sustainable Agriculture, November 2016.

²³ Kuhlmann, Katrin, et. al. *China Horticulture Case Study*. Syngenta Foundation for Sustainable Agriculture, November 2016.

²⁴ Mayers, Paul. *A Closer Look at Food Safety in Canada*. *Food Safety Magazine*, April/May 2015. Web. 1 October 2017.

performance.²⁵ In this regard, the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) began publishing location-specific data about slaughter and processing facilities.²⁶ The data are comprehensive, determined by criteria such as potential impact on public health, and accompanied by user guides to facilitate use of the data.²⁷

Certification

In food safety systems, certification is typically a verification process, usually done by a third-party, that a product, process, or system conforms to a given standard.²⁸ Certification can be voluntary or mandatory. Notably, as certification bodies (CB) and certifications have proliferated, accreditation bodies (AB) and mechanisms to standardize and regulate CB have emerged.²⁹ Export growth can hinge on certification when foreign governments and large retailers condition market access. For China, “a 10% increase in the number of sites/facilities certified to ISO 22000, GLOBALGAP, and BRC is associated with an increase of a country’s food exports to the United States in the ranges of 0 to 6.7%, 1.6 to 2.2%, and 2 to 3.3%.”³⁰

In China, the Certification and Accreditation Administration (CNCA) oversees a wide range of certification and accreditation activities, including managing 11 certification systems aligned with international standards such as HACCP and GAP.³¹ China has proactively promoted benchmarking against international standards, equivalence, harmonization, and international cooperation. For instance, the China HACCP scheme satisfies the equivalence requirements outlined in the GFSI Guidance Document version 6.³² More recently, China hosted the Belt and Road International Symposium on Accreditation, a two-week conference that focused on international cooperation, such as mutual accreditation, among accreditation authorities of 14 countries.³³

However, consumer confidence in the Chinese certification system has dwindled as a result of poor oversight and reports of counterfeit labels.³⁴ Ensuring the competence and independence of the AB and CB is key to the integrity and growth of the certification system. To that end, both government-backed and market-based mechanisms are potentially applicable in China.

As an example of a public mechanism, the US maintains a comprehensive, incentive-based voluntary program for a subset of AB and CB through the FSMA Rule on Accredited Third-Party Certification.³⁵ The program has detailed entry requirements and creates substantial

²⁵ United States Department of Agriculture, *FSIS to Begin Posting Location-Specific Food Safety Data Online*, 11 July 2016. Web. 1 October 2017.

²⁶ *Id.*

²⁷ *Id.*

²⁸ Global Food Safety Resource, *The Importance of Food Safety Certification*. Web. 1 October 2017.

²⁹ Carmen Bain, Elizabeth Ransom and Vaughan Higgins, *Private Agri-food Standards: Contestation, Hybridity and the Politics of Standards*, *Int. J. Jnl. of Soc. of Agr. & Food*, Vol. 20, No. 1, pp. 1–10

³⁰ Yuqing Zheng, Mary Muth, and Jenna Brophy, *The Impact of Food Safety Third-Party Certifications on China’s Food Exports to the United States*, presentation at the Agricultural & Applied Economics Association’s 2013 AAEA & CAES Joint Annual Meeting, 2013

³¹ Certification and Accreditation Administration of the People’s Republic of China, *The Certification of Food and Agricultural Products*, 28 December 2015. Web. 1 October 2017.

³² Global Food Safety Initiative, *GFSI Embarks on Public-Private Partnership with China’s CNCA to Accelerate Food Safety Development*. 3 November 2015. Web. 1 October 2017.

³³ Certification and Accreditation Administration of the People’s Republic of China,

“The Belt and Road” International Symposium on Accreditation Development Was Held in Beijing, September 25, 2017. Web. 1 October 2017.

³⁴ Xiaochua Yu, *China’s Fight for Safe Food*, *Slate*, 5 May 2015. Web. 1 October 2017.

³⁵ United States Food and Drug Administration, *FSMA Final Rule on Accredited Third-Party Certification*, 21 June 2017. Web. 1 October 2017.

financial advantage. After all, only importers who work with program participants can obtain eligibility to qualify for the Voluntary Qualified Importer Program that grants importers expedited entry of food.³⁶ Given that FSMA mandates third-party certification for imported food, importers will likely transact with program participants.

Market-based quality control mechanisms also exist. Users of the certification system can help distinguish the qualities of various AB and CB, thereby rewarding actors with better performance and improving the system as a whole. For instance, both Costco and Walmart maintain positive lists of CB for certain categories of products.³⁷ Moreover, Costco sometimes works directly with CB, bypassing suppliers, to guard against potential collusion between suppliers and CB.³⁸ Indeed, auditors must first notify Costco, instead of suppliers, for "an immediate food safety situation."³⁹

C. Storage

Rigorous implementation of storage regulations and standards, such as temperature and cleanliness, protects food from contamination by harmful microorganisms and associated toxins.⁴⁰ In particular, access to cold storage is essential to food safety for perishable goods. Cold storage is one link in a temperature-controlled supply chain known as cold chain, which addresses refrigeration requirements at all stages of the food value chain.

In China, cold chain logistics have experienced rising demand on the one hand and insufficient supply on the other hand. Indeed, in 2015, 65 percent of China's seafood, 50 percent of its meat, and 30 percent of its fruits and vegetables traveled through its cold chain network.⁴¹ Despite growth and investments in cold storage capabilities by public actors in South China and by private actors such as e-commerce giant JD.com in Tianjin,⁴² lack of cold storage has persisted as a main hurdle for China's perishable logistics, resulting in food contamination and spoilage.⁴³

To build a nation-wide cold chain system to transport fresh farm produce and perishable food, the general office of the State Council, China's cabinet, released a guideline on the establishment of cold chain logistics framework in April 2017. The guideline calls for the development of a cold chain temperature tracking system and logistical infrastructure in major food producing regions and consumer markets.⁴⁴ Subsequently, the National Development and Reform Commission and the Ministry of Transport jointly issued a document with a stated goal of accelerating the improvement of infrastructure, technology, and stricter regulations by 2020.⁴⁵

Notably, an inclusive approach that accounts for the resource constraints of SMEs is vital to spread the benefits of cold chain logistics. The example of India showcases how public

³⁶ *Id.*; United States Food and Drug Administration, *FDA's Voluntary Qualified Importer Program, Guidance for Industry*, November 2016. Web. 1 October 2017.

³⁷ California Certified Organic Farmers, *Costco Releases Updated Food Safety Audit Expectations*, 10 July 2017. Web. 1 October 2017; Walmart., *Food Safety Requirements for Food and Beverage Suppliers* (2017).

³⁸ Lena H. Sun, *Food Inspection Is Often Flawed*, Washington Post, 22 October 2010. Web. 1 October 2017.

³⁹ *Id.*

⁴⁰ Lam H-M, Remais J, Fung M-C, Xu L, Sun SS-M. Food Supply and Food Safety Issues in China. *Lancet*. 2013;381(9882):10.1016/S0140-6736(13)60776-X. doi:10.1016/S0140-6736(13)60776-X.

⁴¹ ChinaAg, *State Council Eyes Improving China's Cold Chain Logistics System*, 30 April 2017. Web. 1 October 2017.

⁴² *Id.*; United States Department of Agriculture Foreign Agricultural Service, *Annual Retail Foods Report – China*, January 2017.

⁴³ Sam Whelan, *Schenker Beefs-up Services in China as Demand for Fresh Food Soars*, *The Loadstar*, 28 August 2017. Web. 1 October 2017.

⁴⁴ ChinaDaily, *China Aims to Improve Logistics System to Protect Food Safety*, 22 April 2017. Web. 1 October 2017.

⁴⁵ Greg Knowler, *China's growing cold chain needs better industry standards*, Journal of Commerce, 13 July 2017. Web. 3 August 2017.

investment, technologies, and targeted policy interventions can accelerate the dispersion of cold chain logistics at an affordable price to SMEs. Between 2000 and 2005, India's National Horticultural Board launched a major sector promotion scheme that supported the establishment of 1,242 cold storage facilities covering 23 states. In Bihar, the state government contributed additional support and invested in infrastructure development, such as electricity and roads, which improves cold chain access within and between states.⁴⁶ Also in Bihar, new technologies, such as high-speed compressors, shortened cooling periods and reduced operational costs by 20 to 30 percent. Moreover, in Rajasthan, a policy scheme was introduced to link groups of producers to processors and markets by enhancing supply chain management.

Private actors such as industry associations can promote knowledge and training for members and promote good storage practices. For example, the Kenyan flower industry developed a guide for best practices on cold chain linkages.⁴⁷ The guide includes recommendations for operators on how to store harvests at the proper temperature in order to prolong shelf life and maintain quality. Also, Kenyan operators of cold storage for floriculture participate in FlowerWatch, which facilitates compliance with standards in the EU, a critical export market for the industry.

In addition, international cooperation and platforms could also be pursued. In Kenya, the Horticultural Crops Development Authority partnered with the Japan International Cooperation Agency to build pre-cooling and cold storage facilities. Internationally, the Global Cold Chain Alliance a platform that aims to promote linkages along the entire cold chain, works through its offices and affiliates to conduct training and technical workshops, create guides, and provide policy support.

D. Packaging

To prevent hazardous substances,⁴⁸ China's FSL regulates packaging for different types of products. Notably, the new law categorizes food packaging materials as "food-related products,"⁴⁹ thus subjecting them to additional scrutiny such as risk assessment and inspection.⁵⁰ Best practices from both public and private actors exist.

In the private realm, industry actors have contributed to standard setting, training and awareness, as well as more comprehensive certification. For instance, the eighth edition of the Safe Quality Food (SQF) Food Safety Code for Manufacture of Food Packaging will be applicable to all certification and surveillance audits after January 2018.⁵¹ The public sector, through a variety of institutional arrangements, sets rules and standards, monitors, shares information, and institutionalizes private rules and standards.⁵² The EU publishes general requirements for all food contact materials (FCM) in EC 1935/2004. Requirements for specific materials, such as ceramic, plastic, regenerated cellulose film, and so forth are laid out in separate regulations,

⁴⁶ Bart Minten, Thomas Reardon, K.M. Singh, and Rajib Sutradhar. "The New and Changing Roles of Cold Storages in the Potato Supply Chain in Bihar," *International Food Policy Research Institute*, August 23, 2012, https://mpr.aub.uni-muenchen.de/61109/1/MPRA_paper_61109.pdf.

⁴⁷ *Kenya Cold Chain Assessment*. (2015). Report. Global Cold Chain Alliance, n.d. Web. 3 May 2017.

⁴⁸ Chemical Inspection & Regulation Service, *Food Contact Regulations in China*, August 2015. Web. 1 October 2017.

⁴⁹ The Amended Food Safety Law (2015), Article 2.

⁵⁰ The Amended Food Safety Law (2015), Articles 17 and 52.

⁵¹ Food Marketing Institute, *SQF Food Safety Code for Manufacture of Food Packaging Edition 8*, 2017.

⁵² See Kuhlmann, et. al. *East Africa Legal Guide*. New Markets Lab, September 2015. Web. 2 Aug 2017.

which are legally binding. In addition, the European Food Safety Authority (EFSA) publishes scientific opinions, provides advice, and evaluates the safety of substances intended for use as food contact materials. Institutionally, within the EU, a variety of systems exist, ranging from centralized management in the Netherlands, Denmark, and Belgium, to decentralized schemes where authorities work in a regional or local system in Spain, Germany, the UK, and Ireland.

E. Traceability

Effective traceability systems trace food through all stages in the value chain – production, processing, distribution, import, and retail – and help minimize the occurrence and extent of foodborne illness. These systems can be critical during recalls of widely-distributed products.⁵³ Globally, traceability systems are being designed and implemented by both the private and public sectors, sometimes in collaboration. However, the sheer size and complexity of supply chains as well as the dispersion of shareholders render data collection and analysis difficult.

China's FSL requires both private and public traceability systems. The State is mandated to establish a national traceability system by 2020. The law also places responsibility on producers and distributors for ensuring food safety and quality of both upstream and downstream actors. Implementation has proven difficult, however, due to poor record keeping, numerous layers of transactions between producers and wholesale distributors, and resource constraints of SMEs.⁵⁴ Innovations and experiments appear to occur at the subnational level. For instance, in Shanghai, Administrative Measures on Food Safety Information Traceability for the City of Shanghai went into force on 1 October 2015 and covers a variety of foods and edible agricultural products.⁵⁵

As China moves towards a more detailed national framework to meet its 2020 target, several steps could be explored to strengthen traceability systems. The first is to consult comprehensive guidance documents or handbooks prepared by international organizations and public entities that administer more developed traceability systems. For instance, the EU,⁵⁶ Japan,⁵⁷ and the Institute of Food Technologists (IFT)⁵⁸ have released broadly applicable traceability guidelines.

Second, pilot projects should be closely studied in order to fine tune and scale up existing traceability systems. China is running a number of pilot projects, targeting sectors and products such as meat, baby formula, and Chinese medicine. Detailed reports, rigorous analysis, and recommendations are necessary for pinpointing deficiencies to tweak and optimize the system. Notably, the execution of pilot projects could be delegated to specialists with more abundant time, resources, and possibly expertise. For instance, the US FDA has designated IFT to execute traceability pilots.⁵⁹ IFT then collaborated with representatives from over 100 organizations,

⁵³ Jianrong Zhang and Tejas Bhatt, *A Guidance Document on the Best Practices in Food Traceability*, Comprehensive Reviews in Food Science and Food Safety Comprehensive Reviews in Food Science and Food Safety, Vol. 13, 2014.

⁵⁴ Kuhlmann, Katrin, et. al. *China Horticulture Case Study*. Syngenta Foundation for Sustainable Agriculture, November 2016.

⁵⁵ Asia Pacific Food Industry, *Staying Compliant with China's New Food Safety Law*, 15 February 2017. Web. 3 August 2017.

⁵⁶ European Commission, *Guidance on The Implementation Of Articles 11, 12, 14, 17, 18, 19 And 20 Of Regulation (Ec) N° 178/2002 On General Food Law*, January 2010, Web. 1 October 2017.

⁵⁷ Ministry of Agriculture, Forestry and Fisheries., *Handbook for Introduction of Food Traceability Systems*, 2008, Web. 1 October 2017.

⁵⁸ Jianrong Zhang and Tejas Bhatt, *A Guidance Document on the Best Practices in Food Traceability*, Comprehensive Reviews in Food Science and Food Safety Comprehensive Reviews in Food Science and Food Safety, Vol. 13, 2014.

⁵⁹ *Id.*

including various government agencies, industry and consumer groups, and not-for-profit organizations, to produce an extensive final report with thorough recommendations.⁶⁰

Third, in light of the technical and financial cost of traceability systems, policies and tools to assist SMEs are indispensable. In addition to structural changes such as land reform and contract farming, some services are geared towards helping SMEs. For example, FarmForce is a mobile traceability platform initiative created by SFSA with backing from other donors.⁶¹ The mobile platform initiative focuses on information storage, data input, and information retrieval of business outputs. Additionally, yield predictions are more likely to be accurate with the use of a market tool like FarmForce. The platform interface is simple to navigate, which makes the switch from traditional data recording, usually done on paper, to a technological approach that is simple and straightforward for farmers and agents.

Fourth, benchmarking against international standards helps to more efficiently track and trace products across international markets.⁶² For instance, GS1 is an international nonprofit association that develops and maintains the most widely-used supply chain standards system relevant to traceability.⁶³ It offers private sector solutions that have become widely accepted such as use of barcodes and electronic product codes (EPC) and radio frequency identification (RFID) tags to identify locations, products, and shipments and establish standards for electronic data synchronization and exchange along entire supply chains.

Fifth, technological innovations could be pursued.⁶⁴ Technology could significantly enhance the quality, consistency, and comprehensiveness of data collected and subsequently turn the data into useful analytical tools. Both large companies and start-ups have been active in technological developments related to traceability, including automation and information tracking using DNA, molecules, or radioisotope.⁶⁵

Blockchain technology is particularly noteworthy given its relative technological maturity and its ability to reliably and transparently exchange data throughout the supply chain. Indeed, the blockchain system employs “a single, tamper-resistant ledger of information that can only be updated through consensus.”⁶⁶ Pilot projects have already delivered promising results: in one study involving Walmart, blockchain reduced tracking time from approximately 7 days using traditional methods to 2.2 seconds.⁶⁷ Seeing the potential of blockchain, private actors have mounted a multi-stakeholder, transnational collaboration to precipitate its diffusion.⁶⁸ Six leading retail and food companies, such as Nestlé and Walmart, introduced the “first fully integrated, enterprise-ready” IBM blockchain platform to expedite the expansion of blockchain ecosystem

⁶⁰ Jennifer McEntire, Tejas Bhatt, *Pilot Projects for Improving Product Tracing along the Food Supply System – Final Report*. Institute of Food Technologists, 2012.

⁶¹ *Id.*

⁶² Sylvain Charlebois, Brian Sterling, Sanaz Haratifar, and Sandi Kyaw Naing, Comparison of Global Food Traceability Regulations and Requirements, *Comprehensive Reviews in Food Science and Food Safety*, Vol13, 2014.

⁶³ *Id.*

⁶⁴ The Amended Food Safety Law (2015), Article 2.

⁶⁵ The Future of Food Traceability, *Food Safety Magazine*, Web. 1 October 2017. For instance, in 2016, Sample6 and Safe Traces, two prominent start-ups, raised 12.7 million \$1.5 million respectively. See The Challenges 9 Traceability and Food Safety Technology Startups Face in Disrupting the Industry, *AgFunder*. Web. 1 October 2017.

⁶⁶ The food industry gets an upgrade with blockchain, *IBM*, Web. 1 October 2017.

⁶⁷ IBM Forges Blockchain Collaboration with Nestlé & Walmart In Global Food Safety, *Forbes*, Web. 1 October 2017.

⁶⁸ *Id.*

across academia and the start-up community.⁶⁹ For instance, IBM, Walmart, and Tsinghua University in China are jointly pioneering a traceability model, with trials tracking pork and mangoes in both the US and China.⁷⁰

Last but not least, successful private initiatives could be institutionalized by the public sector. The GrapeNet Initiative, for instance, is a monitoring software developed by the private company Logicsoft with a centralized web-based database to help ensure that international standards are met for Indian table grapes,⁷¹ covering “all stakeholders in the grapes export supply chain.”⁷² The traceability system under GrapeNet was later replicated by the government in *HortiNet* which included mangoes and vegetables.⁷³ In China, private actors such as Metro and CHIC Group are leading the development of traceability systems. For instance, CHIC Group tracks logistics with GPS and embeds comprehensive product information, such as fertilizers and pesticides, in the barcode.⁷⁴

F. Recall

Products are recalled from the marketplace if they are mislabeled or present health risks. China is slated to establish a national recall system.⁷⁵ China’s FSL obligates a variety of actors to conduct food recall and report to authorities: food producers and traders must recall and report upon discovery of unsafe food and importers must recall and report upon discovery of standard non-compliant imported food.⁷⁶ Additionally, the Measures for the Administration of Recall of Food Products released by the CFDA add additional instructions, including the classification of recalls based on risk levels and their attendant requirements.⁷⁷

As China begins to assemble its national recall system, a few principles are worth highlighting. First, public-private partnerships underpin an effective recall system.⁷⁸ Since food business operators are principally in charge of removing unsafe food from the market, they should be consulted, trained, monitored, and guided during the design and implementation of recalls.⁷⁹ Second, communication mechanisms must be in place, ideally rehearsed and automated, to timely and effectively notify all relevant actors.⁸⁰ Different communication methods, such as in-store notices and social media, can help target different audiences.⁸¹ The US FDA has developed web widgets and mobile applications to help the public stay updated,⁸² and Australian authorities

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ Shukla, Danashree and Elisa Sabbion. *Electronic Traceability of Agricultural Products in India: The Case of GrapeNet*. Brief No. 15. United Nations Network of Experts for Paperless Trade and Transport in Asia and the Pacific, Aug. 2015. Web. 13 May 2017.

⁷² *GrapeNet: Traceability Solution for Fresh Grapes Exported from India*. Logicsoft International Private Limited, n.d. Web. 12 May 2017.

⁷³ APEDA has GrapeNet for grapes and AnarNet for pomegranate, while mango and vegetables exporters are registered with State Horticulture Department.

⁷⁴ 熙可：安全逼上全供应链 《商界评论》，CHIC GROUP, 3 August 2017, Web. 1 October 2017.

⁷⁵ Amended Food Safety Law (2015) Art 63.

⁷⁶ Amended Food Safety Law (2015) Art 63.

⁷⁷ Hogan Lovells, *China Launches New Rules on Food Recall System*, 2015, Web. 1 October 2017.

⁷⁸ Food and Agriculture Organization of the United Nations/World Health Organization, *FAO/WHO guide for developing and improving national food recall systems* (2012).

⁷⁹ *Id.*

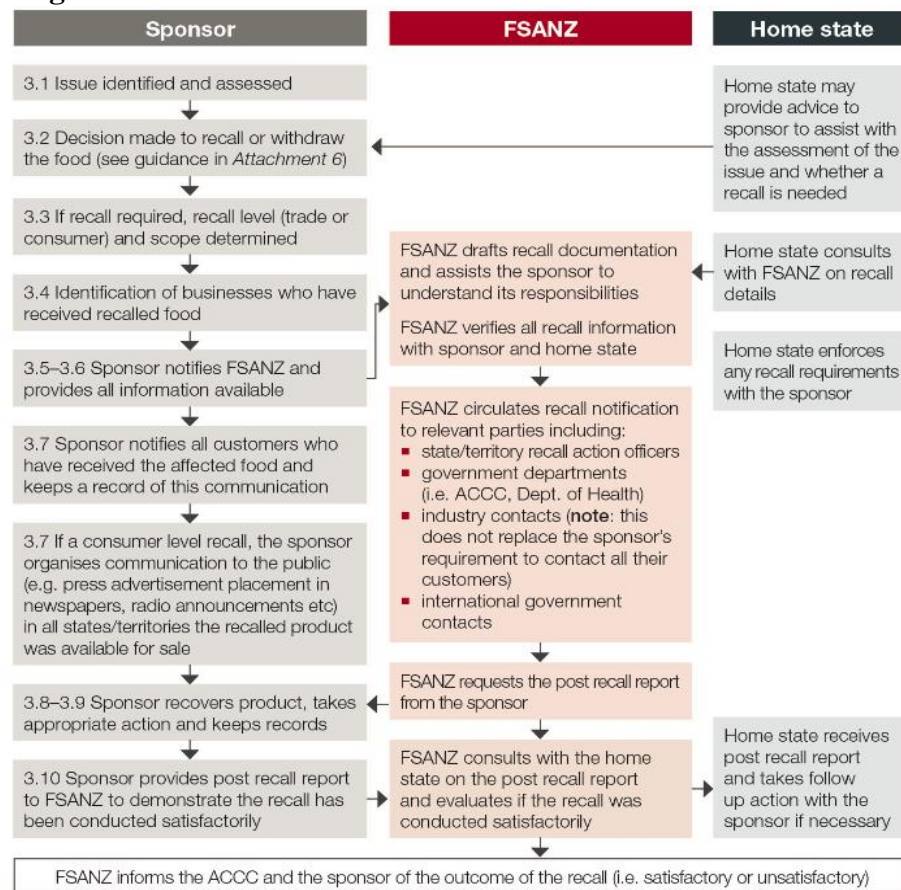
⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*; United States Food and Drug Administration, *Recalls, Outbreaks & Emergencies*, 9 September, 2016. Web. 1 October 2017.

use an email list to alert subscribers.⁸³ Third, as the last step, follow-up oversight could further improve the outcomes of recalls.⁸⁴ Notably, increasingly globalized food supply chains also render food-related risks transferrable across borders. Therefore, global platforms for rapid exchange of information, such as INFOSAN, managed by the Food and Agriculture Organization of the United Nations/World Health Organization, (FAO/WHO), could be incorporated as part of national protocols.⁸⁵ Australia, for instance, has included notification to INFOSAN in its governmental protocol.⁸⁶ Moreover, Codex guidelines recommend that each country designate an official national contact point for INFOSAN.⁸⁷ Diagram 2 depicts the Australian domestic recall system. The diagram delineates the interactions and responsibilities of food businesses, the national authority, and subnational authorities.

Diagram 2: Australian Recall Process



Source: FSANZ (2014)⁸⁸

⁸³ Food Standards Australia New Zealand, *Food Industry Recall Protocol, Information on Recalling Food In Australia And Writing A Food Recall Plan*, May 2014. Web. 1 October 2017.

⁸⁴ *Id.*

⁸⁵ Food and Agriculture Organization of the United Nations/World Health Organization, *FAO/WHO guide for developing and improving national food recall systems* (2012).

⁸⁶ Food Standards Australia New Zealand, *Food Industry Recall Protocol, Information on Recalling Food In Australia And Writing A Food Recall Plan*, May 2014. Web. 1 October 2017.

⁸⁷ Food and Agriculture Organization of the United Nations/World Health Organization, *FAO/WHO guide for developing and improving national food recall systems* (2012).

⁸⁸ Ivain Charlebois, *Food Safety, Risk Intelligence and Benchmarking*, John Wiley & Sons (2016).