

# China Potatoes Case Study

New Markets Lab  
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This Paper is Part of a Series Under the China Food Safety Project Developed in Partnership Between the Syngenta Foundation for Sustainable Agriculture & the New Markets Lab

## **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. This case study assesses the pace at which food safety laws and policies are being implemented in China in relation to the potato industry and recommends intervention points for moving the system forward. Several areas of legal and regulatory reform are assessed, all of which are essential to upgrading, expanding, and diversifying the potato industry: storage, transportation, e-commerce, and traceability. This case study on potatoes is part of an ongoing series of work on China's legal and regulatory system for food safety done in partnership by the Syngenta Foundation for Sustainable Agriculture (SFSA) and New Markets Lab (NML) and approached through the lens of the impact that changes in law and regulation will have on small farmers. The series includes additional case studies on important value chains (horticulture, Chinese medicinal herbs, and forthcoming studies on kiwi and dairy), an assessment of global best practices in food safety, and a report on China's evolving landscape for e-commerce in the context of food and agriculture.

Among horticultural crops, potatoes hold unique health, food security, and economic significance. Indeed, China has pledged to cultivate potatoes as the country's fourth staple and has released a series of policies to upgrade, expand, and diversify the industry. This case study is based on a review of China's relevant policies and laws as well as stakeholder consultations, which took place in the Northern single crop zone and the Southwestern mixed crop zone in late 2017. Together, these zones span 85 percent of total production acreage and all end uses: seeds, direct consumption, processing, and export.

The action-oriented recommendations at the conclusion of the case study (summarized in Table 1 below) were developed in the context of global best practices and are designed to address the challenges identified in the legal and regulatory assessment. Overall, two overarching themes are worth highlighting. First, relevant policies, laws, and standards are not always communicated in a

way that is timely, widely accessible, reliable, or clear; hence, effective communication (for example, through popular social media) should be a priority. Second, the development of several aspects of the value chain (including cold chain logistics and e-commerce), which are central to the livelihood of smallholders and small and medium-sized enterprises (SMEs), has outpaced corresponding legal and regulatory frameworks. In formulating relevant rules, regulators should safeguard food safety while fostering competition and inclusivity.

**Table 1: Summary of Current Status of Food Safety Regulation in Chinese Potato Context**

Regulatory Issue	Current Status	Recommendations
<b>Storage and Transportation</b>	<ul style="list-style-type: none"> <li>Storage and transport infrastructure both have gaps, but obtaining financial assistance in the form of tax cuts and subsidies presents a number of issues. Rebates are only available once facilities or vehicles are in place, leaving behind small farmers who lack the financing to obtain these assets in the first place; programs tend to be short-term in nature which adds uncertainty to investment; subsidy allocations are insufficient to spur investment; and uneven allocations exist among regions, which may create gaps in value chains and exacerbate spoilage.</li> <li>Standard-making has intensified, but enforcement against small logistics providers without permits or licenses has reportedly been ineffective.</li> <li>Industry leaders have been able to meet relevant regulations and standards, but many farmers and small enterprises have continued to rely on traditional storage options (e.g. root cellars) that do not adequately control temperature or humidity.</li> </ul>	<ul style="list-style-type: none"> <li>Subsidies should be modified to include forward payment based on project proposals and longer-term plans (e.g. 5 years) in conjunction with more streamlined permitting and licensing; coordination at the central and local levels should be enhanced to minimize drastically uneven regional development that may lead to gaps in the value chain</li> <li>Regulators should continue to release relevant standards that are benchmarked against international standards (e.g. Codex Alimentarius and International Organization for Standardization) and enforce standards rigorously.</li> </ul>
<b>E-commerce</b>	<ul style="list-style-type: none"> <li>Three overlapping sets of existing and contemplated laws and regulations are relevant to the potato industry: 1) baseline public sector regulations that cover all potato products and actors; 2) public sector regulations that address specific distribution channels (online catering services and cross-border e-commerce (CBEC); and 3) private</li> </ul>	<ul style="list-style-type: none"> <li>An inclusive legal and regulatory framework should be implemented with clearly defined legal obligations; commitments should be staged based on regulatory priorities, and stakeholder resources could be leveraged to ease</li> </ul>

	<p>regulations that exceed the scope or stringency of public regulation (self-regulation and public-private partnerships).</p> <ul style="list-style-type: none"> <li>• Under baseline public sector regulations, producers, traders, and third-party platforms are subject to stringent and multi-pronged requirements, which could be heightened with the forthcoming E-Commerce Law; legal complexity and ambiguity affect third party platforms and mobile applications and raise entry barriers, which favors more sophisticated actors.</li> <li>• Online catering services, a rapidly growing field that is instrumental to the livelihood of SMEs such as restaurants and food vendors, is regulated through detailed requirements for third party platforms, delivery service, and catering service providers (for example, the mandatory physical store requirement excludes smallholders who are unable to afford store fronts). While the law has entered into force, mobile applications featuring catering services without physical stores are still available.</li> <li>• Action-oriented private regulations exist through self-regulation and public-private partnerships which are complementary to public regulation (private initiatives include a shared blacklist of offending catering services and a dedicated fund for research and development, surveillance, and enforcement).</li> <li>• CBEC goods face a new set of tariff, tax, customs, and inspection obligations; implementation has been delayed repeatedly due to challenges with compliance for many industry actors (a result of inadequate inter-ministerial communication and industry input); legal ambiguities (e.g.</li> </ul>	<p>administrative and financial burdens on small actors.</p> <ul style="list-style-type: none"> <li>• Local regulators could design parallel food safety management systems for small workshops and food vendors (e.g. private chefs or restaurants housed in private dwellings) engaging in online catering services in a manner commensurate with local enforcement capacities.</li> <li>• Action-oriented private regulations should be replicated and scaled (e.g. share and update a blacklist of restaurants that have violated relevant food safety laws and standards and pool resources to conduct spot checks of restaurants listed on multiple online catering service platforms).</li> <li>• Consultation with private actors and close and sustained coordination among central and local regulators should be prioritized to fine-tune and interpret national CBEC laws (e.g. addressing legal ambiguities surrounding products not on the positive lists and closing loopholes such as direct shipping by merchants).</li> </ul>
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	<p>status of goods that are not included in the positive lists), loopholes (goods directly shipped by merchants and individuals), and disparate local practices (e.g. 15 CBEC pilot zones policies and protocols), all of which could undercut regulatory objectives and increase operational cost.</p>	
<p><b>Traceability</b></p>	<ul style="list-style-type: none"> <li>• A general national framework and detailed local frameworks have been established and refined according to local financial and technological capacities; local differences exist in terms of institutional arrangements (e.g. municipal ministries administer joint or separate traceability systems), priorities, and scope, which break the continuous stream of information and increase compliance burdens.</li> <li>• Private traceability systems are highly heterogeneous due to differences in financial and technological capabilities and supply chain structures; e-commerce platforms sometimes facilitate traceability, but the traceability of fresh potato has been hampered by a lack of packaging (without identifiers such as barcodes) and a fragmented market.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased collaboration among national and local authorities will be necessary to streamline and standardize different frameworks (e.g. pilot projects targeting potatoes), ensure interoperability across national and local systems, and reduce duplication and fragmentation.</li> <li>• Rigorous analysis, institutionalization, and scaling up of pilot projects could help refine existing traceability systems.</li> <li>• Private innovations, particularly those with robust technology (e.g. blockchain), should be encouraged, scaled, and institutionalized by public actors.</li> <li>• Smallholders can be assisted through supply chain integration (e.g. equitable contract farming, e-commerce, and direct supply to supermarkets); contract farming, which could be based on the UNIDROIT-IFAD-FAO Legal Guide on Contract Farming and other tools, would improve access to inputs and finance, increase compliance with standards, and boost incomes and productivity.</li> </ul>

Source: *New Markets Lab (2018)*

## II. Overview of China's Potato Industry

China is the largest potato producer in the world. In China, potatoes of different varieties are produced continuously throughout the year in four production zones. The production zones are characterized by their climatic conditions, soil, and end uses. A substantial proportion of China's potato industry is either localized or straddles two adjacent production zones. This is because potato varieties from one production zone may not fit the industrial purpose of the of another production zone and because inadequate supply of affordable and quality storage and transportation reduces the feasibility of supply chain extensions. Table 2 summarizes the characteristics of the different potato production zones.

**Table 2: Potato Production Zones in China**

Production Zone	Seed Varieties/End Uses	Harvest Time	Percentage of China's total production acreage
Northern single crop zone <sup>1</sup>	<ul style="list-style-type: none"> <li>Seed potatoes</li> <li>Direct consumption</li> <li>Processing</li> </ul>	<ul style="list-style-type: none"> <li>September</li> <li>October</li> </ul>	50%
Southwestern mixed crop zone <sup>2</sup>	<ul style="list-style-type: none"> <li>Direct consumption</li> <li>Processing</li> </ul>	<ul style="list-style-type: none"> <li>February</li> <li>April</li> </ul>	35%
Central double crop zone <sup>3</sup>	<ul style="list-style-type: none"> <li>Export</li> <li>Direct consumption</li> </ul>	<ul style="list-style-type: none"> <li>May or June (Spring potatoes)</li> <li>October-November (Autumn potatoes)</li> </ul>	10%
Winter crop zone <sup>4</sup>	<ul style="list-style-type: none"> <li>Export</li> <li>Direct consumption</li> </ul>	<ul style="list-style-type: none"> <li>February-March</li> </ul>	5%

Source: *New Markets Lab (2018)*<sup>5</sup>

Depending on their end uses, China has three main categories of potatoes (seed potatoes, table potatoes suitable for direct consumption, and potatoes earmarked for processing (processing potatoes)) each with a unique market and supply chain structure. Government and industry estimates put table consumption in the lead (50-60%), followed by feed (16%), processing (7-15%), seeds (4-10%), and wastage (4%).<sup>6</sup>

<sup>1</sup> This zone includes the Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Xinjiang, Qinghai, Ningxia, Shanxi and Shaanxi provinces.

<sup>2</sup> This zone includes the Sichuan, Guizhou, Yunnan, Tibet, Chongqing, and part of Hunan and Hubei provinces.

<sup>3</sup> This zone includes the Jiangxi, Jiangsu, Zhejiang, Anhui, Shandong and Henan provinces.

<sup>4</sup> This zone includes the Guangdong, Fujian, Guangxi, and Hainan provinces.

<sup>5</sup> Information derived from United States Department of Agriculture Foreign Agricultural Services, *Potatoes and Potato Products Annual, China's Potato Production to Rise in MY2016/17*. September 26, 2016.

<sup>6</sup> United States Department of Agriculture Foreign Agricultural Services, *Potatoes and Potato Products Annual, China's Potato Production to Rise in MY2016/17*, September 26, 2016; Ministry of Agriculture of People's Republic of China, *马铃薯 2016 年市场分析及 2017 年市场预测*.

Seed potatoes traded and used in China are local variations of imported seeds and are predominantly produced in the Northern single crop zone. Seed varieties have remained largely constant.<sup>7</sup> According to a sales representative from a major seed potato company, only one-fifth of seed potatoes in use are high yielding, disease-free varieties (which are twice as expensive as common table-stock potatoes).<sup>8</sup>

Table potatoes are consumed as an affordable fresh vegetable. Much of the table potato sector operates through conventional producer-wholesale-retail channels, and e-commerce has increasingly allowed producers to directly reach consumers. Nutritional and cosmetic qualities of table potatoes vary widely across the country.<sup>9</sup>

Processing potatoes are chiefly characterized by higher starch content and cosmetic standards in comparison to table potatoes, with wide disparities among different varieties.<sup>10</sup> The processing industry has three major product lines, in ascending order based on capital and technological intensity these are: 1) potato starch (thousands of small and medium-sized enterprises), 2) potato flour (about 200 enterprises), and 3) frozen french fries (5 domestic and international enterprises). The requisite capital and technological intensity is also correlated with supply chain structure and quality of food safety management. For instance, the supply chain for frozen french fries is highly integrated: manufacturers enter into forward contracts with potato farms (generally over 300 mu), provide all agricultural inputs and regular on-site supervision, and are increasingly internalizing cold storage with different temperatures throughout production and distribution.

The fourth staple policy, launched by the Ministry of Agriculture (MOA) in 2015, elevated the potato to become China's fourth staple crop, sparking intense interest in the expansion, diversification, and upgrade of the potato industry. MOA pledges to enlarge potato acreage from 80 to 150 million mu by 2020, boost the use of high quality, disease-free seed potatoes from 20 to 45 percent, and broaden the share of the processing industry from 10 to 30 percent.<sup>11</sup> Supporting policies are gradually taking shape, including publicly funded product development projects to introduce potato products that suit regional tastes (e.g. noodles with potato flour).

Comprehensively upgrading the potato industry and ensuring equitable gains for all stakeholders in the process will require addressing longstanding roadblocks (e.g. inadequate access to quality storage and transportation) and tackling new ones (e.g. declining potato prices as rising supply of

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<sup>7</sup> In particular, the Holland 15 and Holland 18 varieties comprise 80 to 90 percent of all seeds for table potatoes.

<sup>8</sup> United States Department of Agriculture Foreign Agricultural Services, Potatoes and Potato Products Annual, China's Potato Production to Rise in MY2016/17, September 26, 2016.

<sup>9</sup> For example, thanks to quality seeds and aridity of land, potatoes from the Northern single crop zone are reputed for having more starch and are sold at a higher price than potatoes from the Southwestern mixed crop zone.

<sup>10</sup> While some varieties in Shandong could yield 3-4 tons per mu (about 0.067 hectare) with low starch content; the Yidianhong variety from Gansu has high starch content with merely 1-1.5 ton of yield per mu.

<sup>11</sup> Ministry of Agriculture of People's Republic of China, *农业部关于推进马铃薯产业开发的指导意见*, February 25, 2016; USDA Foreign Agricultural Services, Potatoes and Potato Products Annual, China's Potato Production to Rise in MY2016/17 September 26, 2016.

fresh potatoes has outstripped slowly rising demand).<sup>12</sup> At this critical juncture, an inclusive and efficient legal and regulatory framework will be needed to enable and accelerate the ambitious national policy. Other pillars of the development of potato industry, such as insurance, may warrant additional studies. For instance, since 2012, China Insurance has established potato insurance in Gansu Province, with an insurance rate of 350 yuan/mu and a 6 percent premium (21 yuan/mu).<sup>13</sup>

### III. Legal and Regulatory Framework

In the wake of numerous high-profile food safety scandals, China has revamped its institutional and legal frameworks over the past five years. Institutionally, the China Food and Drug Administration (CFDA), created in 2013, is the primary food safety regulatory body with comprehensive legislative, supervisory, managerial, and investigative power.<sup>14</sup> Several institutions also perform supporting functions: MOA is responsible for the supervision and management of edible agricultural products; the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) handles national quality, entry-exit animal and plant quarantine, import-export food safety, and certification and accreditation; the National Health and Family Planning Commission (NHFPC) undertakes food safety standard setting and risk assessment; and the Ministry of Commerce (MOFCOM) has broad authority over domestic commerce and administers pilot traceability projects for selected products.<sup>15</sup>

Legally, the FSL is the core legal instrument governing food safety. FSL's Draft Implementation Regulation has gone through several drafts and corresponding rounds of public comments; the latest version was notified to the World Trade Organization (WTO) on August 14, 2017. Additional supporting laws, regulations, standards, and opinions promulgated by various central and local authorities also exist.<sup>16</sup> Notably, national laws, regulations, and standards establish minimum requirements, and local authorities and private actors are encouraged to enact more stringent requirements.

As food safety laws, regulations, and standards proliferate, their implementation has encountered a multitude of challenges. One cross-cutting roadblock is timely and effective communication of relevant policies, laws, and, in particular, standards. Government websites, especially those of local authorities, are not always updated, do not contain clear and specific information, and rarely refer to interrelated instruments, requiring stakeholders to piece together the entire regulatory framework. Instead of using public platforms, local authorities sometimes directly alert established actors and associations of legal and regulatory updates; others (e.g. start-ups) must resort to blogs or chat rooms to solicit information that may be inaccurate, or may simply sidestep the legal and

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<sup>12</sup> Some cities, companies, and research institutions have taken the lead to research and develop new food options derived from potatoes and particularly potato flours. See, e.g.: 21 potato, “副食”逆袭成“主食”，马铃薯主食化在上海还有多远的路?, September 9, 2017.

<sup>13</sup> 张宗军, 刘琳, 吴梦杰, 基于差异化费率的农业保险保费补贴机制优化——以甘肃马铃薯保险为例, 2016.

<sup>14</sup> Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *China Food Safety Legal and Regulatory Assessment*, Web, March 2017.

<sup>15</sup> *Ibid.*

<sup>16</sup> *Ibid.*

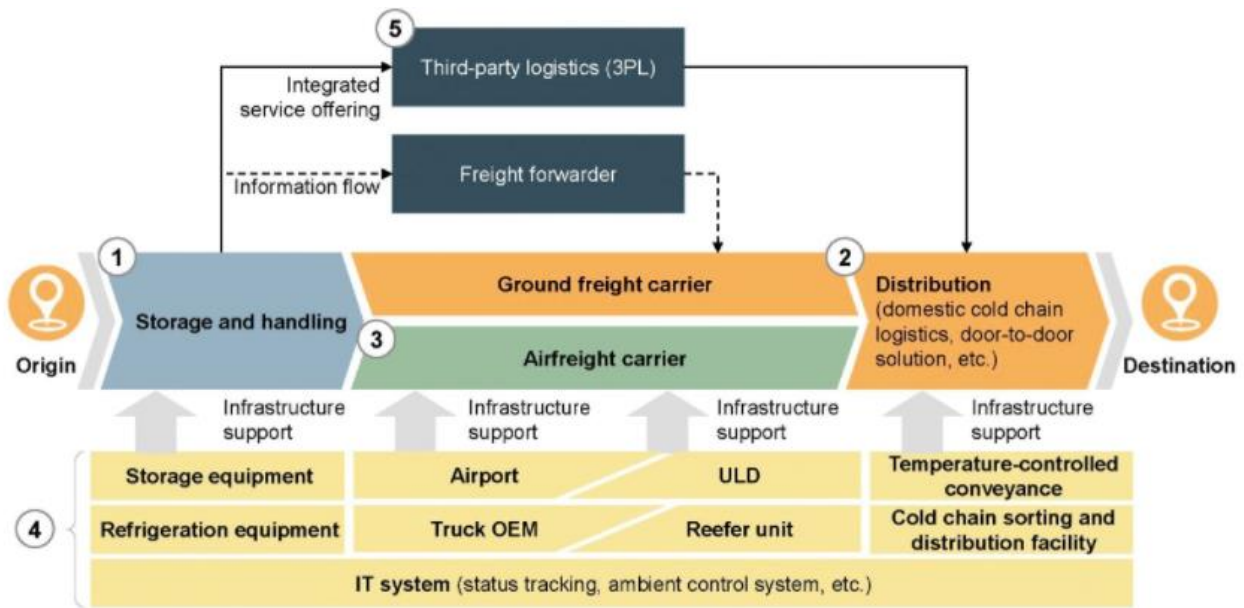
regulatory requirements. An encouraging trend is that authorities that are better adept at technology are using social media (such as Wechat, which is China’s preeminent mobile application) to communicate with the public.

### Storage and Transportation

The cold chain is critical to maintaining food safety and commercial quality throughout the supply chain. As illustrated in Figure 1, China’s cold chain is comprised of a number of temperature-controlled segments, including warehousing, ground transportation, air transportation, distribution, infrastructure providers, and third-party logistics service providers.<sup>17</sup>

Temperature, humidity, and ventilation are the primary environmental factors that impact safety and quality of potato products. Different types of potato products have different levels of water content, which call for different storage and transportation requirements. For instance, fresh potatoes have high water content and are, therefore, subject to spoilage and sprouting during storage and transportation. On the other hand, potato flakes have significantly lower water content (less than 10 percent of water by weight), are easier to store and transport, and can be a critical component of the national staple food strategy.<sup>18</sup> Large potato flake enterprises exist but are limited in number,<sup>19</sup> so fresh potatoes will remain the dominant potato product and are in need of better storage and transportation infrastructure throughout the country.

**Figure 1. China’s Cold Chain Logistics**



<sup>17</sup> Yong Teng, “Seizing the Opportunity in China’s Cold Chain Logistics Market,” *L.E.K Consulting, Executive Insights*, Vol. XIX, Issue 23. Web. 2017.

<sup>18</sup> Gao Kang, He Puming, *马铃薯主粮化战略研究*, (2018).

<sup>19</sup> *Ibid.*



Source: Yong Teng, “Seizing the Opportunity in China’s Cold Chain Logistics Market,” *L.E.K Consulting, Executive Insights*, Vol. XIX, Issue 23. Web. 2017.

To prevent sprouting and disease and to control water and sugar content, the optimal storage temperatures vary significantly as potato products move through the supply chain; these are summarized in Table 3.

**Table 3: Temperatures Management of Potatoes and Potato Products**

Product	Storage Temperature	Key Considerations
Seed potatoes	3°C – 4°C	Sprouting, water content, and disease control
Table potatoes	3°C – 6°C	Sprouting, water content, and disease control
Processing potatoes	7°C – 10°C	Sugar-starch conversion for french fries and chips (leading to undesirable browning and blackening), pasting quality for potato flour, sprouting, water content, and disease control
Frozen french fries	-12°C – -20°C	Minimization of breakage and spoilage
Potato flour	Room temperature (up to 6 months)	Minimization of spoilage

Source: *New Markets Lab (2018)*.

Overall, cold chain logistics in China are at an infancy in terms of capacity, quality, and regulatory framework. Indeed, in 2016, only 20 percent of fresh products in China were circulated through the cold chain (compared with 95 percent in developed countries).<sup>20</sup> The rate of cargo damage to potatoes is estimated to be between 15-30 percent or equivalent to 10 billion RMB,<sup>21</sup> as unsupervised small logistics providers and individuals proliferate and cut corners in areas such as warehousing, ground transportation, and distribution services.<sup>22</sup> Generally, potato storage facilities in China include well cellars, kiln cellars, ventilated storage, constant temperature storehouses, and mechanical refrigerators.<sup>23</sup> Traditional methods such as well cellars and kiln cellars have high loss ratios. Ventilated storage and constant temperature storehouses are becoming more common in the North because of low construction costs, low energy dissipation, and large capacity.<sup>24</sup>

The shortage of affordable quality cold storage impedes farmers’ ability to earn higher incomes by selling during off seasons and hampers expansion within the processing, e-commerce, and export sectors. As the quality control manager of a large french fry company has indicated, the inability to fully control temperature during transportation, especially during customs procedures, has led the company to refrain from cross-border trade. For instance, some potato processing manufacturers do not operate the full year: significant spoilage during storage reduces operation timelines, and transportation costs discourage processors from undertaking contract farming in

<sup>20</sup> “Cold Chain Logistics Industry in China,” *Academic Room*, Web, April 21, 2017.

<sup>21</sup> Sun Jie, Wang Xizhuo, Huang Zhenlin, Sun Haiting, Cheng Qinyang, Zhuming, “Classification, Integration of Storage and Transportation Engineering Technologies in Potato Producing Areas of China,” 2017.

<sup>22</sup> Yong Teng, “Seizing the Opportunity in China’s Cold Chain Logistics Market,” *L.E.K Consulting, Executive Insights*, Vol. XIX, Issue 23. Web. 2017.

<sup>23</sup> Zhu Ming, Cheng Qinyang, Wang Xizhuo, et. al., “Q&A on Potato Storage Technology and Facility,” 2016.

<sup>24</sup> Ministry of Agriculture Planning and Design Institute, “Design Specification for Potato Storage Facility,” 2015.

other production zones. As for e-commerce, cold chain logistics can render the fresh produce segment prohibitively expensive.

It is thus imperative that the legal and regulatory framework is designed and implemented to spur rapid development of a quality cold chain. Efforts already underway encompass several components. The first involves broad-stroke national policies aimed at boosting cold chain logistics. The State Council, China's cabinet, released a guideline on the establishment of a 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.<sup>25</sup> Subsequently, the National Development and Reform Commission and the Ministry of Transport (MOT) jointly issued a document seeking to accelerate the improvement of infrastructure, technology, and stricter regulations by 2020.<sup>26</sup>

The second component is financial assistance in the form of tax cuts and subsidies, provided for in the Notice on Central Finance's Support for the Development of Cold Chain Logistics jointly released by the Ministry of Finance and Ministry of Commerce. Some local governments have also rolled out additional subsidy programs. Some provisions are particularly relevant to the potato industry, including those that relate to potato cold storage, general cold storage, and artificially ventilated stores that are built by farmers and farmers' cooperatives, electricity fees, and refrigerated trucks.<sup>27</sup>

On the implementation side, a number of issues could dissuade stakeholders from taking advantage of these programs. First, the programs are generally short-term and only provide for rebates once the facilities or vehicles are in place. This approach does not assist smallholders and SMEs who may not have access to finance in the first place. In addition, the short-term nature of the programs adds unpredictability and uncertainty to investment (anecdotal evidence suggests that it could take two years to obtain a construction permit for cold storage or a license for operating refrigerated trucks). Second, in some cases the subsidy amount is insufficient to encourage investment. For instance, a cold storage facility covering 400 cubic meters only received 65 Renminbi (roughly 10 dollars) in 2017.<sup>28</sup> Third, subsidy levels vary widely across different provinces: only 10 provinces fall within the subsidy program of national ministries, and local authorities have different financial capacities to support cold chain logistics in their jurisdictions. This renders the industry, which is a network industry dependent upon facilities and services in other parts of the country, susceptible to gaps in the value chain. As a result, spoilage frequently occurs during "first mile" and "last mile" delivery. Cold chain logistics companies have reported greater difficulty obtaining financial assistance since 2017. Some of the representatives of these companies view this trend as a way of consolidating the extremely fragmented market, which favors financially robust actors that can better control quality.

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<sup>25</sup> "China Aims to Improve Logistics System to Protect Food Safety," *China Daily*, April 22, 2017. Web.

<sup>26</sup> Greg Knowler, "China's Growing Cold Chain Needs Better Industry Standards," *Journal of Commerce*, July 13, 2017. Web.

<sup>27</sup> Ministry of Finance, *关于做好2018年农业综合开发产业化发展项目申报工作的通知*. Web, June 26, 2017; Bany, *2017年全国各地冷库补贴最新政策来了-申报时间及流程*, Web, November 17, 2016.

<sup>28</sup> Mrcjcn, *2017小型冷冻库补贴标准 全国冷库补贴发放标准汇总一览*. August 18, 2019.

The last component is standards. As noted above, different sets of standards exist and national and local levels, which can sometimes create compliance challenges. The standards system applicable to the potato sector is also complex. Standards can be further broken down into those that are applicable to storage and transportation generally and those that are applicable to potatoes specifically. For example, MOT has taken the lead in promulgating general standards regarding temperature-controlled vehicles. Another example is the 2015 standard GB/T 51124-2015, which categorizes storage facilities based on their storage capacities: small storage facilities (under 100t), middle storage facilities (100t – 1000t), and large storage facilities (over 1000t). An example of a potato-specific standard is GB/T 25872-2010: Potatoes — Guidelines for Storage in Artificially Ventilated Stores.

Overall, the level of implementation of storage and transportation standards differs based on enterprise size. According to a number of cold chain logistics companies that provide services for potato companies and a french fry company that is building its own cold storage, compliance is limited to industry leaders such as Swire (a cold chain logistics provider), Xianyi Holding (a cold storage operator), and Dongfeng Motor (a provider of refrigerated trucks). Notably, it is rare for potato companies to build their own storage facilities due to the large capital outlay (and because it has become more difficult to apply for subsidies) and the difficulty of obtaining a permit (especially after several fire incidents in storages and warehouses in recent years). Based on the calculation of a representative of a french fry company, it would take about 10 years for a potato company to recuperate the cost of building a standards-compliant cold storage facility; the high upfront-cost means that most companies would need to rely on third-party logistics providers and may result in inefficient supervision of regulatory compliance.

As for industry actors with fewer resources – such as a potato flake company, a french fry company, and several cold chain logistics companies consulted – there are shared concerns about under-enforcement of standards. These concerns stem from the fact that many farmers and small enterprises are slow to phase out their non-compliant practices. These practices typically include scattered storage with limited capacity or home-made cellars, neither of which fully controls temperature and humidity resulting in loss of water content, high germination rates, and withering.<sup>29</sup>

The continued use of scattered storage or home-made cellars appears ubiquitous in several production zones. For instance, according to a potato retailer in Sichuan who frequently sources from Inner Mongolia, farmers in Inner Mongolia routinely dig holes in their backyards to build rudimentary root cellars. This type of root cellar is a low-cost option for small-scale potato production with potatoes that are intended for direct consumption. Similarly, in Chicheng county of Hebei province, storage facilities are basically scattered cellars with limited storage capacity.<sup>30</sup> Likewise, in Huidong county of Sichuan, some farmers are still using scattered storage or build workhouses to store potatoes; in places where the altitude is over 2500m, home-made cellars are often used.<sup>31</sup> Overall, the storage capacity of these facilities varies. In Shanxi province, farmers in

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<sup>29</sup> Xu Chengyong, Zhang Caibin, Zhang Rong, *会东县马铃薯产业发展现状及对策*, 2018.

<sup>30</sup> Yang Guipeng, Wang Youjun, Wen Haiyin, *赤城县马铃薯行业现状以及发展建议*, 2018.

<sup>31</sup> Xu Chengyong, Zhang Caibin, Zhang Rong, *会东县马铃薯产业发展现状及对策*, 2018.

hilly areas have their own small storage facilities with capacities ranging from thousands of kilograms to tens of thousands of kilograms.<sup>32</sup>

## E-Commerce

Propelled by robust private innovation and investment, a trusted and ubiquitous digital payment system (e.g. Wechat and Alipay),<sup>33</sup> and the purchasing power of 415 million millennial consumers, China has become the world's largest e-commerce market, with a burgeoning retail segment.<sup>34</sup> Food is digitally traded via numerous channels, such as hybrid retail stores with physical and online stores, online catering services, and cross-border e-commerce (CBEC).<sup>35</sup> E-commerce benefits a wide range of stakeholders within the sector: it positions smallholders to increase sales by marketing to a broader consumer base and eliminating layers of middle-men, allows processors to source ingredients worldwide, and enables consumers to access a large selection of potato products such as through online catering services and cross-border trade.

However, China's rapidly evolving e-commerce sector has outpaced corresponding food safety regulations, and filling this gap is still a work in progress. Figure 1 depicts the three overlapping sets of existing and contemplated laws and regulations relevant to the potato industry: 1) baseline public regulations that cover all potato products and actors; 2) public sector regulations that address specific distribution channels (online catering services and CBEC); and 3) self-regulation within the private sector that exceeds the scope or stringency of public regulation (this also includes public-private partnerships).

### Figure 2. The Relationship of Public and Private Regulations Governing the E-commerce Sector

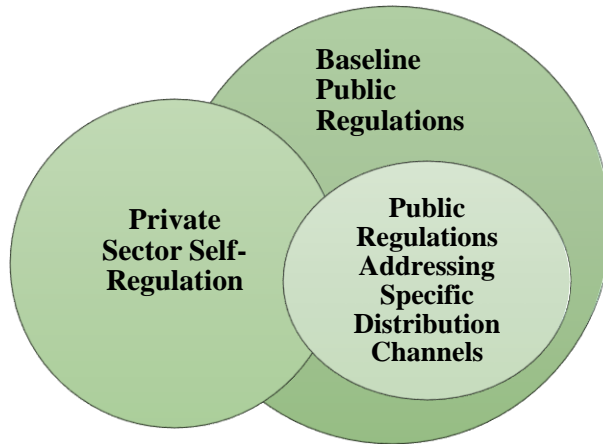
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<sup>32</sup> Feng Zhu, *山西马铃薯发展状况、问题及对策*, 2018.

<sup>33</sup> Paul Mozur, "In Urban China, Cash Is Rapidly Becoming Obsolete," *The New York Times*, Web, July 16, 2017.

<sup>34</sup> PricewaterhouseCoopers, *Total Retail 2017, E-Commerce in China – The Future Is Already Here* (2017), Web, November 17, 2017; United States Department of Agriculture Foreign Agricultural Service, *China's Cross-border E-Commerce Opportunities for U.S. Exports*, August 17, 2015.

<sup>35</sup> United States Department of Agriculture Foreign Agricultural Service, *Annual Retail Foods Report – China*, Web, January 26, 2017.



Source: *New Markets Lab (2018)*

#### ***A. Baseline Public Sector Regulations***

The baseline public framework consists of the FSL, the Measures of the Investigation and Punishment of Illegal Conduct Concerning Online Food Safety (Order 27), and the forthcoming E-Commerce Law (which has gone through two drafts and is still under consideration).<sup>36</sup> Order 27 articulates specific rules for food producers, food traders, and restaurants that engage in online catering services, as well as third party e-commerce platforms. A hallmark of Order 27 is the set of complex, multi-pronged compliance obligations that apply to third party platforms (this may be heightened by the forthcoming E-Commerce Law):<sup>37</sup>

- Transparency and information verification (e.g. relevant licenses required of traders);
- Food safety surveillance, including regular self-inspection and spot checks;
- Management of food safety complaints;
- Reporting of FSL violations to law enforcement;
- Record keeping (e.g. real-name registration of admitted food traders and preservation of transaction data for at least 6 months past the expiration of the transacted product or for at least 2 years for products with unspecified expiration dates); and

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<sup>36</sup> China Food and Drug Administration, Measures of the Investigation and Punishment of Illegal Conducts Concerning Online Food Safety (CFDA Order 27), Web, July 19, 2017; the Amended Food Safety Law (2015), Articles 62, 131; PricewaterhouseCoopers China, *China's New E-commerce Food Safety Measures* - PwC China. 2017. Web; King & Wood Mallesons, *China's E-commerce Regulatory Tsunami Continues: New Advertising and Food Safety Regulations*, July 29, 2016. Web; Baker McKenzie, *China: Food Traders to Comply with New Measures Governing Online Food Safety*, October 11, 2016. Web. 163.com, *电子商务法草案二审稿审议 委员:微商应纳入监管*, November 5, 2017. Web.

<sup>37</sup> *Ibid.*

- Legal liabilities, including indemnification requirements (third party platforms are liable for damages suffered by consumers in food safety incidents, provided that third party platforms fail to identify the admitted food distributor at fault).

Two major concerns have been raised regarding these baseline rules. The first concern is that the complex and stringent compliance obligations could raise entry barriers and stifle competition that could bring consumers cheaper and more diverse services (e.g. niche or regionally focused platforms). In particular, commentators and stakeholders have flagged that the administrative and technological costs of monitoring, information verification, and data retention obligations favor sophisticated businesses with robust information and communication technologies (ICT) systems.<sup>38</sup> Coupled with the high cost of temperature-controlled warehouses, small enterprises such as start-ups could find operations financially and administratively burdensome. Suppression of competition is already unfolding: Alibaba either owns or is the largest investor in several prominent platforms (e.g. Taobao, Yiguo, and Hema Supermarket).

The second concern is the legal ambiguity and potential flexibilities surrounding mobile applications such as Yimutian (a platform and application for edible agricultural products) and digital stores in WeChat (the primary social media application). Given the mobile-first consumer behavior and high cost of operating on major third-party platforms (e.g. JD.com, a prominent third-party e-commerce platform, charges a \$25,000 security deposit and a \$5,000 annual fee), affordable mobile applications that forge fast and trusted linkages between sellers and buyers are key avenues for smallholders and SMEs to capitalize on e-commerce. For instance, the staggered harvest dates of potatoes from different production zones means that farmers could earn higher incomes by selling seasonal table potatoes at higher prices to out of season production zones rather than within local markets. Therefore, in the forthcoming E-Commerce Law,<sup>39</sup> China should aim to clarify rules about mobile applications with a view toward stimulating inclusivity and competition.

### ***B. Public Regulations Addressing Specific Distribution Channels and Industry Self-Regulation***

Building on the baseline public regulation, the second set of e-commerce rules tightens governance of specific distribution channels, including online catering services and cross-border e-commerce. Online catering services have grown exponentially and play a pivotal role in market expansion for SMEs such as small restaurants. For catering services, potato-based dishes (such as french fries) enjoy high demand. As the fourth staple grain policy takes hold, potato products (including noodles made of potato flour) could capture a bigger share of orders among the estimated 3 billion customers.<sup>40</sup>

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<sup>38</sup> See, e.g.: PricewaterhouseCoopers China, *China's New E-commerce Food Safety Measures* - PwC China, Web, 2017

<sup>39</sup> 163.com, *电子商务法草案二审稿审议 委员:微商应纳入监管*, Web, November 5, 2017.

<sup>40</sup> The State Council of the People's Republic of China, *Draft Regulation for Online Food Delivery Services Puts Safety First*. Web, February 16, 2017; Xinhuanet, *外卖食品安全要监管也要自治*, Web, July 25, 2017.

The rise of online food services and related food safety incidents have prompted reactive regulation. Centrally, CFDA rolled out the Measures for Supervision and Administration of Food Safety in Online Catering Service (Order 36). Order 36 seeks to curb a number of well-documented food safety issues, such as unlicensed operations, and prescribes roles for actors at each link of the service. For instance: third party platforms must adhere to requirements similar to those provided for in Order 27; delivery services must maintain food safety and quality during storage and transportation; and catering service providers must have at least one physical store licensed for distributing food and prepare food on the premises (instead of outsourcing the preparation).<sup>41</sup> Local branches of CFDA have also put forth additional requirements or initiatives. Shanghai municipal CFDA, for instance, is implementing video surveillance of high-risk sectors such as fresh produce and sandwiches.<sup>42</sup>

Two interrelated aspects of Order 36 are noteworthy: the inclusion of smallholders and the critical role of private regulation. During the drafting period of Order 36, industry members voiced the concern that the physical store requirement does not directly tackle food safety and may exclude SMEs that cannot afford store fronts. CFDA nonetheless included the provision in the final rule, reasoning that a physical store could at least aid public surveillance and facilitate tracking of offending entities.<sup>43</sup> The extent to which the physical outlet requirement enhances food safety or inhibits economic activities is an empirical question, and the closure of 60,000 unlicensed operations in Shanghai could signal the scale of the challenge. Enforcement appears lenient at this point. Mobile applications featuring catering services without physical stores are still available.

Creative approaches that are linked to local enforcement capacities may be essential to balancing goals of promoting food safety and including smallholders, such as private chefs or restaurants housed in private dwellings. As will be elaborated below, Article 36 of China's FSL explicitly authorizes local authorities to engineer a parallel system that regulates small food workshops and food vendors; private regulation could buttress this parallel system.

Private regulation complements public regulation via self-regulation and public-private partnerships. Private actors have the potential to mitigate public capacity constraints in enforcement, bring expertise and adaptability in order to address new risks in a timely manner, and more efficiently develop and distribute technology.<sup>44</sup> While some stakeholders view industry associations in China primarily as forums for information sharing and networking, they are also

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<sup>41</sup> Economic Information Daily, *外卖热暗藏多重食品安全问题*, February 18, 2017; The State Council of the People's Republic of China, "Proposal Would Tighten Online Food Rules," Web, June 19, 2017. CFDA, "Measures for Supervision and Administration of Food Safety in Online Catering Service," Web, November 10, 2017; CFDA, "Interpretation of Measures for Supervision and Administration of Food Safety in Online Catering Service," Web, November 10, 2017. To emphasize platform responsibility and facilitate compliance, CFDA held meetings with representatives from the prominent platform owners such as Ele.me and Baidu Waimai. See, Liao Shumin, "Regulator Holds Disciplinary Talks with Online Food Services on New Safety Measures," *YicaiGlobal*, Web, December 28, 2017.

<sup>42</sup> Xinhuanet, *上海：外卖食品合格率低于总体水平 政府将加强大数据监管*, Web, November 8, 2017.

<sup>43</sup> The State Council of the People's Republic of China, *Draft Regulation for Online Food Delivery Services Puts Safety First*, Web, February 16, 2017.

<sup>44</sup> New Markets Lab, *Assessment of Good Regulatory Practices for Food Safety and Implications for China's New Legal Regime*, Syngenta Foundation for Sustainable Agriculture, Web, October 2017.

optimistic about replicating and scaling more action-oriented models that involve a small number of leading private sector actors. For instance, four prominent industry platforms formed an alliance that shares a blacklist of non-compliant catering services, leading to the delisting of 5073 catering services.<sup>45</sup> Subsequently, the four members set up a food safety fund under the guidance of the Beijing municipal CFDA.<sup>46</sup> The fund will contribute to research and development, surveillance, and enforcement;<sup>47</sup> risk assessment reports will be shared with CFDA and inform platform features such as restaurant ranking and delisting of high-risk products.<sup>48</sup>

### C. Cross-Border E-Commerce (CBEC)

Compared to conventional trade, CBEC broadens possible destination markets for exporting producers and traders while diversifying the selection of imported products available for consumers (e.g. snack companies that purchase brands of potato flour not registered in China).<sup>49</sup> CBEC is much more fragmented than other segments of e-commerce, which has allowed small platforms to grow, innovate, and stimulate competition to improve the CBEC ecosystem.<sup>50</sup>

CBEC products have been treated as personal parcels and have thus faced weak legal scrutiny. The new supervision model for CBEC, effective January 1, 2019, will align CBEC more closely with conventional trade.<sup>51</sup> Through Decrees 18 and 40, 11 ministries or commissions have delineated tariff, tax, customs, and inspection obligations for 1203 products itemized in two positive lists (e.g. potato flour); the lists will be updated in the future.<sup>52</sup> Pursuant to the positive lists and FSL, some product categories (like health food) must undertake additional registration and filing with CFDA.<sup>53</sup>

Notably, the new supervision model bifurcates CBEC products based on their business and logistics models. The new model primarily regulates goods traded through Business-to-Consumer (B2C) third party platforms (“commercial goods”) with bonded warehouses or overseas

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<sup>45</sup> Xinhuanet, *外卖食品安全要监管也要自治*. Web, July 25, 2017.

<sup>46</sup> *Ibid.*

<sup>47</sup> *Ibid.*

<sup>48</sup> *Ibid.*

<sup>49</sup> Thymen Ballering, *China Cross-Border E-Commerce Guidebook, Consulate-General of the Kingdom of the Netherlands in Shanghai*, Web, January, 2017

<sup>50</sup> These platforms fall into three categories: prominent brands with a CBEC wing, smaller CBEC-specific platforms, and niche platforms (e.g. baby products). While Alibaba assumes 60–70 percent of other parts of e-commerce, no actor operating in CBEC has market share exceeding 25 percent. See, “*The Ultimate Guide to Cross-Border Ecommerce in China: History and Scale*,” *GrizzlyPanda* Web, September 4, 2017.

<sup>51</sup> Thymen Ballering, *China Cross-Border E-Commerce Guidebook, Consulate-General of the Kingdom of the Netherlands in Shanghai*, Web, January, 2017; David J. Ettinger and Yin Dai, “Regulatory Landscape of Cross-Border E-Commerce in China Enters a New Spring,” *The National Law Review*, Web, May 20, 2016.

<sup>52</sup> Ministry of Finance, 《*跨境电子商务零售进口商品清单*》公布. Web, April 7 2016; Ministry of Finance, 《*关于跨境电子商务零售进口税收政策的通知*》. Web, March 24 2016. The General Administration of Quality Supervision, Inspection and Quarantine, *质检总局关于跨境电商零售进口通关单政策的说明*. Web, May 15 2016. While 11 ministries or commissions, including CFDA and MOFCOM, jointly released Decree 40 and the first positive list, only three ministries released Decree 18, and MOFCOM alone issued the second positive list.

<sup>53</sup> *Ibid.*



distribution centers. In contrast, goods directly shipped by merchants or individuals are still viewed as personal parcels and are therefore not affected by the new rules except for modified tax rates. For instance, with respect to inspection, AQSIQ has clarified that only commercial goods will need to obtain inspection certifications from China Inspection and Quarantine (a branch of AQSIQ) at the border before the products can be released.<sup>54</sup>

The implementation of the new framework has encountered multiple challenges. Chief among them is feasibility of application, which may have stemmed from insufficient input from all relevant ministries and industry. Indeed, CFDA was notably absent in the issuance of Decree 18, which first announced the new supervision model as a taxation change. When CFDA later jointly issued Decree 40 and the positive lists with the additional registration or filing requirements, industry actors noted the insufficient prior notice, as CFDA registration and filings are lengthy processes that could take 2–5 years.<sup>55</sup> To ease the transition, the effective date of the new model has been repeatedly postponed (most recently from April 4, 2016 to January 1, 2019).<sup>56</sup>

Legal ambiguities also create uncertainties for businesses. For instance, the new rules do not specify the treatment of products that are not on the positive lists; it is therefore unclear whether these products can be imported through bonded warehouses. In addition, there may be loopholes in the new model that could undermine regulatory objectives. Importantly, businesses could easily circumvent the new model with direct shipping via postal or courier service. Finally, disparate local practices further challenge business operations. 15 CBEC pilot zones have their respective policies and protocols and could interpret and enforce national laws inconsistently, giving rise to confusion and additional business costs (such as canvassing and comparing both local rules and interpretations).<sup>57</sup>

## Traceability

Traceability ideally captures product, locational, and stakeholder attributes throughout the value chain and helps minimize the occurrence and extent of foodborne illness, especially during recalls. In China, traceability initiatives predate recent legal reform and lie at the heart of FSL and subsequent regulations. Traceability also dovetails with other areas (including storage, transportation, and e-commerce) in that it requires effective record keeping throughout production, processing, distribution, import, and retail. Traceability as a marketing tool is particularly pertinent for smallholders that seek to distinguish their products as well as for leading exporters competing in overseas markets.

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<sup>54</sup> The General Administration of Quality Supervision, Inspection and Quarantine, *质检总局关于跨境电商零售进口通关单政策的说明*. Web. May 15, 2016.

<sup>55</sup> Thymen Ballering, *China Cross-Border E-Commerce Guidebook, Consulate-General of the Kingdom of the Netherlands in Shanghai*, Web. January, 2017.

<sup>56</sup> See, e.g.: United States Department of Agriculture Foreign Agricultural Service, *Chinese Government Policies Change for Cross-Border E-Commerce*. Web. December 7, 2016.

<sup>57</sup> For example, one DHL agent located in one of the pilot zones commented that since 2017, every parcel was inspected (at least one year prior to the national policy entry date). Additionally, the State Council has relaxed some requirements, including import license, for the pilot zone in Shanghai. United States Department of Agriculture Foreign Agricultural Service, *Chinese Government Policies Change for Cross-Border E-Commerce*. Web. December 7 2016; Thymen Ballering, *China Cross-Border E-Commerce Guidebook, Consulate-General of the Kingdom of the Netherlands in Shanghai*, Web. January, 2017.

China mandates both public (national and local) and private traceability systems. Activities from farm-to-fork fall within the ambit of traceability: production, trading, and distribution of food and edible agricultural products, restaurant and catering services, storage, and transportation.<sup>58</sup> Central and local authorities both actively undertake rulemaking and supervision of public and private traceability systems. Centrally, in relation to potatoes, MOA and CFDA are jointly responsible for public and private farm-to-fork national traceability systems (MOA's national traceability platform is fully operational<sup>59</sup>). This institutional setup comports with the division of authority between MOA and CFDA: MOA oversees edible agricultural products and agricultural inputs, and CFDA steps in once the product enters circulation. National laws generally lay down broad-stroke guidelines and call for product specific frameworks that can be tested through pilot programs.<sup>60</sup>

The highly general nature of the initial set of traceability-related policies, laws, and regulations contributed to largely divergent frameworks. These early frameworks captured substantially different types of data and could undermine the establishment of national platforms.<sup>61</sup> This concern was later mitigated by CFDA through Guiding Opinions for Food Producers and Traders to Establish the Food Safety Traceability System (CFDA Opinion 2017), detailing the types of information and procedures that various entities must have in place and record at each production and distribution step. For instance, food production companies must record the following information during the shipping phase: product name, quantity, batch number, vehicle, time of shipment, acting employees and their contact information, and relevant cold logistics information.

Industry experience is highly heterogeneous and differentiated by financial and technological capabilities and supply chain structures. Large enterprises have received continuous government training and do not find the detailed requirements of CFDA Opinion 2017 to be onerous. According to a french fry company with a fully integrated supply chain, the only perceived difficulty is the accuracy of tracing potatoes in storage a step back in the supply chain to specific farmers, as round potatoes tend to move around during storage. Likewise, a potato starch company, Beidahuang Group, has been able to build a traceability system with a platform that can be further divided into planting information subsystems, starch processing subsystems, and product traceability information.<sup>62</sup> Moreover, e-commerce can sometimes function as an effective tool for traceability, as platforms automatically record sales information. Some potato farmers or cooperatives have been able to partner with platforms, such as Meiriyouxian, to provide potato products that can be traced back to specific counties. Despite these efforts, the majority of smallholders still distribute

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<sup>58</sup> National laws include FSL Article 42, Regulations on the Implementation of the Food Safety Law of the People's Republic of China (2017 version), Opinion of the State Council's General Office for Accelerating the Construction of the Traceability System for Key Commodities, Opinion to Further Improve the Food and Drug Traceability System (CFDA Opinion 2016), Guiding Opinions for Food Producers and Traders to Establish the Food Safety Traceability System (CFDA Opinion 2017), and Opinion of the MOA for Accelerating the Construction of the Traceability System for Edible Agricultural Products (MOA Opinion 2016).

<sup>59</sup> MOA, *国家农产品质量安全追溯管理信息平台上线运行*. Web. June 30, 2017.

<sup>60</sup> See, e.g.: MOA Opinion 2016.

<sup>61</sup> Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *China Food Safety Legal and Regulatory Assessment*, Web, March 2017.

<sup>62</sup> Zhao Yue, *Research on the Quality Traceability Information Management System of the Beidahuang Potato Starch Product*, (2014).

fresh potatoes through a web of middlemen; the lack of packaging of fresh potatoes (without identifiers such as barcodes) and fragmented markets further hamper full traceability.<sup>63</sup>

Compared to central authorities, local authorities (especially local branches of MOA and CFDA) administer more granular traceability systems that are linked to the financial and technological capacities of local public and private actors.<sup>64</sup> As a result, traceability has become fractured, and local traceability systems vary considerably in their institutional arrangements (MOA and CFDA have not merged their systems in all cities), priorities, and scope. For instance, while Shanghai has over 17,000 food enterprises participating in its unified food safety information traceability platforms that cover 7 product categories (including potatoes), Chengdu has two traceability systems (MOA and CFDA) that focus on live pig and vegetables (which do not include potatoes in a number of major supermarkets).<sup>65</sup> A fractured landscape has spawned broken links in information streams as well. For example, vegetables grown in another jurisdiction may not carry all of the information mandated under the traceability system of Shanghai.<sup>66</sup>

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<sup>63</sup> Jfdaily, *上海肉奶酒等食品追溯系统相对完善*. Web. March 14, 2017.

<sup>64</sup> See, e.g.: MOA Opinion 2016.

<sup>65</sup> Rachel Shen, “*Gradual Progression of Food Traceability System in China*,” *ChemLinked*, Web, June 8 2016.

<sup>66</sup> Jfdaily, *上海肉奶酒等食品追溯系统相对完善*. Web. March 14, 2017.

#### **IV. Recommendations**

Key implementation gaps exist in China’s legal and regulatory framework with regard to the potato industry. The recommendations below are both cross-cutting and issue-specific, and are tailored to respond to these gaps. As a comprehensive first step, policies, laws, and standards should be communicated in a way that is timely, widely accessible, reliable, and clear; this would help stakeholders stay abreast of key developments and allow for dynamic feedback as laws and regulations are implemented. Different approaches could address this challenge, including diligent updating of official websites with eye-catching references to relevant social media accounts, increased use of social media (with interactive features) in local jurisdictions, wide distribution of print media like posters, and collaboration with different search engines (e.g. Baidu) to ensure that official websites appear prominently in web queries. In addition, policies, laws, and their implementation should align at both the inter-ministerial and inter-city levels. For the potato sector in particular, subsidies and incentives for cold chain logistics could prioritize the potato industry, ministries should closely collaborate and speak with one voice to the public, and local interpretations of national laws should be consistent to minimize confusion and regulatory arbitrage. Outlined below are recommendations targeting specific areas.

##### ***Storage and Transportation***

In order to spur the development of high quality cold chain logistics, China could consider taking the following steps:

- Subsidy programs should be modified to include forward payment based on project proposals in order to assist smallholders without sufficient access to finance. Subsidy programs could also include longer term plans (e.g. 5 years), in conjunction with more streamlined permitting and licensing applications, in order to bolster predictability of investment. In addition, central and local authorities could coordinate financially to avoid drastically uneven regional development that may lead to gaps along value chains.
- Regulators should continue to release relevant standards that are benchmarked against international practices (such as the Codex Alimentarius and International Organization for Standardization). As mentioned, unsupervised small logistics providers and individuals (which often face challenges meeting standards) have proliferated in areas like warehousing, ground transportation, and distribution services. Rigorous enforcement of standards will be important in order to root out sub-standard facilities and services.

##### ***E-Commerce***

Since the use of e-commerce in the potato sector is still an emerging practice, there is ample room for government to construct an inclusive and efficient legal and regulatory environment that balances food safety with market participation and competition. The following priority actions are recommended:

- Differential and phased implementation, with commitments pegged to priority and capability, could gradually boost food safety in numerous areas of e-commerce.

Stakeholders with fewer resources who face, or potentially face, a multitude of stringent obligations (for example startup third-party platforms with digital stores below a threshold number) could delay implementing some of the most administratively burdensome or financially demanding elements until other priorities have been addressed.

- On a related note, for online catering services, local authorities could set up parallel food safety management systems for small workshops and food vendors, pursuant to Article 36 of China's FSL. The scope of small workshops and food vendors, as well as their supervision and guidance, should be commensurate with local enforcement capacities. Potential pilot candidates could include small businesses (such as private chefs or restaurants housed in private dwellings).
- Private regulation could advance efficient and effective food safety management via education, supervision, and enforcement. For instance, third party platforms could offer education and supervision of small workshops and food vendors operating on their platforms and ensure compliance through immediate delisting of offending stores. Additionally, collective efforts similar to the food safety alliance of online catering services could be strengthened to share good practices (like mandatory food safety contracts between platforms and digital stores) and pool resources to better spot check restaurants listed on multiple platforms.
- For CBEC, a higher level of unanimity and sustained coordination among central and local regulators will be important to balance different policy considerations within CBEC, such as food safety, and mitigate uncertainty and confusion facing the business community.

### ***Traceability***

As China moves towards more detailed national, local, and private traceability systems, several steps could be explored:

- First and foremost, MOA, CFDA, their local branches, and municipal governments should work together to promote compatibility and avoid duplication and fragmentation of existing traceability systems. Unified standards and methodologies will ensure a continuous stream of information across a wider region and help private sector actors navigate the range of traceability requirements. As a first step, local governments should aim to cover vegetables and particularly potatoes in their pilot projects.
- Private innovations should also be encouraged, scaled, and institutionalized by the public sector. A good example comes from the GrapeNet Initiative, which is a monitoring software that covers all stakeholders in the export supply chain through the use of a centralized web-based database.<sup>67</sup> This helps ensure that international standards are met

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<sup>67</sup> 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, Web, August 2015; "GrapeNet: Traceability Solution for Fresh Grapes Exported from India," *Logicsoft International Private Limited*, Web.

for Indian table grapes, and it covers all stakeholders in the export supply chain.<sup>68</sup> The traceability system under GrapeNet was later replicated and scaled by the government through *HortiNet*, which includes mangoes and vegetables.<sup>69</sup> Priority should be given to innovations with robust technology, such as information tracking using DNA, molecules, or radioisotopes (chemical elements in their radioactive form) and blockchain.<sup>70</sup>

- Supply chain integration could also help address implementation challenges posed by the fragmented potato market. Possible options include equitable contract farming arrangements between processing companies and farmers, e-commerce, and direct supply to supermarkets. Contract farming is a particularly promising option, as it addresses a multitude of challenges facing smallholders: access to inputs and finance, adherence to standards, and enhancement of incomes and productivity. A useful springboard for contract farming is the Legal Guide on Contract Farming jointly released by the International Institute for the Unification of Private Law (UNIDROIT), International Fund for Agricultural Development (IFAD), and Food and Agriculture Organization of the United Nations (FAO).<sup>71</sup>

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<sup>68</sup> 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, Web, August 2015; "GrapeNet: Traceability Solution for Fresh Grapes Exported from India," *Logicsoft International Private Limited*, Web.

<sup>69</sup> APEDA has GrapeNet for grapes and AnarNet for pomegranate, while mango and vegetables exporters are registered with the State Horticulture Department.

<sup>70</sup> William Fisher, "The Future of Food Traceability," *Food Safety Magazine*, Web. June 6, 2017. For instance, in 2016, Sample6 and Safe Traces, two prominent start-ups, raised 12.7 million \$1.5 million respectively. See, Louisa Burwood-Taylor, "The Challenges 9 Traceability and Food Safety Technology Startups Face in Disrupting the Industry," *AgFunder*. Web. August 25, 2016; Merve Unuvar, "The Food Industry Gets an Upgrade with Blockchain," *IBM*, Web. June 15, 2017; and Roger Aitkin, "IBM Forges Blockchain Collaboration with Nestlé & Walmart In Global Food Safety," *Forbes*, Web. August 22, 2017.

<sup>71</sup> Food and Agriculture Organization of the United Nations, International Institute for the Unification of Private Law, and International Fund for Agricultural Development, *Legal Guide on Contract Farming*, 2015.