*The Political Economy of the Chinese Food Traceability System:
Cultivating Trust, or Constructing a Technocratic Certainty Machine?*

by

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Abstract

The World Health Organization (WHO) estimates that food contamination makes nearly 10% of the world population sick in 2020. Persistent food fraud also costs the global food industry billions of dollars every year (Reuters, 2020, para. 61). More than 50,000 Chinese citizens got sick or died from numerous recent food safety incidents, such as rotting "pigwash" food in the high school canteen, stinking pork turned into packaged oil, and deceased pigs with disease re-entering the market and ending up on the Chinese citizen's table (BBC, 2019; Wang et al., 2019). Not only have these incidents stirred up public rage and outcry, but they have also undermined the public's trust in the food safety system (Kendall et al., 2019). Furthermore, in contrast to local supply, the global food supply chain no longer presents as stable and reliable due to economic, environmental, and political disruptions brought about by the e-commerce law (2019), the Covid-19 pandemic, African swine fever, and the ongoing trade war between the US and China. The sheer scale and rapid spread of Internet food-related rumours have also spurred the Chinese government to commit to boosting local food production, bolstering public trust, and collaborating with "dragon head" technology corporations to build a large-scale, highly automated, market-driven, smart and technocratic food traceability system. Understanding the food traceability system also has much broader ramifications because it has become the prototype for how other public policy issues are approached. For example, food traceability apps were quickly repurposed and adopted by the Chinese government as the basis of a mandatory COVID-19 health app distributed to all Chinese citizens. The upshot of these observations is that the rapid development of the food traceability system in China over the last decade or so is a microcosm for understanding much broader processes of social, economic, political and technological development in China.

Keywords: food traceability, political economy, science and technology studies, trust, integration, datafication, automation, diversification, commodification, gamification, socialization

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Chapter 1: Introduction

The World Health Organization (WHO) estimates that food contamination makes nearly 10% of the world population sick in 2020. Persistent food fraud also costs the global food industry billions of dollars every year (Reuters, 2020, para. 61). More than 50,000 Chinese citizens got sick or died from numerous recent food safety incidents, such as rotting "pigwash" food in the high school canteen, stinking pork turned into packaged oil, and deceased pigs with disease re-entering the market and ending up on the Chinese citizen's table (BBC, 2019; Wang et al., 2019). Not only have these incidents stirred up public rage and outcry, but they have also undermined the public's trust in the food safety system (Kendall et al., 2019). Furthermore, in contrast to local supply, the global food supply chain no longer presents as stable and reliable due to economic, environmental, and political disruptions brought about by the e-commerce law (2019), the Covid-19 pandemic, African swine fever, and the ongoing trade war between the US and China. The sheer scale and rapid spread of Internet food-related rumours have also spurred the Chinese government to commit to boosting local food production, bolstering public trust, and collaborating with "dragon head" technology corporations to build a large-scale, highly automated, market-driven, smart and technocratic food traceability system.

In response to this ongoing crisis in China's food system, a massive and coordinated effort between government and "big tech" has been put into place over the past decade to secure the Chinese food system's safety and restore people's faith in it. The goal is to provide a technological solution to every conceivable uncertainty that might arise in the Chinese food system to pre-empt future risks along those just reported. The goal is to provide "perfect transparency" by creating food traceability apps and mini-apps that connect the health-conscious customer to the complete food life-story narratives with a simple code scan and also give the state and the large corporations involved

maximized control over the food life-cycle and consumer habits. The goal is to employ market-based Internet of things (IoT) technologies to expedite large-scale, centralized, and automatized food factories to boost food production and solve food safety. Organization for Economic Co-operation and Development- Food and Agriculture Organization (OECD-FAO, 2019) affirms the need to prove the origin of the premium product as organic, vegan, and high quality, which incited the food traceability system's development (p. 186).

As research for this thesis to date shows, the response has been nothing short of astounding: in June 2020, there were eighty-two app development companies that had built 112 food traceability apps now available on Apple's App Store in China, there were 334 mini-programs available on WeChat, 2988 registered food traceability corporations across the country, and countless “smart” food supermarkets. While our attention might be easily dazzled and distracted by the large amount of data generated by the fancy technologies and vast scale of smart food traceability markets across China, there are more significant and profound issues at stake. For example, even though there are hundreds and thousands of small companies actively participating in the food traceability system in China, in reality, three major Chinese internet companies already dominate the development, distribution, operation, and transition of the country's food traceability system: Alibaba, Tencent, and JD. As JD's vice president, Xiaosong Wang, stated in 2017, “this is a game only multi-billion and privileged national corporate champions can play”.¹

These companies and food traceability system are so crucial to research and understand, in turn, because they embody China's long-term economic development strategy where advanced technological solutions and the drive of the “digital gold rush” are implementing a profound, market-

¹Jingdong. (2017, May 29). 论一只跑步鸡的自我修养 (*On the self-cultivation of Gogo chickens*) [[Video](#)], 0:18-0:22.

driven and technocratic approach to vital public policy issues in the country (Jia and Winseck, 2018; Hong, 2017b; Liu et al., 2014; Mosco, 2019; Schiller, 2014). In other words, this is politics by technological and market-based means, all coordinated by a single-party state. Indeed, China's use of private companies and technology to meet public health, food safety and security needs reveal a symbiotic relationship that concedes to corporations to profit while giving the state more control through aggressive automation processes, market consolidation and by deflecting attention from the politics that all of these issues raise (Jiang and Fu, 2018). Public input is eclipsed as a relatively small number of dominant corporations working in tandem with the Chinese government intrinsically redefines food safety in technological and market-based terms while promoting, in turn, technological and market-driven solutions to the problems so construed.

It is also noticeable that the Chinese government did not rely on private businesses solely to build the food traceability system but also concurrently intensified punishment measures for food contamination (CSC, 2020), increased public education with respect to food safety issues (FSCSC, 2012), created a co-regulation system such as "reports and reward" (MAPRC, 2017), and included food safety and quality measures into the central government's performance review of provincial governments (Yunnan, 2020). While these measures suggest a holistic approach to the issues, the reality, however, is that they are negligible parts of the government's approach. For example, only 3% of the provincial government's total performance measurement depends on their approaches to food safety and quality—suggesting the central government's rhetoric aside, it has given relatively low priority to this aspect of its approach (Yunnan, 2020). The upshot is that, despite some appearances to the contrary, the development of the food traceability system still relies mainly on business interests, market forces, self-regulation, and consumer feedback—all of which enlarges

social, economic and digital inequalities, intensifies unaccountable privatization, and magnifies widespread distrust in food, technology, markets and government.

Ultimately, the impetus to use technology to solve public health problems of this type embodies a larger drive in the country to build, in effect, a "certainty machine" (Zuboff, 2019) where the "illusions of perfect information" are held out as the magic key to solving complex social and public health problems (Winseck, 2002). China now stands at a crossroads and faces a choice of continuing to pursue this technocratic and state-corporate driven approach to food safety or changing course to adopt an approach that is securely rooted, not just a faith in "big tech" brought to us by large corporations backed by the Chinese state, but a framework of well-defined laws and regulations, public knowledge and social trust. While the prevailing approach can, perhaps, best be described as a kind of corporatist, authoritarian technocracy, the alternative would be developed collaboratively with the interests of the people implicated in the food system and the public directly engaged (Feenberg, 2010). China's technocratic and market-driven approach to food security also demonstrates the asymmetry of information and power that is becoming ever more deeply rooted in our growing dependence on technology-centred digital platforms that function as the "operating system of our lives" (Vaidhyathan, 2018). This approach also manifests the festering conflict that exists between rural and urban areas in China's uneven development strategy and lack of comprehensive protection for citizens (Hong, 2017a).

A sense of this can be gained once we understand, for example, that the application of high technology solutions to agriculture is also interlinked with a broader drive to industrialize and informatize agriculture in the country. Part of that process is a drive to transfer small farmers from

their under-developed land², where they usually make less than \$200 a month, into emerging "digital towns" like Guiyang that transform landless young rural migrants into digital labour to tag and clean the high volume of data generated from the internet of things in the food traceability system (Thompson, 2020). Others "dispossessed" from such lands are swept into the cheap labour pools that define the urban, commission-based food delivery business, many of which are also owned by the same corporations. Simultaneously, small farms are still struggling with limited resources and poor internet infrastructure to promote their business. Alibaba, for instance, has provided them with an essential "free" internet connection to integrate them into its supply chain where farmers can stream piglets falling asleep listening to them singing a lullaby at the one end, all the way to the other when those same farmers sell their pigs and build deep relationships with their customers (Alibaba Group Holding Limited, 2020, p. 10). In turn, Alibaba gets to strengthen its reach in the underserved market and expand its rural regions' domination. Not incidentally, this integration of rural areas into complex industrial supply chains has also led to prices for a traceable food product like "gold standard" pork to skyrocket, with the record online auction for one pig sold set at 270,000 yuan (\$51,923) in 2016 (Weiyang, 2020, para. 7).

The food traceability system's essence is to put the Chinese food system on a fast track of digital transformation and devote more considerable efforts to build mobile governance, which heavily depends on the digital device, internet connection, and quality internet infrastructure. Based on the Internet development report from the China Internet Network Information Center (CNNIC, 2020), the Internet population in China is currently 904 million, with a penetration rate of 64.5% in

² Government and corporations claim small farm businesses are usually messy and dirty. Also, farmers lack the capacities and willingness to operate farm businesses that fit into the national food traceability model. However, these statements overlook the biodiversity and multi-stake model those small farms bring. It also neglects that broader social inequality and national strategy put those farmers in those tough positions in the first place.

2019. However, in rural regions or villages, 53.8% of people do not have Internet connections (Ibid, p. 21). Even for those who have an Internet connection, the vast majority access it by cell phone, which relies on 4G with a download speed of 24.02 Mbit/s, which is much slower than landline on average (Ibid, p. 17). As one illustration of how such matters are linked to the food app and traceability system, the Ministry of Commerce announced a collaboration with China Unicom in 2013 to prioritize internet development, speed, internet service fee and bandwidth to meet the needs of the food traceability apps in the trial cities taking part in the early stages of such efforts. Moreover, while the gap between who has access to different qualities of Internet has continued to grow, so too has the gap between the eastern region and western region of the country, which has also grown from 2013 to 2019 in terms of disposable income from 9,739.4 yuan (\$1,948) to 14,362.4 yuan (\$2,872)³. Furthermore, according to Prime Minister Li, 600 million people in China only make 1,000 yuan (\$200) a month (Xinhua, 2020b). 1.7% of the Chinese rural population, 27 million people, still live in extreme poverty with merely 191 yuan (\$37) as monthly income ([China Statistical Yearbook](#), 2019, para. 6-35).

³ Based on data calculations provided in the [China Statistical Yearbook](#) (SSB, 2019, para. 6-3, "Per Capita Disposable Income of Nationwide Households in Eastern, Central, Western and Northeastern Regions").

Figure 1

The Wholesale Price of Pork in July 2020 in Different Chinese Regions

Note. This figure illustrates that pork's price increased 103.09% nationwide, but some west regions with darker blue legend have a higher price for pork.

Source. Ministry of Agriculture and Rural Affairs of the People's Republic of China (2020, July 30).

The Wholesale Price of Pork in July 2020 in Different Chinese Regions. *MOA*.

<http://zdscxx.moa.gov.cn:8080/nyb/pc/search.jsp>.

Additionally, the price of food also presents a significant gap between eastern and western regions of the country based on the monthly index from the Ministry of Agriculture and Rural Affairs of the People's Republic of China (2020) (Figure 1: The price of pork compared to the same time last year, a darker colour indicates the higher wholesale price of the pork in the city). Moreover, there is an unbalanced development of the food safety system between urban and rural regions. The food safety and quality tests did not merely result in twelve provinces below the national average, but also caught most of the disqualified food sold back to rural regions after it was turned down by

the city and coastal markets due to failing the essential food quality and safety test. Meanwhile, rural regions also have much less media coverage to reveal this issue (Xinhua, 2020a). Consequently, the food traceability system did not bring perfect transparency. It had instead amplified the information and power asymmetry as well as regional disparities.

Previous research has conducted interviews and collected survey data on the food traceability system (Wu, 2020) but is usually limited to coastal regions and middle and high-income customers. Such studies also concentrate on consumers' willingness to pay for food products embedded with different food traceability information and technologies (Wu et al., 2020). Consequently, this limited focus on food traceability and food safety system reports tends to neglect voices from outside the middle- or high-income classes, especially voices from rural areas. Comparing high-tech food solutions, local food, and "techno-local food" on food producers and distributors' marketing strategies and building consumer trust also tends to examine such issues from a purely western perspective (Broad, 2020). In addition, underlying data, links and documents cited in various government, corporate, news media and academic research are too often missing or broken (as in hyperlinks). Furthermore, the size of the food traceability market has never been systematically classified or researched due to the widely identified difficulty to obtain valid data and low customer familiarity with food traceability products (Hou et al., 2019). Lastly, a great deal of the existing research on these issues takes these conditions as immovable, hardly-worth-noticing fixtures of the landscape. In other words, they reinforce the power and the status quo. These shortcomings demonstrate the urgency of this research and the need to create a better system to showcase a comprehensive archive of records available for the public.

1.1 Thesis Statement and Research Questions

Understanding the food traceability system also has much broader ramifications because it has become the prototype for how other public policy issues are approached. For example, food traceability apps were quickly repurposed and adopted by the Chinese government as the basis of a mandatory COVID-19 health app distributed to all Chinese citizens. The upshot of these observations is that the rapid development of the food traceability system in China over the last decade or so is a microcosm for understanding much broader processes of social, economic, political and technological development in China.

To this end, this thesis focuses on three things:

1. How China has framed food safety as a technology- and corporate-based control systems;
2. The power relations between the three major Chinese Internet companies –Alibaba, Tencent, and JD—who are the primary stewards of this effort and, first and foremost, the Chinese Government but also a number of other actors, including provincial governments, the many small complementors (individual producers or small farms who contribute to the content or diversity of the food traceability system), and citizens from different regions of the country;
3. Applying an approach to trust that is anchored in the social context within which the food traceability system is situated. In this approach, rather than trust being seen as a function of individual subjective choices or as a gift-wrapped feature of technology and market-based solutions to the food safety issue, three different sources used to develop the sociologically-grounded conception of trust are drawn on: an institutional approach (Sen, 1977, 2001; Portes, 1993; Swire, 2003), contextual integrity theory (Nissenbaum, 2011), and empirical studies (Bjørnskov, 2007; Wu and Shi, 2020).

Focusing on these considerations will help to illuminate how the public policy agenda for food safety and traceability system in China has been set and framed. The near-exclusive emphasis on technology- and corporate-based control systems are at the center of the current approach to food safety in China, and the power relations between the three major Chinese Internet companies (Alibaba, Tencent, and JD) and different levels of the Chinese government. It will also help us to examine a broader conception of trust to counteract the technocratic view that currently prevails in China, where the key to solving the problem of people's trust in the food system is to simply add more market forces, technology and information—none of which, either singly, or taken together, will address the issues at hand, I will argue.

1.2 Research Methodology

To examine these issues, this thesis will focus on three of the top thirteen most valuable publicly traded internet companies in the world: Alibaba (\$836 billion), Tencent (\$709 billion), and JD (\$128 billion)⁴. These companies were selected because they accumulate substantial revenue, attract a high volume of monthly active users⁵ with slickly-designed business models, and play an essential part in constructing and metamorphosing the Chinese food traceability system. Yuezhi Zhao (2014) suggests that untangling the Chinese technology platform's conceptual and historical development framework can help us better comprehend the complex social, economic, and political issues at hand.

⁴ The market value was gathered on October 13, 2020. Alibaba's market shares plunge as the Chinese regulator announces an anti-monopoly investigation against internet companies like Alibaba. This thesis will look into this regulation and its impact on Chapter five.

⁵ Tencent has the highest monthly active user accounts of 1164.8 million and 50 million active merchant accounts among the big four internet companies (Tencent AR, p.5). Alibaba has 846 million monthly active user accounts (Alibaba AR, p. 21). Meituan has 448.6 annual active user accounts (Meituan AR, p. 2), but due to the research restriction, this thesis will only briefly mention Meituan. JD has 417.4 annual active user accounts and is more involved in the food traceability system than Meituan (JD AR, p. 10).

To understand these companies, the ownership structure, the markets they operate in, their business models and so forth, this thesis relies heavily on the financial documents they file with financial market regulators and investors, business reports, and other relevant documents. Using such documents, the methodology of this thesis as informed by the literature aims to investigate:

1. **Ownership and Capital:** The structure of their ownership and the financial capital invested in them, a process that, as other researchers have shown, involves a three-way relationship between the Chinese government, technology corporations, and foreign capitals (Jia & Winseck, 2018);
2. **Operations and Profits:** Their operating profit levels and how they coordinate commodity chains, minimize costs, and increase user "stickiness"⁶ for their services through the food traceability apps and mini-apps they provide (i.e., commercialization [Schiller, 2014], socialization [Chen and Qiu, 2018], and gamification [Nieborg et al., 2020, Jiang and Fu, 2018, p. 388]);
3. **Platform Mechanisms:** Their multi-level collaboration and integration in national and global supply chains and how such relationships articulate and propel technology advancement, optimize network effects, take advantage of their technical architecture, and utilize consumer data (i.e., integration through mergers, acquisition [Howard, 2016], automation [Zhao, 2011], and diversification [Jiang and Fu, 2018; Zuboff, 2019]).
4. **Power Asymmetries:** The opaque and complex nature of these companies' operations and the policy and market environments in which they operate (i.e. revealing problems of information

⁶ Chen, Mao, and Qiu (2018) develop the sickness concept to define the super-platform like WeChat, which "is super-sticky because it includes so many functions, and it keeps growing to the extent that its average Chinese users are glued to the meta-platform whenever they use their smartphones" (p. 10).

and power asymmetries) [Nieborg and Helmond, 2019; Van Dijck, 2019; Van Dijck et al., 2018; MacKinnon, 2012; Zhao, 2020]);

5. **Digital Labour:** This thesis also discusses how the big three technology companies exercise power by periodically changing their obscure algorithms and rules to their benefit and at the expense of the thousands of small complementors who depend on them. More specifically, it points to the different phases in the historical trail where technology companies encouraged small complementors to contribute to their platform and how they amend the rule and redirect traffic from encouraging small complementors to pleasing state and their business sponsors. It also compares these companies' user bases and examine how they strive to increase the "stickiness" of their apps and platforms to maximize daily and monthly active user rates (Nieborg and Helmond, 2019; Chen and Qiu, 2019).

This thesis critically assesses several primary and secondary sources to examine these questions and depict the relatively short history of food traceability system in China. First, this thesis examines 24 financial reports published by four publicly listed big Chinese technology companies filed with the United States Security and Exchange Committee (SEC) and Hong Kong Stock Exchange (HKEX). This research also looks at the corporate statement, private research institution, and academic institution-issued reports on company development, which helps reveal the opaque and complex nature of these companies' operation, business structural, global collaboration and competition as national champions.

Then, this research gathers official statistics on food violation reports, food safety regulations, telecom adoption rate, five-year plans, social media usage and Internet development status from Government of China sites like the State Council, State Statistical Bureau, China Food and Drug

Administration, State Administration for Market Regulation, Chinese State Information Center, China Internet Network Information Center (CNNIC), and Xinhua that published throughout 2009 to 2020 (see Appendix 1. Full list of documents reviewed at this time). This period is vital to this research because insurmountable food safety incidents, especially the melamine-milk scandal that caused the illness of 300,000 infants, stimulated the food traceability system's initial development back in 2008. Furthermore, the Chinese government published a series of policies and announcements within this period which exemplify their beliefs in the power of a market-driven approach, the need for large scale digital transformation and use of consumer feedback ("倒逼") as the testing ground to eliminate uncertainties and turn back the tide of food insecurity and distrust (CSC, 2010).

While these documents form the central corpus upon which much of this research turns, it is essential to recognize this documentation's limitations in China. As Thomas Piketty (2020) observes, for example, in China, publicly available data are often flawed, lack continuity, and are "full of holes" (p. 416). As Jiang and Fu (2018) state, the majority of the government data stay hidden from the public, and they select what the public can view (p. 383). Levels of both government and corporate disclosure are also very incomplete and shrouded in mystery, so comparing patterns emerging from various data sources over a long period helps identify consistency and inconsistencies over a decade and compile a reasonably comprehensive outcome. Moreover, it is also essential to identify critical junctures that stimulate, obstruct, or redirect the food traceability system within this time frame. This review identifies and elaborates on the range of preventative measures and disciplinary terms, distinguish the regulated food markets from those that are not, and identifies the social norms set out within these official documents.

1.3 Thesis Outline

This thesis consists of six chapters. The introduction chapter offers an overview of the current food safety concerns, trust crisis, public policy agenda, key players, and junctures involved in the Chinese food traceability system's historical development. This chapter provides an initial sketch of the crucial literature and concepts that shaped the research questions, research method, and the study's urgency (Winseck, Zuboff, Zhao, and Feenberg). It then justifies the central focus on the three major Chinese Internet companies as central analysis and conclude with a thesis outline.

Chapter 2 reviews three bodies of literature that underpin this thesis's theoretical and methodological foundation: (1) This thesis is primarily grounded in the critical political economy of communication (CPEC), which provides a clear focus on how digital media platforms, market-based solutions, and state coordination shape institutional regulatory development, national resource distribution, economic structure, historical information and power asymmetries at the digital transformation juncture (Winner, Winseck, Mosco, Winston, Polanyi, Feenberg, Van Dijck, Ferguson, Schiller, Neiborg and Poell); (2) The science and technology studies (STS) and critical theories of technology highlight the sociological significance of studying multidirectional technological development models (Pinch & Bijker, Gillespie, Pasquale, Hughes, Kitchin, Conzalez-Bailon, Bjørnskov, Wu and Shi); (3) The works on sociological view of trust (Fukuyama, Sen, Portes, Swire, Nissenbaum, Bjørnskov, Wu and Shi) address how a lack of trust hinders the country's long term development and provide new routes to cultivate trust.

Chapter 3 examines how the big three Internet companies dominate the development, distribution, operation, and transition of the food traceability system with a seamlessly integrated structure and slickly designed business model. This chapter highlights 13 of the most salient government policies that distinguish two critical phases in the food traceability system's development

trajectory. It also presents the global collaboration and long-term impact by analyzing the three-way relationship between state actors, internet companies, and foreign capitals in the food traceability system. While briefly outlining the thousands of complementors, it focuses on how the big three Internet companies exercise power, redirect their operation and policy to satisfy the state and neglect the need of small complementors. Empirical research outcome manifests how government policy agendas for food safety in China have been set and framed to favour the technological-based solution and market-driven approach to construct the certainty machine. This chapter concludes that the current Chinese food traceability system's blooming expansion and "gluing" services platform has broader implications beyond the future of food and many areas of our lives.

Chapter 4 evaluates the influence of the food traceability system that transforms consumers into prosumers, food producers into digital labour, and citizens' fundamental right into purchasing power. This chapter zooms in on the uneven telecom development and historical inequality between urban and rural regions in China. It leads to limited job options and reduced food diversity, which puts rural food producers in a further disadvantaged position and restricts urban consumers' choices. Last, it argues that cultivating trust, fostering a fair society, forming aligned interests and accountability will generate a healthier and more sustainable food safety system and community to protect citizens' welfare better.

Chapter 5 proposes the alternative food safety regulations trajectories and imagination of the future Chinese food system that breeds trust. This chapter acknowledges other Chinese government measures throughout the past decade, and the recent law and regulations change. Despite the light adjustment on the government's slightly increased supervision responsibility and amendments to the "toughest" food safety law (CSC, 2020), the tide is still heading toward building the perfect food traceability certainty machine. Chapter 5 reflects on how we can only move forward in food safety,

breed societal trust with a better system to protect the most vulnerable, value citizens' rights over consumers, and distribute resource and infrastructure construction between coastal and interior regions more evenly.

Chapter 6 offers concluding remarks on the techno-capitalist hellscape of China's food traceability system and accentuates the food system's future should commit to serving citizens. It reviews three delusions about the food traceability system perpetuated by the government and corporate hype: First, that the food traceability system acts as a 'certainty machine' that supersedes the necessity of trust and constructs the illusion of perfect information; Second, that a highly integrated and automated food system can increase efficiency and improve convenience; And finally, that stringent laws can drive technology giants away from carrying food businesses on their platform. This final chapter disputes these delusions and stresses the critical juncture for us to reimagine the food safety system in a way that focuses on taking care of citizens instead of consumers and corporations.

Chapter 2: Literature Review and Conceptual Framework

This thesis draws on three bodies of scholarship to understand the issues at hand to develop its theoretical and methodological approach: the critical political economy of communication approach; science and technology studies (STS) and critical theories of technology; and the sociological view of trust. This chapter reviews the key contributions to each of these bodies of literature, especially what they make in terms of theory and method.

2.1 Critical Political Economy of Communication (CPEC)

The first body of literature provides an overview of historical and contemporary governance forms that emerge in digital transformation junctures and the transition to a digital platform economy (Feenberg, 2010, 2011, 2020; Ferguson, 2017; Nieborg, 2018 & 2020; Schiller, 2011, 2014, 2020; Van Dijck, 2018, 2020). The critical political economy of communication (CPEC) approach directs our attention to more significant national resource distribution issues and the historical asymmetries of power and information between coastal regions and interior regions of China. This situation in China has long defined the uneven development of the economy, society and the telecommunications system upon which the Internet, consequently, the food traceability system in China and the food industry overall depend on (Qiu, 2009; Hong, 2017). In other words, to understand the current approach to the development of the food traceability system in China, it is also crucial to understand the context of China's long-term development strategy where advanced technological solutions actively compete in selling certainties and demonstrate a market-driven and intertwined three-way relationship among the Chinese government, technology corporations, and foreign capitals (Jia and Winseck, 2018).

To help understand these processes and this context, this thesis emphasizes the role of the big three technology corporations introduced earlier—i.e. Alibaba, Tencent, JD—and how the logic and

dynamics of the food traceability technologies rest on maximizing the revenue growth engine for the companies and expanding a lavish consumer market in a basic human need: food. To this end, several processes at the heart of these efforts to create new engines of business and market development will be highlighted: *commodification* (Schiller, 2014), *socialization* (Chen and Qiu, 2018), and *gamification* (Nieborg et al., 2020). This approach also focuses on how the companies' pursuit of *integration, automation, datafication and diversification* (Van Dijck et al., 2018) are also being used to maximize the role of market expansion, market consolidation and capital accumulation while also minimizing transaction costs—all of which are also common phenomena in Western food systems (Howard, 2016).

2.1.1 Double Movement

In *the Great Transformation*, Karl Polanyi's (1944/57) double movement theory presents an account of the consolidation of liberal capitalist democracies in the first half of the 21st Century and which is crucial to this thesis because it helps us explain how people and society respond to the increasing encroachment of market and technology-based values on more and more areas of everyday life. *The first movement* occurs when "all transactions are turned into money transactions," and everything from air to labour has been morphed into a commodity for capital gain (p. 120). Like Polanyi repeatedly stresses, it is a mere utopian project to solely form and rely on the market to self-regulate all-around actions. If the economic system dis-embeds from society, social relations would be embedded in the economic system instead of letting the market adjust and adapt to the social relations accordingly (p. 143). A market society is problematic since "its economy [is] based on self-interest" (p. 413). Polanyi (1944/ 57) renders the primary distinction between real and fictitious commodities is whether it deviates from their original meaning. In his opinion, "[l]abor is simply the activity of human beings, the land is subdivided nature, and the supply of money and credit in

modern societies is necessarily shaped by governmental policies" (p. 23). In a sense, when we let the market take charge and set rules, that allows the market to set prices and terms for the real and fictitious commodities that citizens and society depend on. A self-regulated market is oriented to accumulate profit and pursue endless expansion, bringing irreversible destruction to society, labour, and limited natural resources. It will harm society in the long term.

Polanyi's *double movement* theory further explains market liberalism and Marxism's co-existence, where a *countermovement* emerges in a bid to surpass the market mechanism. While the market consistently chases capital on a large scale and scope, it can encounter protective countermovements and contestation from the various social collectives that fight for a sustainable development plan, balanced working conditions, and public welfare with participation from all social groups. A consistent and meaningful double movement can challenge the legitimacy of technology and market-centered solutions; however, social relations have continually been entrenched in the economic system. Nick Couldry and Ulises Mejias (2019), for example, claim that a new form of colonial logic incorporates data extraction systems, a process that they dub data colonialism. According to Couldry and Mejias, data colonialism is based on extracting and commodifying almost every aspect of social life in pursuit of corporate profit incentives, which leaves no room for the countermovement to be exempt from economic forces (p. 117). Alex Wood and Mark Graham (2019) identified that remote gig economy workers organized countermovement in six Asian and African countries; nevertheless, more research is required to follow up on the effectiveness and long-term outcome of these activities on their function surpasses the market mechanism. Polanyi's work helps us comprehend and propose alternatives to manage, shape and make human the digital disruption brought about by excessive reliance on the market and technology-based solutions like the Chinese food traceability system. This emphasis on Polanyi's work is also part of a broader

theoretical commitment in this thesis to the critical political economy of communication tradition, although it must be admitted that Polanyi does not often figure largely enough in this tradition.

2.1.2 Platform, Platform Ecosystem, and Platform Society

In *The Platform Society: Public Values in a Connective World*, José van Dijck, Thomas Poell, and Martijn de Waal (2018) extensively demonstrate the intertwined relationship among platform, platform ecosystem, and platform society, which shapes everyday life. The platform organizes interactions among end-users, corporate entities, and public bodies, while a platform ecosystem magnifies those interwoven relationships to provide “infrastructural services” (p. 4). The platform society depends on dominant global platform ecosystems to channel social, economic, and interpersonal traffic, favouring commercial benefits and corporate ideology over the public interest and societal values (Van Dijck, 2020). Moreover, the platform ecosystem expands its influence through constant horizontal, vertical, and diversified integration strategies (see: Section 2.1.2.1) that connect an assemblage of integrated platforms and infrastructure from a wide range of sectors to generate data and optimize algorithms. This process works to transform public goods into private commodities through platform mechanisms like integrated circulation, monetized datafication, algorithmic commodification, and automatic selection and collection (Van Dijck, Poell, & Waal, 2018, p. 32).

User agreements govern the platform, and the platform ecosystem is governed by platform mechanisms, terms of service or business models, according to Van Dijck, Poell, & Waal (2018, p. 9; p. 4). Since those mechanisms are generally self-regulated and not subject to government or independent oversight, it is increasingly challenging and opaque for citizens to gain democratic control over platform activities because they are left with, at best, an incomplete picture and lack the expertise needed to steer and utilize the data that the platform generates to optimize algorithms

across all connected sectors (Pasquale 2015; Van Dijck et al., 2018). The following sections will look into six encapsulated platform mechanisms: *integration (diversification)*, *datafication*, *automation*, *commodification*, *socialization*, and *gamification*, which platform ecosystems employ to grow their power and influence and define the critical juncture at hand.

2.1.2.1 Integration, Diversification, and Datafication.

Through the deep and massive vertical and horizontal integration of data flow across platforms, the platform ecosystem can utilize its ownership structure to link and track data among a new range of connected platform businesses, which enables user habitation, network effect, path dependency and global expansion within an interconnected platform ecosystem (Van Dijck, Poell, & Waal, 2018). However, it is essential to note that not all platforms integrate into the same format. For instance, Dwayne Winseck (2020) points out that big technology corporations like Google are vertically integrated into their online advertising system, but Facebook is not. Instead, both corporations hoard massive intimate information of users that is transformed into currency and exchanged in buying and selling of online advertising (p. 8). The convergence and fully integrated model that formed the platform ecosystem was emulated from how telecommunication companies merged with traditional media companies to own both the channel and content from the 1990s to the early 2000s, which Winseck (2002) referred to it as the "walled garden" strategy (p. 810). Gillian Doyle (2002) affirms that vertical integration generally helps enlarged corporations to reduce transaction costs, it also "gives firms some control over their operating environment and it can help them to avoid losing market access in important upstream or downstream phases" (p. 23). For illustration, food traceability app companies start to purchase or invest in previously outsourced business from farmland, logistics, offline supermarket to customer services, which help them keep the supply chain from production, distribution, and exhibition at bay. Doyle (2002) posits that

economy of scale, market power, and efficiency gain are the three fundamental motivations for corporations to take over other rival corporations in the same market, which is horizontal integration (pp. 25-26). Van Dijck, Poell, and Waal (2018) deem horizontal integration to occur as sectoral platform integration, such as one platform corporation buys a substantial interest in another platform business that conducts different business. However, it manifests the market relationships better to follow Doyle's (2002) distinction that horizontal integration is within a single market and diagonal integration takes over complementary businesses across markets. The infrastructural and sectoral platform integration will also incite path dependency, allowing corporations to manipulate the data stream better and accumulate more power. More specifically, this makes the companies within the platform ecosystem more "fluid" – if you already checked the history of your egg breakfast through the app, then it also directs you to purchase a napkin from a supermarket they own with the ten-dollar redeemable coupon from your points collection. It consequently helps to lock in the consumer (p. 19). The integration process also helps the platform optimize its meticulously designed business models to facilitate economic interactions that generate social exchange, produce social structures, and obtain social advantage (Van Dijck et al., 2018).

Couldry and Mejias (2019) note not all extracted data can be cashed, commodified and turned into capital, but that this is the ultimate target of data extraction processes and platform mechanism (p. 29). To contest this development, Van Dijck, Poell, and Waal (2018) stress that users could take collective actions, like abandoning the services altogether to control and change the platform's development discourse (p. 47). It is easier to leave one platform collectively but much more challenging to leave a platform ecosystem that governs every aspect of our utility needs, from paying a bill to purchasing essential food for daily survival (Vaidhyathan, 2018; Van Dijck, 2020).

The non-profit platform can hardly survive outside of the platform ecosystem, even if they have distinct features and services that solve multiple societal issues. Platform ecosystem orchestrates the infrastructural entanglements that platforms are situated within. For instance, social connections exist, emerge, and evolve through the diverse and connected utility features embedded within the mega platform ecosystem. Naturally, the more diverse social life areas the platform ecosystem enters, the more political and economic power they gain. In other words, we are transitioning from what Polanyi (1944/57) identifies as "all transactions are turned into money transactions" to all integrated activities that are automatically datafied and eventually commodified. Overall, as Van Dijck and others insist, understanding the platform mechanisms can help envision a better regulatory framework to draw out antitrust and anti-monopoly law. This is a critical juncture that we need to take forceful action to regulate the platform ecosystem that is about to take over our lives with accelerated integration, multilayered datafication, and diversified commodification.

2.1.2.2 Automation.

The platform ecosystem employs automated technologies like artificial intelligence algorithms and Internet-of-Things (IoT)⁷ smart devices like a Fitbit tracker to harvest, store, and analyze a large amount of content, data related to users' behaviour and emotional data generated across platforms and sectors. These data are then automated and processed into real-time platform decisions or reactions to gain commercial advantage. Couldry and Mejias (2019) summarized IoT as "life's annexation to capital" (p. 134). The automation process at a large scale aims to improve efficiency and minimize human labour costs (Qiu, 2019). As Tarleton Gillespie (2018) explains, this context aims to minimize human judgment while opening expansive new space for large-scale,

⁷ Couldry and Mejias (2019) said the Internet of Things (IoT) is the "intersection of hardware and software" (p.51), which "aims to incorporate consumption—— what we do with products after we buy them——into an extended chain of profit extraction through the processing of data (p.xx).

automated decision-making processes like content moderation. These activities, in turn, play an essential role in shaping experience and social discourse. David Nieborg (2018) also identifies how automated and speedy profiling enables large-scale online monitoring and facilitates instant personalized recommendations.

Furthermore, the automated process increases standardization, which will decrease diversity and increase the “one size fits all model” (Van Dijck et al., 2018, p. 135). Also, Van Dijck, Poell, and Waal (2018) examine the role of platform dynamics that favour “quantified user demand” to edit the news coverage we have access to, employing automated algorithmic editors to take over a large percentage of the job from the human editors (p. 55). Chinese news media, *Toutiao* (今日头条), for example, have zero human editors as of today. This is one of many platform paradoxes that promotes instant personalized service or recommendations, while large-scale standardization reduces the variety of information or services we have access to. Gillespie (2014), Pasquale (2015), and Zuboff (2019) all note that platforms use automated algorithms to “transform input data into a desired output” for their private interests (Van Dijck, et al., 2018, p. 9). Ultimately, Van Dijck, Poell, and Waal (2018) assert that this process is concealed by notoriously opaque and obscure automated algorithms that are embedded in the platform ecosystem and which hides how decisions are made within a ‘black box’⁸, all in the name of the private trade secrets. The automation process increases their certainties in the future and reduces their connection costs, while users and those outside the ‘black box’ can only see the tip of the information iceberg.

⁸ Frank Pasquale (2015) chose black box as a metaphor that refers to mysterious systems that “tracked ever more closely by firms and government, we have no clear idea of just how far much of this information can travel, how it is used, or its consequences” (p.3).

2.1.2.3 Commodification.

Mosco (2017) foretells, "The commodified self is a contested terrain in business battles that are only just beginning" (p. 106). From online to offline, from step counts to biometric data, the mechanism of commodification process is morphing every datafied activity into tradable commodities while transferring public values into economic values, like Van Dijck, Poell, Waal (2018), and Zuboff (2019) examine. From surplus labour to behavioural surplus, Zuboff (2019) identifies how every human interaction is extracted as raw data and summoned by corporations or the platform ecosystem to produce commodities, anticipate consumer preference, and alter behaviours within a system of *surveillance capitalism*. Dan Schiller (2011) asserts that with such information capitalists' main drive is to maximize their corporate profits and answer to their stockholders instead of serving society. Essentially, information technology corporations continually expand capital accumulation and control by minimizing their costs and maximizing their resource utilization. Therefore, information capitalists are continually generating a new cycle of commodity products and information to profit from, regardless of societal trust level.

Based on Dallas Smythe's audience commodity theory⁹, Linchuan Qiu (2016) argues that the digital platform users' phenomenon is not novel. Users are transitioning from watching to participating to self-generating, from an advertiser-supported media system to a ubiquitous surveillance system using multiple business models to generate diversified commodities and capital. First, users might not be aware of the virtual commodification and further exploitation of the digital platform that may affect them. Then, digital platform users are consuming digital content that continually categorizes them, and all their activities are datafied and available for advertisers to bid

⁹ Audience commodity is "using addiction to create stable, even growing, market demand through voluntary as well as involuntary servitude" (Qiu, 2016, p.107). For instance, the TV network produced the audience's attention and time as a commodity and sold to the advertiser. In another words, audience are the real commodity.

for the prime time ad slots. By identifying a customized group of users with the right emotional vulnerabilities, they might be more inclined to purchase particular products (Zuboff, 2019). Murdock (2013) also highlights the exploitative labour involved since platform users also act as 'prosumers', contributing content and providing diversified add-ons to the platform consciously or unconsciously.

Subsumed by this increasingly datafied progress, Payal Arora (2019) points out that market logics render "privacy as a barrier to innovation" (p. 5). In the present case, food traceability development companies aspire to penetrate more aspects of an individuals' daily life by accumulating people's data and the processes of what some scholars refer to as *data colonialism* (Thatcher et al., 2016) and *surveillance capitalism* (Zuboff, 2019). Shifting from division of labour to division of learning, Zuboff claims *surveillance capitalism* has privatized the division of learning and may drastically expand the information and power asymmetry among corporations, government entities, and users through the hyperscale¹⁰ of knowledge that they can store and process. Now, we are transitioning into all transactions being manufactured into commodities regardless of the necessity.

2.1.2.4 Gamification.

Gamification mechanisms were used to penetrate various sectors, like education, health, insurance, and online communities, to enhance active participation, harness standardized data, and reinforce the platform ecosystem's stickiness. Couldry and Mejias (2019) articulate the 'gamified' business model that digital platforms formalize to spread their influence and direct social discourse development to favour their own market interest. For instance, a digital platform like Google transforms consumers into unpaid prosumers¹¹ that incentivizes them to generate more content,

¹⁰ Zuboff (2019) says that "hyperscale operations are found in high-volume information businesses such as telecoms and global payments firms, where data centers require millions of "virtual servers" that exponentially increase computing capabilities without requiring substantial expansion of physical space, cooling, or electrical power demands."

¹¹ Murdock (2013) states that "prosumers contributing ideas, energy, and expertise that can be used to develop new cultural commodities for sale or market them more effectively" (p. 168). Essentially, it is an act of exploitation to transform consumers into prosumers.

reinforce their positive experiences, and develop long-term social connections and dependency on the platform. Specifically, consumers generate content for the platform in exchange for recognition like a pep talk, digital badge, or to get "rewarded" with the platform's other integrated and diversified services or products for a free trial period or sample (p. 58). Van Dijck, Poell, Waal (2018) examined a patient experience exchange site, PatientsLikeMe (PLM), which is a platform that gives virtual award incentives like "stars" and recognition such as a free T-shirt, to encourage patients to keep producing their detailed patient experience, which can be easily datafied for monetizing purpose (p. 104). Since the user thought they were collaborating to find a cure by sharing and contributing, they overlook the data and privacy exploration cloaked under the gamification elements.

Gamification mechanism also acts as a fail-safe if discount-induced consumer attraction failed, fun and competitive gamified setting can gain another user base. In a review of Kevin Werbach (2014), Michael Sailer (2017), Yu-kai Chou (2017) and Ian Bogost's (2011) work, Zuboff (2019) concludes that gamification builds result-oriented tasks, engagement cumulated team relationships, scenario compelled narratives, "performance-based contests and incentive-based challenge[s]" with a fun, engaging, and competitive setting beyond simple recognition and a platform integrated gift (p. 297). Therefore, these gamification designs represent "exploitation ware" that helps to manipulate actions, promote loyalty, and predict behaviour to serve the company's interest to accumulate investment return and cut costs (p. 298). Intrinsically, the fun and reward came from the food traceability system's gamification design that leads us to social numbing and overlooking the behaviour surplus and surveillance capitalism.

2.1.2.5 Socialization.

Socialization mechanisms provide effective ways for the platform ecosystem to acquire massive amounts of new users, steer social norms, stimulate platform habituation, and obtain a

competitive advantage. Van Dijck, Poell, and Waal (2018) point out that large platform ecosystems like Google and Facebook draw a vast number of new users to form a habit of connection to the platform and to attract advertising revenues with network effect and economies of scale. The more that one's central group of friends and connections reside in the platform ecosystem, the more challenging for us to withdraw (p. 27). Zuboff (2019) proclaims that the socialization mechanism helps generate surveillance revenue in closed loops in addition to "tipping the self-other balance toward the pseudo-harmonies of the hive mind" (p. 441). Winston (1998) agrees that network effects can help technical artifacts like platforms or traceability systems generate a good adaptation rate.

Additionally, Couldry and Mejias (2019) illustrate the new "data relations" that have emerged from the seamlessly integrated digital platform, which produces social relationships from different chat groups and digital social circles. The platform enables activities and scenarios to aggregate data and stabilizes the user's connection habit to the platform and platform ecosystem (p. 27). The data relations are used to produce social life in digital platforms, stabilize platform adoption rates, and cultivate a business model. For instance, the mega platform ecosystems of Alibaba and Tencent integrate multilevel social relations with plug-ins to connect users across sectors (p. 25). Bingchun Meng (2018), for instance, elaborates on how WeChat optimizes their highly intertwined and embedded socialization and commercialization functions to generate more profits from Chinese parents who purchase study materials under social group pressure (p. 161).

In a nutshell, the integration, datafication, diversification, commodification, automation, gamification and socialization design mechanisms of the platform ecosystem move the platform dispossession cycle from incursion to habituation with digital rewards, behaviour reinforcement, and social glue mechanism described by Shoshana Zuboff (2019). It helps to foster a platform ecosystem organized around concentrated power and a monopolized economic structure. It is essential to pay

attention to these realities and govern the platform ecosystem's development accordingly. As Van Dijck stressed, "platform ecosystems are shaping not only norms and values, but the very fabric of society" (2020, p. 3).

2.1.3 Chinese Internet, State, Market

Chinese internet companies and their highly integrated platforms are pillars of the stated-led long term global marketization plan (Hong, 2017; Jia & Winseck, 2018; Davis & Xiao, 2021). Dan Schiller (2005) explicates the deep-seated role that China and the technology industries play as “two poles of market growth” in developing the global economy (p. 94). The booming development of the Chinese platform ecosystem was enabled and enacted by three-way dynamics among State, Chinese Internet giants, and foreign capital investment. One of the essential focuses of the platform society is the geopolitical battle between two dominant platform ecosystems: The US (GAFAM¹²) and the Chinese (BAT¹³) platform ecosystems. These systems continually compete for international influence and market ownership (Van Dijck et al., 2018, p. 139). Lianrui Jia and Dwayne Winseck (2018) elaborate on the significant scale of foreign capital invested in the Chinese BAT platform ecosystem; concurrently, BAT is also “buying their way into the foreign market” (p. 51). However, Schiller (2005) and Meng (2018) also caution about the uncertainties rooted in these three-way dynamics, specifically that the Internet corporations and state have a relatively fluid rather than stable relationship. Meng (2018) also states the potential political threats that technology companies may pose for their aspiration to reap the capital gain and their advantage to information and power access.

¹² GAFAM is commonly referred to as five US-based internet companies, Google, Amazon, Facebook, Apple, and Microsoft. They also fit into the definition of platform ecosystem in this thesis.

¹³ BAT is commonly referred to as three dominant Chinese-based internet companies, Baidu, Alibaba, and Tencent. Various pieces of literature also include other Chinese Internet companies like JD.com, Meituan, Pingduoduo.

Yuezhi Zhao (2014) and Yu Hong (2017) explore the uneven development and increased social, spatial, and labour inequality in the Chinese information technology system. Zhao discusses the historically structured and reproduced social and technical development among urban and rural regions, coastal and interior regions, which entrench long-standing power and information asymmetries. Zhao indicates that the Chinese government directs the media convergence and the explosive growth of telecommunications to favour their own agenda while supporting the capitalistic orientated market transformation and neglecting the basic need of rural citizens. Both Zhao and Hong note that this development-approach had further disadvantaged the rural and interior regions in China. Countryside residents and businesses struggled to survive and eventually transformed into low-cost migrant labour for coastal regions. Moreover, Meng (2018) highlights that rural citizens would get less voice and be neglected, excluded, and placed on an inherited inequality with the blooming development of the platform ecosystems, while coastal cities' voice, content exposure and interests get amplified on the platform. Yujie Chen and Linchuan Qiu's (2018) work additionally addresses how big corporations like Alibaba and Tencent manipulate their slickly-designed business model and collaborate with the central government's development strategy to take advantage of the migrant workers' cheap labour. Instead of creating the perfect public sphere and generating more opportunities like state-led projects delineated, those platform ecosystems leave less room for alternatives. Platform ecosystems' highly intertwined and embedded datafication, automation, socialization and commercialization mechanisms make it easy for them to reap and accumulate capital (Meng, 2018; Yujie Chen and Linchuan Qiu (2018). Inevitably, we are still far from living in an equal Chinese society, and it is essential to cultivate trust.

2.2 STS and Critical Theories of Technology

Technology systems and their vast amounts of extracted data appear to be neutral, objective, and promise a more transparent domestic future (Gillespie, 2010; Pasquale, 2018). However, too often, the complex dynamics at play in the social and political construction of technology are ignored or downplayed. Questions about how complex technology systems will emerge and shape society are also neglected (Hughes, 1989; Kitchin, 2014). Langdon Winner (1980), a seminal thinker in the politics of artifacts, notably states that “the things we call ‘technologies’ are ways of building order in our world” (p. 32). It is getting harder to understand the order of our world. Thatcher and his colleges (2016) identify that technology corporations are hiding under the mystery of the black box without anyone getting the complete picture, let alone the perfect information. This opaque and complex system that constitutes the heart of the technology system has also been noticed by Van Dijck (2019) and Nieborg (2018). They elaborate further that citizens and society are gradually growing dependent on those technologies and platforms, which has enlarged the asymmetrical informational power between the state and technology corporations on one side and citizens on the other.

This thesis will apply the multidirectional technological development model and appropriation developed by Pinch & Bijker (1989). Their approach focuses on the different stakeholders involved in the processes of technological development and use. In the present case, this means carefully examining a select number of the widely adopted food traceability apps and mini-apps, the myriad food security problems that have emerged and which these apps try to solve, and the multiple workable interpretations and technological solutions proposed to deal with these problems.

Next, this thesis turns to Thomas Hughes (1989) and Rob Kitchen (2014) to discuss how social influences are embedded in technology systems despite their seemingly neutral portrayal. This thesis also presents theoretical ideas from the sociological construction of technology (SCOT) and science and technology studies (STS) perspective to help us do a more mid-range analysis of food traceability apps and mini-apps. To this end, this thesis introduces the multidirectional model of technological development as well as the unintended uses, meanings, and consequences that come to be associated with numerous food traceability technologies (Pinch and Bijker, 1989; González-Bailón, 2017).

Feenberg (2010) and Kitchin (2014, 2015) also help us understand that a technology's development and impact are intrinsically social, so we cannot deviate from the community-based mutual ethical values and shared long-term benefit in the design of technology. Andrew Feenberg (2010) states that we should be conscious of how technology shapes our way of life. The nature of this method is to transform the techno-centric approach back to human-centric and community-based ethical values, to build trust and form shared long-term goals. Feenberg and Winner (1980) both identified that the shape and development of an innovation process usually take a long time, and we need to keep adapting the solution to the new community based on mutual ethical values.

Andrew Feenberg (2010) has pointed out that the STS approach often leads to an incomplete discovery yet is mistreated as the truth. Despite the large body of data that this thesis collected at the beginning of this research, it is impossible to grasp all of the new regulations, the unprecedented scale of the food traceability apps, mini-apps, innovative food markets (智慧菜场), other innovative food traceability products and technologies. However, instead of solely relying on the STS approach to map out the field, this thesis combines the sociological views of trust, the STS approach, critical theory of technology, applying double movement theory, and employing the critical political

economy of communication approach. It offer a rich contribution to the study of the Chinese food traceability system.

2.3 Sociological View of Trust: “Shared Trust is the Only Real Protection from Uncertainty”

The platform society and the information industry tend to carry three common delusions of ‘trust’ in their practice and governance guidelines. The first delusion is that corporations and society can increase efficiency within a low to zero trust society. Another delusion is that they can replace trust with a certainty machine with a relentless process of automation. The final delusion is that the demand for information has superseded the necessity of trust. This section reviews literature that identified those delusions and followed by three routes to rejuvenate the trust.

2.3.1 Low Trust, Low Efficiency

A literature review on Chinese people's trust in society and the food system's safety and security demonstrates that trust is generally rather low. This is important because the available research shows that people's trust in society depends on society's perceived social fairness, income inequality, and perceptions of efficiency (Sen, 2001; Zack, 2001 Bjornskov, 2007). Within this thesis's context, the available literature suggests that the much sought-after goal of increased trust in the safety and security of the food system in China will not be determined by the increased availability of information or ICTs.

According to the World Value Survey's longitudinal measurement of self-reported trust from 1993 to 2014, China's societal trust has dropped precipitously since 2009 (Ortiz-Ospina and Roser, 2016). National and international surveys have also documented the decline of trust in China. In 2013, the *Chinese General Social Survey* report found that when asked whether most people could be trusted, the number of people agreeing with that statement fell by 21% between 2003 and 2013 (Wu and Shi, 2020, p. 120). Levels of trust have continued to decline. Chinese citizens' trust levels in food

security are the lowest compared to other public government services, with only 2.94 out of 10 people trusting food safety (Wu et al., 2017). Significantly, 50,000 food e-commerce stores had been found with unqualified food quality and safety standards by the Supreme People's Procuratorate, and 78.71% of the consumer had experienced quality and safety issues with the food they purchased online (Xinhua, 2020). Thus, even though the size of the food e-commerce industry exploded by more than 70 times – from 4 billion yuan (\$0.66 billion)¹⁴ in 2009 to 280 billion yuan (\$54.9 billion) in 2018 (Xinhua, 2020) – and the food traceability system which took off over the same period, neither led to a perceptible improvement or rejuvenation of people's trust in food security and safety.

Multiple Chinese government policies were issued from 2009 to 2020 to prompt the private corporations to develop the food traceability system and encourage them to employ marketing strategies to guide consumers to favour food products with traceable information. During the same period, 658 social science journal articles have published that concentrate on Chinese consumers' willingness to pay for food traceability products to reinforce the market-based technology-driven direction. Figure 2 shows that this topic of research is still gaining momentum. Notably, within those studies, it is generally concluded that there is a marginal level of willingness to pay a premium for food traceability products, and 85% of consumers who participated in their survey tend to have a deficient trust level toward the information provided by the food traceability products (Liu et al., 2019; Sun and Wang, 2019).

¹⁴ The exchange rate is calculated based on the yearly average in Appendix 3

Figure 2

658 Journal Articles Published about Chinese Consumer's Willingness to Pay (WTP) for the Food Traceability Apps in the Period 2008 to September 1, 2020.

As Shoshana Zuboff observes in *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (2019), the disastrous delusion held by governments and technology corporations maintains that creating a new generation of '**certainty machines**' will bring about untold new efficiencies and social and economic improvements (p. 330). Still, there is little evidence so far that the need for social trust can be superseded by the development of a more efficient certainty machine. According to Amartya Sen (2001), Paul Zak (2011) and Francis Fukuyama (1996), a society with low trust will typically end up with far higher transaction costs than a high trust society. Both Zak and Fukuyama examined this point through several experiments and illustrations that information technology would not offer long-term efficiencies for a low trust society as a whole. Sen also points out that "when these behavioural modes (mutual trust and the use of norms) are plentiful, it is easy to overlook their role, but when they have to be cultivated, that

lacuna can be a major barrier to economic success" (2001, p. 263). For instance, in a Chinese society where most of the citizens live by the famous Thomas Hobbes's notion, "nobody can trust anyone else" (Thompson, 2020). The widespread distrust drives everyone to spend extra time and energy to verify the products' quality and information, which imposes a higher transaction cost. Sen also dives deep into how explicit and implicit social choice and individual behaviour shape trust, democracy discourse, and economic success in China (2001). Furthermore, Fukuyama (1996) contends that the concentration of economic power cannot help global corporations with low trust levels to increase efficiency. It can only generate scalable challenges. Hence, for a low trust society, corporations, nations, and citizens will end up paying more for its low-efficiency cost.

2.3.2 "Trust is Not Reducible to Information"

The second common delusion held by the current food traceability system is to gift wrap fancy technology with layers of information to "bypass the need of trust" (Zuboff, 2019, p. 413). Nevertheless, as William Bruce Cameron (1963) nicely put it, "not everything that can be counted counts, and not everything that counts can be counted" (p. 13). Helen Nissenbaum (2001) points out that the essence of e-commerce is to add an extra layer of functions and information to act as something like a door lock and make it into an innovative technology-wrapped super surveillance camera. Sun-ha Hong (2020) compares the messy data piled and dumped by fancy technology on us to that of a toxic gas, which suffocates us and leads to "carefully packaged expressions of probability that harbour uncertainty by definition" (p. 25). Irena Knezevic (2017) renders layers of information as multiple labels that act as interventions to distance¹⁵ people from their source of food, "[t]hey tell the concerned consumer that the interventions are up to their higher-than-average standards,

¹⁵ Brewster Kneen (1995) refers to distancing as the many interventions distancing people from their food (as cited in Knezevic, 2017 p. 241).

deflecting suspicion that the interventions themselves may be problematic” (p. 243). Nissenbaum (2011) summarizes that trust is not restricted to transparency, consent, nature, nurture, and accountability. It is a well-nourished system that has been tested, guarded, and peer-reviewed for a long time. The sense of safety and certainty is not defined by how much information is available to consume or how concise and straightforward the food safety information is delivered. Instead, it must be established by the common interest that every stakeholder shares. Peter Swire (2013) also explains that trust cannot be interpreted as extra layers of information, but he proposes building a “trustwrap” to cultivate trustworthiness. Swire walks us through how Tylenol handled a product defect. It started with a prompt and robust response and recall, built trust design with a couple of tamper-proof package wraps, and bound legal rules to spur public trust for the product (2013). So, trust consists of not only information but also legal, social and cultural elements and norms.

Thus, Nissenbaum (2011) and Swire's (2013) work helps to establish that "trust is not reducible to information" (Fukuyama, 1996, p. 25), and as Winseck (2002) points out, "more information often creates more uncertainty" (p. 95). Jim Thatcher (2016), José Van Dijck (2019), David Neiborg and Thomas Poell's (2018) work helps to identify why the food traceability system is so keen to keep adding extra layers of information, to recognize information and power asymmetries, and to demystify the illusion of technical necessity.

2.3.3 Social Polarization Reduce Trust

A transnational research study carried by Bjørnskov (2007) shows that social polarization reduces trust. Zack's (2011) empirical research also concludes that wage discrimination and income inequality will result in a low trust society. In other words, “trust is higher in ‘fair’ societies” (p. 296). As Langdon Winner (1980) states, technological artifacts have political qualities, which can often enlarge the existing social tensions and inequality and overlook the underrepresented.

2.3.4 Cultivate Trust

To illustrate that "shared trust is the only real protection from uncertainty" (Zuboff, 2019, p. 490), we need to apply the trust framework in the new recommendation and imagination for the food's future traceability or safety system. We ascertained that the food traceability system needs trust to prosper and reviewed three prominent delusions that will obstruct a sustainable food traceability system in a low trust society. Here are three ways to rejuvenate trust and develop a food safety system, including community-based mutual ethical values, natural habit, quality government, and fair society.

First, the community-based mutual ethical values can cultivate trust. When an internalized moral obligation and shared value are commonly agreed upon, technology corporations support and trust each other based on long-term mutual targets (Fukuyama, 1996). José van Dijk (2016) states that to build trust in platform society, we need to encode public values and anchor collective decisions in institutional norms and ethical codes. Alejandro Portes and Julia Sensenbrenner (1993) connect this idea with Polanyi's concept of embeddedness that "group goal govern economic behaviour" (p. 1325). The community has a high level of trust when they collectively value long-term market advantages based on mutually agreed community virtue. Everyone who lives in the community considers their shared relationship and community norm as 'utilities'. However, they point out that shared community ethical values can vary depending on the community's level of solidarity and options.

Zuboff (2019) also concedes that community engagement and collective decision-making among multiple stakeholders is positively correlated with healthy social trust development (p. 360). Multi-stakeholders should comprise multitude of global, national, and local agencies, including but

not limited to citizens, consumers, complementors¹⁶, corporations, social groups, and governments (Pinch and Bijker, 1989; Van Dijck et al., 2018). Andrew Guthrie Ferguson (2017) suggests that we do not need full transparency of data. Indeed, we need to have accountability instead. It means all stakeholders need to take active accountability in the decision-making process, data possession and dispossession. Nissenbaum (2011) also stresses the importance of constructing multi-stakeholder accountability and giving community members adequate representation in technology design. Van Dijck (2020) incites the same suggestion that all levels and all actors should participate in public value negotiations, policy enforcement, and shared responsibilities when drastically evolving societal arrangements and shared public values are anchored in the platform ecosystem and platform society. Government officials, for example, could reconnect with rural class residents to ensure that community members are adequately represented by technology design and craft a collaborative policy decision (Zhao, 2011). Zhao also envisioned a meaningful Chinese public sphere to form community-based mutual ethical values to cultivate trust. However, Zhao also identifies that forging a collective solution could be a painstaking process. It is requisite to point out that different social groups deal with different pressing problems and are inclined to pursue solutions that work in their favour. The multidirectional model will hinder the artifacts' stabilization or platform in this discussion (Pinch and Bijker, 1989; Van Dijck et al., 2018).

Second, natural habits can help cultivate trust. James Coleman (1988) attributes to the closure of the social structure as a community with a shared culture and belief to form collective trustworthiness (p. 107). More precisely, when a community shares common habits and experiences, they continuously act in this way as a natural behaviour. Alternatively, they are aware of the reward

¹⁶ Complementors play essential roles in the platform ecosystem, Poell, Van Dijck, and Nieborg (2018) categorize them as software developers, data brokers, and parties contributing to the platform's construction.

or punishments that routinely follow their actions. Fukuyama (1996) asserts that trust stems from natural habit rather than "rational calculation" (p. 11). Trust can be nourished by good upbringing and gradually forming "habit as a discipline," like following the law of nature, only eating seasonal food, and nurturing habits that tend to repeat themselves without incentive from reward or punishment (Chun, 2016, p. 91). After examining ancient Chinese history, Sen (2001) also talks about how the code of behaviour is much more effective than relying on financial incentives to keep the ancient Chinese officer remain law-abiding and noncorrupt (p. 276).

Last but not least, quality government and a fair society can help cultivate trust. José Van Dijck (2019, 2020) emphasizes that the market should serve society, as do good public accountability, principles of fairness in governance, and democratic control. Quality government and fair society can help shift stock market value back to social value. Piketty notes that an unregulated market helps a small number of people and corporations to get rich in China quickly. It also leaves more middle- or lower-class Chinese citizens “to foot the bill for decades to come” (2020, p. 415). Zhao (2014) also identifies the same troubling developmental approach and points out the necessity for the government to intervene for the public good, especially when “the right to communication and online activism has become a life and death issue for workers” (p. 16). Food security is a fundamental human right, which should not be left in the hands of unaccountable private corporations. Both Zhao (2014) and Hong (2017) identify the internal contradictions among different levels of government officials, private, state-owned, and hybrid corporations. Finally, Cary Wu and Zhilei Shi’s (2020) empirical research demonstrates that local and central governments have different trust levels, which calls for quality and consistent governance policies across the central and local authorities to cultivate trust in a fair society for us to envision a sustainable and functioning food system.

This thesis is grounded in three bodies of literature: the critical political economy of communication (CPEC), science and technology studies (STS) and critical theories of technology, and the sociological view of trust. Despite this multidisciplinary focus and diverse research methodologies, all these bodies of literature contribute an insightful lens into the festering concerns toward technological solutionism, which stem from the market-oriented technological food traceability development path occurring in China. All suggest that we should shift the focus from a *techno-centric* approach back to a *community-centric* approach in regulating and redirecting the development of technology and the digital economy. Stemming from CPEC, double movement theory renders the concept of a ‘countermovement’ that may surpass market mechanisms and reinstate public welfare as the central focus of technical progress. STS highlights the positive role a myriad of social actors can play to make technical artifacts conform to community demand. The sociological view of trust highlights three common delusions that the information industry and Chinese government tend to propagate. It asserts that trust intrinsically comes from shared-community values, well-nourished laws, and a fair society. Chapter 3 examines 26 Chinese food traceability laws and zooms in on how Chinese Internet companies employ seven platform mechanisms to extract data, commodify social life, accumulate power, balance state mandate, and profit from food traceability system and beyond: *integration, diversification, datafication, automation, commodification, socialization, and gamification*.

Chapter 3: The Utopia of Certainty Meant for Whom? / The Costs of Certainty Machine

The food traceability system in China is the epitome of the market-based and technology-driven long-term economic development strategy. It provides a crucial link to the national information network that embodies the national strategic plan to shift the food industry and national economic restructuring from "made in China to created in China" (Alibaba, 2015). This chapter unties the three-way relationship among the Chinese government, three national champion technology corporations, and foreign capital investment within the food traceability system. After combing through 26 food safety and traceability laws and regulations¹⁷ published over the last decade, this chapter highlights 13 of the most salient government policies that distinguish two critical phases in the food traceability system's development trajectory. It deciphers the original purpose, state influence, regulatory framework and the shifting economic focus of the food traceability system. Then, through the lens of corporate financial reports, this chapter explicates seven fundamental platform mechanisms that technology corporations employ to penetrate more areas of our life, expand their business horizon, and satisfy their thirst for monetization. This chapter demonstrates the catalyzing and long-lasting impact the food traceability system has on the national economic system and power dynamics.

3.1 From Blue Sky to Skynet: the Food Safety Law and the Role of the Chinese Government

The food traceability system in China is designed as a solution to solve the seemingly endless run of food safety concerns, and it is embedded in movements toward techno-centric market reforms that aim to enhance China's ability to compete on the global stage. Before 2015, Chinese state policies allowed technology companies, the self-regulated market, consumer feedback, and the Internet-of-things (IoT) to take over several important government functions with respect to the

¹⁷ See Appendix 4: the complete list of food safety and traceability regulations in China

country's food safety system. In 2015, the State included food traceability in food safety law for the first time.¹⁸ This marked the critical transformation point in which the Chinese government has moved to delegate more responsibilities to technology corporations while maintaining tight regulatory control of the food safety system. The basic point is that food safety, the ultimate guarantor of which up until this point had been the Ministry of Commerce, was now being delegated by the government and that Ministry to "big tech". Policies published after 2015 inaugurated the economic restructuring from export and investment-driven growth to the innovation-driven economy and local consumption-based model. It also underlines the State's orchestrated moves from encouraging a multi-stakeholder model of food traceability systems to a mandatory concentrated and centralized model. It reveals that the regulatory policies worked to reaffirm intelligent technology's crucial role for the hefty ends of nationalism and economic development rather than for citizen welfare, stable food prices, and improving social equality¹⁹.

3.1.1 2009-2014: Self-regulated Techno-market Model

Before 2015, while government policies attempted to speed up the construction of the food traceability system, references to the “food traceability system” were seen as mere “buzzwords” and “gimmicks” to depict how government and big technology corporations use technology as marketing strategies to deal with food safety crisis and to handle citizen’s utility needs (Zuo, 2014).

State policy at the time framed the food traceability system as the idealized solution that brings total transparency, convenience and effectiveness to consumers and technology corporations. In 2010, the Ministry of Commerce and Finance Department issued guiding opinions to encourage

¹⁸ The State Council of the People's Republic of China. (2015). Food Safety Law of the People's Republic of China (Chairman Order No. 21). Section 42.

¹⁹ Chapter 4 will further illustrate the pre-existing and broadening social inequality and uneven development, which manifest social value are not pursued equally with the economic interest in policy and practice.

corporations to apply marketing strategies to guide the consumer to favour food products with traceable information over other kinds of food products. In the *Twelfth Five-Year Development Plan* (2011), the Ministry of Industry and Information Technology asserts that embedding the IoT in the food traceability system is a superior choice to bring convenience and effectiveness to national food safety issues. However, government policies have favoured big technology corporations since the beginning, which has reinforced social inequality and deepened the entangled relationship between state and technology corporations. The Ministry of Commerce and Finance Department announced the call to build ten food traceability trial cities in 2010, but it mandated that the bidding technology corporations have more than 20 million yuan (\$3.07 million) in registered capital. In contrast, according to the China Statistical Yearbook (2010), 56.2% of rural households have less than 5,000 yuan (\$769) for annual net income (Section 10-19). This threshold, in other words, rules small and medium food merchants out of the competition. Subsequently, national technology champions, Alibaba, Tencent, and JD all announced rural development strategies and projects, such as *Dotless Visual Code* and *China Smart Logistics*, to support the construction of a food traceability system in 2014.

In 2014, the State Council announced that the food traceability program would be expanded to 50 cities with 2,000 distribution companies. The aggressive and accelerated expansion of the food traceability system has swelled the inequality among the already marginalized groups. Even though the State Council requested that China Mobile and other entities cooperate in building vital broadband infrastructure in support of the food traceability system's design by the end of 2013,²⁰ this information network prioritized coastal regions, thereby further widening the inequality gap among

²⁰ The State Council of the People's Republic of China. (2013). Notice of the General Office of the State Council on Issuing the Priority Work Arrangements for Food Safety in 2013.

different regions. Meanwhile, government policies continued to advance the accelerated development of the food traceability system in 2012 and 2013, and the food traceability law was not sketched until 2015. Until then, the food traceability system was mainly governed by technology corporations and the techno-centric market.

3.1.2 2015-2021: Introduction of the Food Traceability Law

In 2015, the State Council upheld their enthusiasm in spurring on the development of the food traceability system, yet they explicitly stated that regulatory authorities could not force food producers or enterprises to accept food traceability services from designated technology corporations (Section 10).²¹ However, additional steps were taken to stimulate the regulatory transformation and cultivate the optimal environment for the food traceability system to thrive. For instance, section nineteen of the new food safety law signals the transition from encouragement to mandatory compliance. The central State began requiring big supermarkets, hospitals, and group entities to actively purchase food traceability products to set positive examples for the general public. In 2018, the Ministry of Agriculture and Rural Affairs of the PRC launched the food traceability system as mandatory work for food certification, brand selection, and farm market exhibition.²² The State repeatedly affirmed the goal to complete the whole food traceability system's standardization in 2020.²³ This underpins the current critical juncture that shapes the food traceability system and the more extensive Chinese information network needed to support it.

While the food traceability system concept allows the market and corporations to self-regulate in a decentralized form, it is trending toward a centralized national platform. By accelerating

²¹ The State Council of the People's Republic of China. (2015). The General Office of the State Council on Accelerating Opinions establishes a traceability system for essential products. Guobanfa (2015) No. 95.

²² Ministry of Agriculture and Rural Affairs of the People's Republic of China. (2018). The Comprehensive Promotion and Application of the Safety Traceability Management Information Platform.

²³ Repeated in provincial and central government policies from 2013 to 2020

the implementation of cloud supervision, automatic datafication, standardization, and nationalization in the food traceability system's legal framework, the Chinese government is looking to reaffirm corporate self-regulation reliability, increase government supervision, and perfect the corporate credit system conveniently and efficiently. The State (2015) is also dramatically promoting innovative technology applications and assembling the *National Traceability Platform*, where all food traceability systems need to upload data into the national *Skynet* (2015, 2017, 2018).²⁴ They flaunt the increased urge to form this nationally interconnected information network, but none of the policies articulate how the information will be stored or analyzed and for what purpose.

Additionally, in the *Thirteenth Five-Year Food Safety Plan*, the State Council (2017) also touts the potential rewards consumers can receive if they spot and file food safety violation complaints through the national channel. Furthermore, nationalized and standardized development also extends to farmland; the *Amended Food Safety Law* (2018) asks local government to implement encouragement measures to stimulate food production, operation, and delivery on a centralized scale (Section 43).

The Ministry of Agriculture and Rural Affairs of PRC (2019) confirms that more rural farmers are selling their land as a result; notwithstanding that trend, the number of state-owned farm units only increased slightly from 1785 to 1834 between 2015 and 2019. Also, state-raised livestock products are declining; based on the National Bureau of Statistics of China's *Annual Year Book*, live pork dropped from 146.4 to 102.1 (10,000 tons) in the same period. National pork production also dropped from 5645.4 to 4255.3 (10,000 tons), with state pork production only accounting for 2.5% to

²⁴ Food Safety Law of the PRC (2015) state the 3rd party platform need to report the violation to the central government (section eleven), *Guiding Opinions on Carrying out the Traceability Standardization of Important Products* (2017), and the *Comprehensive Promotion and Application of the Safety Traceability Management Information Platform* (2018) both emphasizes the need to apply the National Traceability Platform in the entire nation. However, according to the Ministry of Commerce's E-commerce report (2020), different technology corporations extract data from a public place differently and turn it into private corporate properties without sharing it. It is still far from completing the national data-sharing system and standardized data and food traceability system (p.107).

2.3% of total national pork production. Simultaneously, the producer price indices for farm products note that live pigs' prices soared 43%.²⁵ Therefore, the nationalized platform and regulation strategies are meant to buttress State control over the food traceability systems and technology corporations. At the same time, those national champions have further integrated the market without bringing more stable food prices, ultimately reducing the number of small farms and failing to boost citizens' confidence in food safety and security.

Transitioning from an entirely self-regulated market, the State incorporates an intensified regulatory framework that compels technology platforms to share more responsibilities and liabilities with food producers and entities. It also relies on the hope that more significant risk will force food producers and enterprises to self-regulate and behave over the fear of the consequence of allowing unsafe food onto the market. In 2015, the State Council stated that third-party technology platforms need to record and review the information submitted by food providers to their platform. Technology platforms are responsible for identifying food providers' abnormal behaviours, ceasing their operation, and reporting all food violations to government institutions.²⁶ In 2017, the *Thirteenth Five-year Plan* elevated the remote supervision requirement, promoting the employment of traceability, big data, and innovative technologies. It offers legitimacy to escalating, reinforcing, and normalizing the datafication process as the pillar and foundation of the Chinese food traceability system.

Furthermore, the *Amended Food Safety Law* (2018) specifies that technology companies can be fined up to 200,000 yuan (\$39,215) if they fail to regulate, report, or suspend problematic food producers on their food traceability e-commerce platforms and compensate consumers (Section 62,

²⁵ Increased from 85.6 (\$17.4) to 150.5 yuan (\$28.94) between 2015 and 2019.

²⁶ The State Council of the People's Republic of China. (2015). Food Safety Law of the People's Republic of China.

Section 131). In 2020, the *State Administration for Market Regulation* formulated guidelines to strengthen the supervision of online live broadcast of marketing activities. Essentially, the online platform needs to follow advertising law and act as an advertising carrier. Platforms are not only liable if they fail to regulate, but they are also responsible for compensating consumers when food safety violations occur. On the other hand, technology companies are protected by law to collect back payments for food safety violation fees incurred by food producers operating on their platforms since 2015. Despite the newly implemented law, regulation, and national automatic regulation channel, food enterprises and technology corporations still take the primary responsibility and carry out self-regulation practices²⁷. It also gives technology companies more power to control other companies or food producers who rely on their platforms to survive.

On the heels of the intensified regulatory responsibilities, added liabilities and risks, the central state and technology corporations' entangled relationship has become even more robust, and the national economic reform process these developments entail gradually deepened. The CEO of Alibaba, Yun (Jack) Ma (2017), for instance, points out the tightly interlinked fate between government policies and platform development: "[t]he political and legal system of the future is inseparable from the internet, inseparable from big data" (para. 8). In alliance with the State's aspiration, technology companies get abundant business opportunities from innovative technology development strategies. Formulating a lucrative digital agriculture economy is part of the equation. The State Council (2015) spurs technology corporations to manufacture food products with added value²⁸ and premiums through a food traceability system (Section Three). Besides, to promote

²⁷ Like the State Council, the State Food and Drug Administration, and the Ministry of Commerce, various government entities repeatedly announced that technology corporations take the primary self-regulated role in the food traceability system (2015, 2017, 2018, 2019).

²⁸ Added value refers to additional traceability information; in this case, this thesis will introduce gamification, socialization as additional values that platform mechanisms carry in order to retain active consumers.

the *digital economy* and *one-click traceability* technologies, several government authorities, like the Ministry of Commerce, began cooperating with JD to develop the *JD Quality Traceability Anti-Counterfeiting Alliance* in 2017. Thus far, the food traceability's legal framework has catalyzed the national economic transformation from one that has focused on pursuing export-driven business to one focused on fostering domestic consumption capacity and developing consumer markets in China. The Ministry of Commerce (2020) states that all of this legislation contributes to Chinese economic restructuring (p. 107).

The historical trajectory and analysis of the food traceability system's legal framework is an indispensable and irreplaceable solution for our new food consumption mode. As the regulatory framework gradually shifts from encouraging the application of food traceability technologies to their mandatory adoption for food producers and restaurant businesses, we enter into a critical juncture that will determine the food traceability system's long-term development. Moreover, the intensified regulatory framework only provides the platform with more power. Promoting food products with traceability information and meticulously designed marketing strategies reflect the Chinese government's hope that it can foster new poles of economic growth that will be in the Chinese government and tech giants' best interest. Lastly, the food traceability system will act as part of the latest innovative technology engine, a certainty machine, to advance the technological nationalist discourse that China aspires to trumpet on the global stage.

Table 1*The Historical Development of the Chinese Food Traceability Law²⁹*

Year	Institution	Law/ Regulation/ Recommendation	Key change
2009	The 11 th National People's Congress	The Food Safety Law of the People's Republic of China	- Ensure the authenticity of food purchase inspection records and keep them for two years at least.
2010	Ministry of Commerce, and Finance Department	Notice on Guiding Opinions on the Pilot Construction of the Traceability System of Meat and Vegetable Circulation	- Start to build ten food traceability trial cities. - Use consumer feedback to facilitate change. - Use marketing strategies to guide the consumer to favour traceable food products first. - Food traceability corporation needs to have more than 20 million yuan registration capital.
2011	Ministry of Industry and Information Technology	Food Product Industry Twelfth Five-Year Development Plan	- Prioritize the food traceability development of essential food products, such as milk powder, meat, vegetables, alcohol, and health products. - Promote the application of the Internet-of-Things in food production corporations.
2012	The State Council of the People's Republic of China	Decision of the State Council on Strengthening Food Safety Work State Development (2012) No. 20	- Accelerate the construction of the food traceability system. - Establish a unified traceability method and technical platform. - Improve the convenience and effectiveness of the traceability system.
2013	The State Council of the People's Republic of China	Notice of the General Office of the State Council on Issuing the Priority Work Arrangements for Food Safety in 2013	- China Mobile and other institutions to collaborate and develop infrastructure to complete the food traceability system's design by the end of 2013. - Speeding up the construction of the food traceability system - Aim to achieve real-time traceability at national level
2014	The State Council of the People's Republic of China	Our country's meat and vegetable circulation traceability system pilot program has covered 50 cities	- Include 2000 distribution companies - Tracing one million pieces of information daily - Implement the food traceability program in 50 pilot cities.

²⁹ This table includes a compilation of sources from government websites and reports. Please see Appendix 4 for a complete list of 26 documents reviewed here.

Year	Institution	Law/ Regulation/ Recommendation	Key change
2015	The State Council of the People's Republic of China	Food Safety Law of the People's Republic of China	<ul style="list-style-type: none"> - Establish food traceability law for the first time - The State encourages food producers to use information technology to collect and retain information on food production and operation - Third-party platforms need to record and review the information submitted by food providers, cease operation and report food violation to government institutions - Food safety violation fine can be set between 50,000 to 200,000 yuan - Consumers can claim compensation from the third-party platform when they encounter food safety violations, and the platform can recover the loss from the food producer.
2015	Shanghai Gov.	Shanghai Food Safety Information Traceability Management Measures	<ul style="list-style-type: none"> - Impose a fine of 5,000 to 20,000 yuan when food producers or operators upload false information.
2017	Food and Drug Administration	Guiding Opinions on Carrying out the Traceability Standardization of Important Products	<ul style="list-style-type: none"> - The goal is to achieve a standardized food traceability system by 2020.
2017	The State Council of the People's Republic of China	The State Council's issue of the "Thirteenth Five-Year" National Food Safety Plan	<ul style="list-style-type: none"> - Establish a national food traceability system - Encourage consumer compliance through a national channel with potential reward - Corporation should take primary responsibility and provide traceable food information - Cultivate "internet +" food and restaurant remote supervision
2018	Ministry of Agriculture and rural affairs of the People's Republic of China	the comprehensive promotion and application of the safety traceability management information platform	<ul style="list-style-type: none"> - Link food traceability system with agricultural brand selection, agricultural product certification, and agricultural exhibitions, and launch them as mandatory work. - Apply the "National Traceability Platform" nationwide. - Promote traceability management in the whole process of edible agricultural products.

Year	Institution	Law/ Regulation/ Recommendation	Key change
2019	The State Council of the People's Republic of China	Opinions on deepening reform and strengthening food safety work	<ul style="list-style-type: none"> - Apply the strictest punishment - Promote "Internet + Food" supervision - Implement smart supervision with the application of big data, cloud computing, the Internet of Things, artificial intelligence, and blockchain technologies
2020	State Administration for Market Regulation	Guidelines for Market Regulation on Strengthening the Supervision of Marketing Activities through Online Live Broadcasting	<ul style="list-style-type: none"> - Online platforms that provide the paid service of guiding customer flow and other services for commodity suppliers shall fulfill the advertisement carrier's responsibilities and obligations.

3.2 Divide and Devour: Big Players of the Chinese Food Traceability System

Stiffened food traceability laws and regulations have stirred up anxieties and disputes about whether increasing platform responsibility and adding financial liabilities could give the tech companies incentives to avoid carrying the food business section on their platform.³⁰ Instead of dropping the food traceability sector from their platform, however, *Alibaba*, *Tencent*, and *JD*, have gradually integrated the entire food supply chain into their operations and heavily invested in or swallowed up other food traceability companies as well as other food-related or diversified businesses. Extensive integration and diversification help technology corporations to assemble a certainty machine for more control, less risk exposure, more data accumulation, fewer expenses, and better platform ecosystem optimization. Through their use of the seven platform mechanisms identified in the last chapter—*integration*, *diversification*, *datafication*, *automation*, *commodification*, *socialization*, and *gamification*—the three technology giants have penetrated deeply into the food traceability system and many other areas of our life, all in alliance with the state's encouragement and guideline.

³⁰ This debate has been ongoing since 2013 but was not a high-profile case for palpable political and economic reasons (Lin & Zeng).

3.2.1 Integration and Diversification

This section will map out how technology giants embed the food traceability sector in their massively integrated business structure, infrastructure, and platform ecosystem to maximize their profit, sustain their market domination and balance the state requirements. Their investment and acquisition trajectory elucidates how their business structure creates linkages between various business sectors. Instead of merely constructing the food traceability technologies, maintaining the food traceability system, and optimizing the food traceability business model, technology giants are also tightly involved in telecom services and many other business sectors. It gives them unfair advantages to create the economy of scale on both the demand- and supply-side of the food traceability technologies and many other related and diversified businesses in their platform ecosystem, which also creates network effects. Technology corporations strive to synchronize data from farm to table, from online to offline, from land to space and conduct evaluation and revelation through seamless integration. Hence, this section strives to illuminate the "big three" Chinese technology companies' business strategies in integrating and utilizing the linkage between the upstream and downstream markets.

In June 2020, the Ministry of Commerce published the *E-commerce Report*, which asserts that technology cooperation and heavy platform integration, such as *Alibaba*, *Tencent*, and *JD*, have driven the food traceability system's massive growth. The report commends the technology giants' ability to identify market demand accurately, integrate it all into one channel, reduce delivery time and production costs, elevate agriculture to 'agri-future', renew farm tools by linking them to digital devices, and effectively "directing consumer traffic" online (p. 104). However, a survey from 2018 attests that less than one-quarter of people aware that the food traceability system even exists (Chen et al., 2018, p. 696). Based on the Ministry of Commerce PRC's (2020) *E-commerce Report*, 900

million Chinese Internet users contributed 34.81 trillion yuan (\$6.8 trillion) of national e-commerce transactions last year (p. 1). Online food retail only accounts for 1% (0.544 trillion yuan/ \$0.11 trillion) of the transaction volume. Despite the blooming development of the food traceability system, the digital food economy only accounts for 7.3% of the whole Chinese food economy, according to the Ministry of Agriculture and Rural Affairs of the People's Republic of China (2020, p. 6). It projects that the digital food economy's revenue will increase by 10.8% annually (p. 10). At the same time, Taobao claims growers had switched 90% of food to the online channel,³¹ making it essential to look into the food traceability system's scale and compare it against different sources.

Regardless of the contradicting number and potential increase, constructing a food traceability system has other alternative ends than mere economic interest. Especially since the average Chinese consumer is also unwilling to pay for the food traceability features of the food they buy, merchants still rely on the conventional food market, in contrast to government and technology corporations' hopes for a mass migration to the highly technologized food system. As discussed in the previous section, the government advocates a consolidated market to replace the small and distanced farm operation. It legitimizes technology corporations to pursue integration and upgrade the entire food supply chain with cutting-edge technologies. The food traceability system is also one link of the national information society or platform society. Without addressing the real issues caused by food safety, capital's endless pursuit for vertical and horizontal integration to extract values drives the Chinese food traceability system's development.

The following section maps out three technology giants' integration process and the critical link in the food traceability system.

³¹ See Hao. (2020). Live-streaming helped China's farmers survive the pandemic.

3.2.1.1 Alibaba.

Table 2

*Alibaba's Food Traceability System and Sector Development*³²

Year	Key junctures
2012	- Open <i>Vertical Mall</i> which promotes organic produce and establishes <i>Taobao's Agriculture Development Department</i> .
2014	- Announce the rural development strategies: - Initiate the <i>Rural Taobao</i> platform, which sells seeds, fertilizers, pesticides, farming machines, etc; - Launch the <i>Jutudi</i> (聚土地) project, which allows consumers to custom order a piece of farmland dedicated to grow the food need to meet their individual needs. The farmers will harvest and ship food from the land to consumers on a bi-weekly basis; - Alibaba's Ecological Resources Institutions provide direct "guidance" over selecting plants, improving efficiency, and maintaining supply chain management and integration; - Build a dual-direction channel in <i>Rural Taobao</i> , which allow the farmers to purchase and sell products; - Launch the <i>Blue Stars Program</i> . Refer to QR code as the "dotless visual code"; - Provide worldwide traceability through <i>China Smart Logistics</i> ; - 500% surge in imported food sale on the <i>Tmall</i> platform.
2015	- Turn QR code from a counterfeit crime-fighter to "customer-engagement campaigns"; - Facilitate the <i>Quality Manufacturing Program</i> , and promote the transformation from "made-in-China" into "created-in-China"; - Actively assist law enforcement to seize more than 300 counterfeit factories.
2016	- Collaborate with <i>Wuchang Government</i> and promote the first <i>rice traceability code</i> .
2017	- Invest in <i>China Unicom</i> (4.3 billion, 2%); - Build <i>Food Trust Framework</i> , the new retail-driven e-commerce closed circle food tracking system, in Australia, New Zealand, and Japan; - Inaugurate <i>Tmall global traceability</i> - <i>Ant Blockchain Traceability</i> operates as a service provider. - Australia and New Zealand's infant milk products participated in the <i>Ant Blockchain Traceability</i> project.
2018	- Blockchain for corporate service; - Activate membership service: 88VIP (RMB 88-888/yr) cooperate with 400 brands and seven businesses within the Ali ecosystem; - <i>ET brain</i> use AI, data analysis, and IoT to raise pigs; - Initiate the <i>Sustainable Farming Programme</i> with <i>Bayer</i> and <i>XAG</i> to construct a new agricultural concept that can maximize the effectiveness and protect the environment with technology; - Implement large-scale standardization, premium brand promotion, first-class transportation, and integrated ecosystem over 6660 square footage farmlands. It targets

³² This table includes a compilation of sources from corporate report and announcement. Please see Appendix 2 for a complete list of websites and documents reviewed here.

Year	Key junctures
	every farmland footage to make a one thousand dollar profit of the food traceability premium produces.
2019	- Collaborate with the <i>Zhejiang government</i> to optimize smart agricultural system;
	- <i>Hema mobile app</i> allows the consumer to trace food from farm to store.
	- Establish the <i>Digital Agricultural Sector</i> , which builds 1000 food traceability technology-supported digital agriculture bases over the nation
	- Collaborate with the <i>China Broadcasting Network International</i> to develop smart ecosystem;
2020	- Work with 100 local TV stations, such as <i>China Central Television, Zhejiang TV, China Broadcasting Network International and National Radio and Television Administration</i> to curate and promote rural livestream with professionally generated content.
	- Built <i>logistics mini package food traceability</i> system to monitor potential Covid contamination;
	- The number of senior shoppers spikes by 300%.

Alibaba was founded in 1999 and listed on the Hong Kong Stock Exchange and New York Stock Exchange respectively in 2007 and 2014. It has adopted three core business pillars to recognize the increased importance of these developments in the food traceability system to its business: *rural e-commerce, information and data technology transformation, and global expansion*. As exhibited above in Table 2, Alibaba started to lay the foundation for its technology-based premium food and rural Empire in 2012. Compared to Tencent and JD, Alibaba had a two-year head start. Even though e-commerce service (See Figure 3) that includes business-to-business and business-to-consumer has declined from 82% to 67.7% of Alibaba's total revenue from 2011 to 2020, it is still Alibaba's major revenue stream. With a concentration on food business development, Alibaba established a separate local consumer service company (本地生活) with 3 billion initial investment in October 2018.

Figure 3

Alibaba Revenue by Segment from 2015 to 2020 (in millions RMB)

Alibaba's integration and expansion of the food traceability system and food business create a path dependency so that its food market consolidation process will achieve economy of scale. Inside the intertwined platforms ecosystem, Alibaba established rural farm-to-fridge service *Jutudi*, the e-commerce platform *Rural Taobao*, and delivery service *Ali Express* play an essential role in driving Alibaba's rural e-commerce growth before 2014. Further, to expand the size of the food traceability platform and active user base, Alibaba has pursued a strategy of horizontal integration through its investments in several e-commerce grocery stores *SuFresh* (*Suning* 苏宁), *Sun Art Retail* (高鑫零售), *Yiguo* (易果生鲜), and *Nicetuan* (十荟团). Its approach to vertical integration builds Alibaba's dominant position in the food and rural e-commerce market. From direct procurement

sources to logistics chain, supermarket, and delivery services, Alibaba has invested in the rural grocery chain *Sanjiang* (三江购物), a seafood marketplace *GFresh* (极鲜网), hypermarket chain *RT-Mart* (大润发), logistics chain *Best Logistics* (百世), and rural retail service platform *Huitongda* (汇通达). It has also invested in food delivery service *Ele* (饿了么), express delivery *ZTO Express* (中通快递), underserved market delivery service *Fengniao* (蜂鸟), suppliers *Kaiyuan* (开源), store chain *Intime Retail* (银泰), grocery chain *Hema/ Freshippo* (盒马鲜生), and local services *Koubei* (口碑). After making its massive investments in food traceability-related technologies and industries, Alibaba's newly developed local consumer services swiftly made 25,440 million yuan (\$4,988 million), which counted for 5% of its total revenue after only established for over a year (AR, 2020, p. 120). Food traceability systems attempt to trace every circle of food production, and Alibaba works to integrate every circle of the food and technology industry.

E-commerce is one way for food traceability systems and corporations to profit; Alibaba also profits from providing information and data technologies to support food traceability systems and sell to other food merchants. With a solid foundation in information technologies and services like cloud computing *Ali Cloud*, retail technology *Shiji* (石基), intelligent car operating system *Banma* (斑马), communication platform *Ding Talk*, and *Ali Telecom*.³³ Alibaba further enlarged their impact by acquiring app analytics firm *Umeng* (友盟+), Israel VR code maker *Visualead*, and logistics data platform operator *Cainiao Network* (菜鸟). On top of that,

³³ Ding talk and Ali Telecom were established in 2014. This thesis will expand on their function and relation with the food traceability system in section 3.2.1.4.2 Telecom and Common Carriage.

Alibaba integrates the buy-side and sell-side of the e-commerce market, amplifies traceability technology for commercial applications, and actively promotes the national code economy. Alibaba traces food and location data in various distribution channels while integrating with Alibaba's cloud-based traceability system. In 2019, Alibaba's cloud computing revenue had exceeded their international commerce retail revenue to become the second-highest portion of Alibaba's business structure. Revenue for its cloud computing division has increased from 650 million yuan (\$110.16 million) to 40,016 million yuan (\$7,846 million) from 2013 to 2020 and accounts for 8% of the total revenue. At present, 67.7% of Alibaba's revenue stems from e-commerce business services, but cloud computing revenue soared 31-fold between 2015 and 2020. Moreover, international commerce revenue also rose 14-fold during the same period and accounts for the second-highest revenue portion (see Figure 3).

Alibaba holds a firm grip on information infrastructure and tight relationships with government institutions. First, to facilitate the development of the local business district, the Chinese government give Alibaba 388 million yuan (\$65.7 million) to 998 million yuan (\$195.68 million) grants from 2013 to 2020, but only counts 0.4% to 0.1% of Alibaba's total revenue (see Figure 3). On the other hand, Alibaba also invested in government-funded infrastructure companies. For instance, Alibaba has invested in *China Unicom* (中国联通)³⁴ and PRC-based smart city *China Transinfo* (千方科技). Further, Alibaba collaborates with various local governments to construct a food traceability system that runs entirely through the Alibaba ecosystem. The Wuchang Government, for instance, sells *Wuchang rice* in Tmall, uses Cainiao delivery, and gains their consumer insights through Ali Cloud Intelligence Brain. This aggressive integration process in data analytics, platform,

³⁴ Alibaba invested 6.37 billion yuan (\$1.2 billion) in China Unicom, but it only counts 5% of China Unicom's stock share.

technology and telecom industries composes the crucial infrastructure and network that food traceability systems need to expand. In the name of empowering farmers, elevating food safety concerns, and connecting the last miles, Alibaba has integrated a comprehensive offline food business and online platform into one data trove to cement their dominant position in the food traceability system.

3.2.1.2 Tencent.

Table 3

*Tencent's Food Traceability System and Sector Development*³⁵

Year	Key junctures
2013	- Huateng Ma, CEO of Tencent, proposed the “Internet Plus” concept
2014	- Announce rural development strategies; - Reach strategic cooperation with <i>JD</i> .
2017	- Collaborate with <i>China Unicom</i> (own 5.2%) to formulate intelligent revolution; - Construct 木星云 (Jupiter Cloud/ Tencent Cloud), which provides eight custom made food traceability designs and operates within the Tencent ecosystem; - Place infrastructure and data centers in three coastal regions to support the government's central food traceability system.
2018	- Launch <i>JD Blockchain Open Platform, BaaS</i> (Blockchain as a service/Smart Treasured Chain) - Host the <i>Autonomous Greenhouse Challenges</i> with the Tencent AI Lab and Wageningen University
2019	- Construct <i>Smart Agriculture Platform</i> ; - Publish ant traceability service, <i>TaaS</i> ; - Announce the merchants accessible <i>One Product One Code</i> System; - Develop “smart fresh hundreds of billion plan” with <i>Miss Fresh</i>
2020	- Raise <i>five standards</i> , premium quality, high yield, low energy consumption, full automation, and technology transferability, for the smart agriculture platform. - January 22, added in app live streaming function - Use iGrow simulator to improve yield and quality of the crop, optimize planting strategy, and achieve full green house climate control - Partner with leading industries and institutions, such as the Chinese Academy of Agricultural Sciences, Chinese Oil and Foodstuffs Corporation (COFCO), and Zhongkai University of Agriculture and Engineering, in building smart agriculture

³⁵ This table includes a compilation of sources from corporate report and announcement. Please see Appendix 2 for a complete list of websites and documents reviewed here.

Tencent was founded in 1998. Like their business model, Tencent constructs and contributes to the food traceability system by providing value-added services (VAS), promoting fintech, business services, and online advertising (See Figure 4). First, value-added-services like video games and digital content subscriptions provide a large user base embedded in the Tencent platform ecosystem and account for most of their business revenue. The gamification design of the food traceability system and WeChat short video play a decisive role; nevertheless, VAS revenue declined from 80% to 53% of Tencent's total revenue between 2014 and 2019. Meanwhile, revenue from FinTech and business services grew from 23% to 27% between 2018 and 2019. This suggests that Tencent is turning its business focus towards FinTech and business services, such as blockchain, traceability, cloud technology as a service, and the innovative agriculture platform that it has been building. Together, these newly segmented activities saw a 39% revenue increase in one year and obtained 101,355 million yuan (\$19,491.34 million) in 2019. Tencent has also been heavily investing in other technology corporations to advance the platform application scenarios, such as agronomic modelling *Phytech*, the electric vehicle company *Tesla* and flying vehicle *Lilium*. Most significantly, Tencent has also invested in e-commerce platform *JD*, *Meituan*, and *Pingduoduo*, which all carry food traceability and simultaneously invest in the same food retail *Xingshengyouxuan* (兴盛优选). With one million paying Tencent cloud consumers on its platform, WeChat has taken the lead in enabling and enacting the digital discourse in the food traceability system. Bingchun Meng (2018) concurred that WeChat act as the information infrastructure driving the accelerated innovative technology to take-off. It also stimulates the transformation of the mobile internet's extensive business.

Figure 4

Tencent Revenue by Segment from 2014 to 2019 (in millions RMB)

Unlike Alibaba, Tencent is not directly selling food traceability products on their platform. However, Tencent has also invested in multiple food supply chains to gain a more active user rate and expand offline market influence to increase platform dependency. Tencent invested in *Miss Fresh* (每日生鲜), which have 25 million monthly active users in a WeChat mini program e-commerce account. Aside from harvesting numerous online active users' data, Tencent also assists Miss Fresh in expanding 10,000 logistics warehouses in over 100 cities to support offline service and delivery. Concurrently, it grows investment in various community food retails, such as *Xingshengyouxuan* (兴盛优选), *Yipinshengxian* (谊品生鲜), *Yonghui* (永辉超市), which are all equipped with WeChat QR code pictures in store for a quick scan that reconnects back online.

Tencent provides food traceability businesses consultation, system designs, mini-program models, cloud technology supports, diversified traceability product marketing solutions, and integrates other food traceability e-commerce platforms instead. To give a sense of its impressive size in this domain, consider, for example, that there are only 112 food traceability apps on Apple's App Store, while there are 334 food traceability e-commerce mini-programs on WeChat. There also 2.4 billion mini-program e-commerce accounts³⁶ and 11 billion daily active WeChat users. In the Tencent annual report (2020), the WeChat mini-program manifests tremendous value with more than 800 billion RMB (\$156.86 billion), and Mini WeChat Pay has one billion daily commercial transactions, from which Tencent takes a 0.6 to 1% cut. Subsequently, the more WeChat moments, mini-programs, and official accounts there are, the more advertising revenue there is, and the more merchants pay for cloud and traceability services. Even though online advertising only accounts for 18% of Tencent's total revenue and has a slower increase rate than Fintech business services, food merchants have swarmed to build food traceability products in the Tencent platform.

Tencent Cloud (腾讯云) also provides technology services to food technology companies like *CES (追溯云)*, a massive company that accounts for 40% of the government-sponsored food traceability market. Tsinghua University and Tencent (2020) have also jointly published the Code Economic report, which shows that the Tencent platform ecosystem generated 8.58 trillion yuan (\$1.65 trillion) of the 35.8 trillion yuan (\$6.88 trillion)³⁷ total in the digital market. The dense integration between the various arms of the diversified Tencent information technology

³⁶ Complementors, like food merchants, individual producers, or established big corporations, custom make mini-program within WeChat. They can add various functions within e-commerce stores, link them to their WeChat public account, WeChat live streaming account. WeChat also provides service to design mini-program for them, and promote their account and sale for advertisement fee in various Tencent platform ecosystem that eventually links back to their mini-program e-commerce store.

³⁷ See China Academy of Information and Communications Technology's (2020) Digital economy development in China. The digital economy accounts for 36.2% of the national GDP (p.3). Tencent counts 23.9% of the national digital economy market.

conglomerated and its booming expansion has helped Tencent link other food traceability platforms with a high level of active user rates into their platform ecosystem. This thesis only takes a close look at one big food traceability carrier, JD, under the Tencent platform umbrella.

3.2.1.3 JD.

Table 4

*JD's Food Traceability System and Sector Development*³⁸

Year	Key junctures
2012	- Open <i>200 poverty alleviation local specialty malls</i> on JD.com.
2014	- Announce <i>rural development strategies</i> .
2015	- Initiate the <i>PLUS membership</i> (RMB 299/yr) with five levels to promote products within the JD platform ecosystem.
2016	- Launch the <i>running chicken, running mountain pig, swimming duck, and flying pigeon</i> food traceability projects.
2017	- Deliver local food through a <i>self-operated logistics network</i> ; - Build <i>JD anti-counterfeiting food traceability alliance</i> with government institutions like the <i>Ministry of Commerce</i> and collaborate with <i>Inner Mongolia</i> ; - Fully initiate <i>global traceability system</i> (collaborate with Holland, Germany, Ireland).
2018	- Blockchain in <i>Transport Alliance</i> ; - Running chicken Imitative provide full traceability with Blockchain technology; - Teamed up with <i>50 partners and local government</i> to cultivate a new smart agriculture industry with “cost-effective” technologies and transparent information; - Link <i>Skynet (天网)</i> base to regional government regulation network;
2019	- Set up 17 <i>smart agriculture farm</i> and sale was up 50%; - Set up intelligent cattle, sheep, aquaculture, birds, and AI pork.
2020	- JD holds second <i>annual agriculture forum</i> ; - Smart JD farms more than doubled to 40 across country - Promote the standard of <i>China speed</i> with technology-driven system. - JD formed a strategic partnership with various world-leading imported food companies at China International Import Expo.

JD began its strategic cooperation with Tencent in 2014. This has contributed to a high monthly active user rate and seamless mobile shopping experience within one platform ecosystem.

³⁸ This table includes a compilation of sources from corporate report and announcement. Please see Appendix 2 for a complete list of websites and documents reviewed here.

JD's commission services revenues increased from 261 million yuan (\$50.1million) to 399 million yuan (\$76.73 million) from 2017 to 2019 on the Tencent platform. Meanwhile, the Tencent ecosystem advertising fee and online payment transaction fee that JD pay to Tencent increased from 675 million yuan (\$129.8 million) to 2222 million yuan (\$427.3 million) during the same period. The flow of revenue from the latter to the former signalled the symbiotic relationship between the two tech giants. JD has also heavily invested in the rural development plan and endeavours to convert the new "China speed"³⁹ that allow freshly picked fruit to be delivered within the same day and to eventually further shrink that to an hour.

Unsurprisingly, they accomplish it by integrating the whole food supply chain, backed up by their extensive network of 700 warehouses, logistics chains, integrated systems, and 15 million JD plus memberships. On *Singles Day in 2020*,⁴⁰ for example, consumers checked food traceability information 7.5 million times on JD. Additionally, JD is cooperating on 28 farm projects to promote overall digital agriculture and husbandry. In March 2019, JD claimed 168,821 pigs in 1692 national pig farms participated in pig facial recognition. To further expand their food market chain, JD has invested in *Jingqishen* (精气神), which owns 200,000 pigs, allowing JD to expand their self-operated chain further. In 2019, JD landed the largest single contract to convert a traditional farm to an intelligent animal raising project. For 206 million yuan (\$39.61 million), JD will help food merchants upgrade their farm with food traceability technologies, a JD cloud service system, and an intelligent biodata analytic platform. COVID-19 also steers consumers who are accustomed to brick-and-mortar stores into online shopping. According to JD's final report of *618* (2020), 220 million

³⁹Zhenhui Wang, CEO of JD Logistics, defined China speed as a technology-driven same-day delivery standard. JD.Com. (2020, August 18). JD logistics upgrades its brand a letter to employees from JD logistics CEO. JD.com corporate blog. Retrieved November 15, 2020, <https://jdcorporateblog.com/jd-logistics-upgrades-its-brand/>

⁴⁰ Singles Day also refers to Double Eleven (November 11), equivalent to Black Friday or Boxing Day.

food products were delivered from January 20 to February 28, 2020. Overall, the sales of vegetables and pork increased 160% and 229% compared to the previous year on the JD platform.

Figure 5

Revenues of Four China's Publicly-traded Internet Companies (in RMB millions)

Figure 6

Mobile Monthly Active Users of Alibaba & Tencent Platform (in RMB millions)

Table 5*Alibaba in Food-related Business (RMB, Yuan) / Alibaba Platform Ecosystem**(Alibaba's current ownership or investment amount or acquired equity percentage)*

1st Inve st year	Cloud computing, other technologies, telecom	Digital Platform (E-commerce, high-DAU platforms)	Offline store (supermarkets, transportation, produce, farm land, factories, supply chain etc))	Other (Insurance, finance, payment, social media, entertainment)
2020	Banma (intelligent car operating system, 50%)	Nicetuan (food mini program, Ali invested 294 million) <u>1.5 million yuan (\$230,000) were fined by State for improper pricing</u>	Hema/ Freshippo (555 direct procurement sources)	Weibo (30%, the second largest shareholder) InTime retail (live-streaming)
2019	China Transinfo (PRC-based smart city; 15%)		STO Express (49% equity interest) Fengniao.ele.me	Focus Media (media network for advertisement, 23%)
2018	Shiji Retail (38%)	Local Services Holdco (integrate Koubei and Ele); Kaiyuan (acquires with 3.4 billion); Huitongda (rural online service platform; 4.5 billion; 20%)	Ele (purchased 9.5 billion) Huitongda (invested 4.5 billion) ZTO Express (8%)	Wanda Film (8%, 4.7 billion)
2017	China Unicom (4.3 billion, 2%) Cainiao Network (100%)	Ele (purchased 47.82 billion in 2018) RT-Mart (Darunfa, invested 22.4 billion, own 49%)	Sun Art Retail (52%) Best Logistics (28%) GaoxinLingshou (20.9%) SanJiang (ruralshopping 32%)	
2016		GFresh (120 million)	Hema/ Freshippo	Youku(4.6billion) SCMP
2015	Visualead (purchased, colorful code, VR code for shopping)		Suning (SuFresh, 19.99%)	Ali Music
2014	Ali Telecom; Ding Talk	Rural Taobao		Ant Group (micro finance)
		Jutudi (invested 10 billion)	Intime retail (acquired 17.8 billion in 2018)	
2013	Umeng (acquired 80 million)		Yiguo (2 billion, 38%)	ZhongAn (13.54%)
2010		Ali express		
2009	Alibaba Cloud			
Before 2008		Tmall(<u>fined by state for improper pricing</u>); Taobao; 1688; Aliexpress	Juhuasuan	Alibaba security; Ali Pay

Note. year reflect on the first time Alibaba invested in the sector of business or specific companies.**Source.** compilations from annual reports and investor telephone meeting records, see Appendix 2

Table 6

Tencent-centered Platform Ecosystem Food Related Business and Investment (RMB, Yuan), (Tencent, JD, Meituan: TJM)

1stIn vest year	Cloud computing, other technologies, telecom	Digital Platform (E-commerce, high-DAU platforms)	Offline store (supermarkets, transportation, produce, farm land, factories, supply chain etc))	Other (Insurance, finance, payment, social media, entertainment)
2020		Xingshengyouxuan (TJM, biggest investor)	Xingshengyouxuan (TJM, unknown)	Tim Hortons (over 1 billion, undisclosed specific number)
2019		XiaoePingping (Tencent) Shixianghui (T, food e-commerce 5%, <u>fined by state for improper pricing</u>); JD Marketing 360 Platform; Yipinshengxian (T, 2 billion);Guangdong Yihao Food Stuff (M, unknown) Meituan Maicai	Ixiancheng (T, Unknown) IPIEN(T, farmland and supermarket20%) Miss Fresh (T) Yipinshengxian (T, 2 billion) Guangdong Yihao Food Stuff (T, farm and full smart ecosystem,unknown) Meituan Maicai	Kepler (JD, technology service) Cloud View Cultural Travel (Tencent opened with China Unicom, unknown %)
2018	NeuHub open AI platform (JD)	JD Nongfu (JD, connect producer with drone manufacturers) JD farm	XiaoXiangShengXian (M, unknown) 7Fresh (JD, community delivery) Jingqishen (JD, pig farm, 9.43%)	Wanda (JD, commercial properties, RMB5 billion) JD smart speaker
2017	China Unicom (Tencent5.20%) China Unicom (JD, 2.40%) JD logistics Tesla (Tencent, 5%) Phytech (T, \$11 million agronomic modeling)	Yonghui Cloud (T, 5.05%) Meituan (Tencent, 20.1%) <u>fined by state for improper pricing</u> Yihaodian marketplace, mobile app,web (JD-Walmart) Weipinhui/VIPS.N (TJ combined as biggest shareholders, 17.1%) <u>(fined by state for improper pricing)</u>	Yonghui Supermarket (Tencent, 5.05%) JD logistics, JD digits,	WeGame; Weixin Mini Programs; JD Digits (consumer financing) Lilium (flying vehicle)
2016		Pingduoduo (Tencent, 16%) <u>fined by state for improper pricing</u>		
2015		Dada (JD, local on-demand retail and delivery, 47.5%) TianTianGuoYuan (JD, uk)	JingDongDaoJia/Dada (JD, 47.5%) Yonghui Supermarket (JD, 12%) MeiriShengxian(Tencent, unknown)	Tuniu (JD, travel, 21%)
2014	JD mobile (collaborate with China telecom)	JD (Tencent, 17.9%)	ZhongAn Online Property & Casualty Insurance (T, 10.21%)	
Before 2013	Tencent Cloud, JDCloud			Weixin Official Accounts

Note. Compilations from annual reports and investor telephone meeting records, see Appendix 2

3.2.1.4 Alibaba and Tencent Platform Ecosystem.

After getting to know the scale of the integration that those three big tech companies took in the food industry and diversified areas in the past decade, this following section will compare the intense competition between the Alibaba platform ecosystem and the Tencent platform ecosystem in the food traceability system (see Table 5 & 6). They share some comparable attributes in their integration model, as all three companies invested in food traceability technologies, digital food e-commerce platforms, offline food stores, logistics chains, and diversified other areas. In contrast, Alibaba made more investment in technology industries; Tencent focuses on integrating other big technology companies, like JD, Meituan and Pingduoduo, into their platform ecosystem and foster symbiotic relationships.

First and foremost, it is imperative to demonstrate how both platform ecosystems cultivate integration through platform design, which serves to direct and generate consumer traffic from one site to another, from online to offline, and from offline back to online. Next, both platform ecosystems invest in and entangle with telecom companies and businesses, which gives them an unfair advantage in market competition. Moreover, they both extended and diversified the food traceability models into other business sectors to expand their market profit and domination. Finally, both claim their sophisticated platform and high integration level contribute to improved efficiency and convenience in Chinese society; nonetheless, this is an efficiency trap. Their intensified monopolization makes it easier for them to abuse their power and prioritize their capital interests over public interests and environmental impacts.

3.2.1.4.1 Integration by Design

Alibaba's Alipay and Tencent's WeChat Pay each integrate their platforms' networks and traceability technologies into one gateway to allow in-depth consumer management, retain consumers longer, enhance code integration, and direct offline and online traffic.

Alipay, for example, integrated their payment code with their food traceability code to promote the *Traceability as a Service* (TaaS) model in the food traceability system. This model enhances the connections and interactions between consumers and users, in turn, Alibaba (2020) claims it boosts transactions and content consumption. Instead of waiting for the consumer to look for the traceability information, integration design makes it an unavoidable step. It has wrapped up the food traceability system as the perfect marketing tool that food merchants should adopt. First, based on Alibaba's *Antblockchain* technology, if food merchants want to add *TaaS* to their food traceability system, it costs from 250,000 yuan (\$49,019) to 1,000,000 yuan (\$196,078) every year. The range of services includes designing, implementing, tracking, managing, and analyzing every step of the business circle from food brand, traceability system, risk management, and consumer market. Food merchants can also insert their Taobao market shop link, which will redirect consumers to shop for more when reviewing for traceability information through AliPay. Through this design, the various food traceability systems on offer shift focus from connecting consumers to their food's life story to connecting merchants to consumers' purchasing habits.

Figure 7

WeChat Pay Interface

Note. This figure demonstrates four utility needs, financial services, daily services, travel and transportation, and shopping and entertainment, all integrated in one interface.

Figure 8

JD Embedded WeChat Redirect Button in Their e-commerce Page

Note. The WeChat redirect button is circled in yellow in the figure.

Tencent also upgraded their WeChat interface design, attempts to create an ultimate one-stop convenience access center with four essential categories, *financial, daily, travel and transportation*, and *shopping and entertainment*, all embedded in the platform (see Figure 7). WeChat Pay prioritizes and directs traffic to related businesses with directly invested interests, like *JD, Meituan, and Pingduoduo* (see Figure 5, 6, 7). The effect is to increase payment volume, with WeChat generating 1.6 times more active users than Alibaba (Figure 6). This integrated design most certainly facilitates in-app purchases and searches, but it also redirects the consumer traffic back to the WeChat ecosystem. For instance, Figure 8 exhibits the green WeChat icon embedded in the JD food purchase interface, which will direct consumers inside the platform walled garden for more browsing and purchasing.

Seamless integration design also reaches offline activities. By luring consumers into scanning offline QR codes, Alipay can potentially connect 555 direct procurement sources, 200 supermarket chains with 1700 traceable food items, free half-hour delivery, and traceable robot restaurants within the Alibaba ecosystem.⁴¹ Tencent and JD also employ the same model to integrate AI-powered services within their respective retail ecosystems. From "One Food One Code" to "One Product One Code," the product is transforming into the online mini program's offline access point. Merchants are encouraged to offer consumer digital red packets over mini-programs for scanning QR code attached to the products. Then, Tencent promotes its customized services based on big data analytic aids built into the WeChat platform, including fully digitizing food merchants' operations with the program. According to their annual report, JD (2020) has 270,000 stores that use their software as a service platform (p. 74). Also, JD's *Kepler* technology service platform provides a one-stop service to integrate brick-and-mortar retailers into digital storefronts in the WeChat mini

⁴¹ Alibaba's *Freshippo* (盒马鲜生) is running the food supply chain.

program. In 2019, the JD marketing 360 platform launched automated AI and big data-based marketing technologies, which automate all aspects of marketing from bidding, creating, targeting to reporting. So, essential food traceability systems connect merchants with the consumer through the integrated platform design from online to offline.

3.2.1.4.2 Telecom and Common Carriage

Without critical internet connections, the food traceability system would not exist. Chinese technology giants share tangled commercial interests and integrated business structures with a Chinese telecom company, which exemplifies the unfair advantage and the potential need to include a common carriage policy. As Henry Hu (2011) emphasizes, Chinese Internet Service Providers (ISP) are not neutral, to begin with, as the state has significant ownership in all three telecoms carriers-ISPs available in China: *China Unicom, China Telecom, and China Mobile*. It is worth noting that the Chinese government made a positive effort to push for "speed upgrade and tariff reduction," which caused their revenue to decrease in 2019, based on China Unicom's annual report (p. 55). However, the current Chinese Telecommunication Regulation does not support fair access and non-discrimination behaviours.⁴² In fact, blocking keywords and controlling intermediaries are regular political and economic moves in China (p. 529). Such common practices by the Chinese state further legitimate the unfair advantages and commercial interests that Chinese telecom companies share with few technology giants.

For instance, Alibaba, Tencent, and JD (ATJ) all hold China Unicom's stock share with a combined amount of 9.6%, and each has a representative that serves as a director in China Unicom.

⁴² Like the US and Canada, Western countries debate the importance of common carriage (net neutrality) as public policy for a long time. Canadian scholars Klass, Winseck, Nanni, & McKelvey (2016) noticed that Section 27 and Section 36 acted as two "crown jewels" in the Canadian Telecommunications Act to protect fair access and non-discriminatory treatment toward data flows, content and users. Relevant cases like the Videotron Unlimited Music proceeding (2017) concluded that zero-rating's harm outweighs the merits.

Since 2017, China Unicom started a strategic partnership with Tencent and Alibaba in automatically synching cloud systems and developing advanced and integrated cloud technology networks to serve private corporations and government businesses. According to China Unicom's (2020) Corporate Social Responsibility report, ATJ operates together as a mobile virtual network operator that produces 67% of China Unicom's revenue, constitutes 80.93 million new users for China Unicom, and soared 1.46 times from 2018 to 2019 (p. 66). China Academy of Information and Communication Technology (CAICT, 2020) states that the WeChat app alone counts 6% of the national data consumption, which increased from 210.8 billion yuan (\$41.33 billion) to 273.6 billion yuan (\$52.61 billion) between 2018 and 2019. The total data consumption revenue from the WeChat ecosystem is 323.8 billion yuan (\$62.26 billion) in 2019. It also addresses that the more underserved market expansion like rural development project WeCun (为村), the more data consumption it would bring.⁴³

ATJ all carry telecom services under this interconnected relationship and leverage the zero-rating scheme to favour products and businesses within their platform ecosystem or construct their "walled garden", as Winseck (2002) states. Zero-rating refers to when an ISP charges subscribers different prices on selective programs or platforms, which have no limit or does not charge an additional premium on data consumption. However, any other usage beyond specified services would count toward data allowance or add an applicable additional charge. Researchers at the Canadian Media Concentration Research Project (CMCRP, 2020) sharply criticize the essence of the zero-rating, which they describe as "transforming carriers into publishers/editors who pick and choose what people get for "free" and what they don't" (p. 24). Some contend that a flourishing

⁴³ CAICT. (2020). White Paper-Mobile Application (App) Data Security and Personal Information Protection White Paper (p.8). CAICT. (2020). 2019-2020 WeChat and China Academy of Information and Communications Technology (p.50).

market, reasonable telecom price and diversified products can justify the high integration level and rationalize the zero-rating mechanism (Hu, 2011). However, this argument neglects the power of the monopolized market and its long-term aftermath. In this case, for merely 19 yuan (\$3.6) a month, the Tencent King Card allows unlimited mobile data usage among 200 mobile services embedded in the Tencent platform ecosystem. For 23 apps included in this package that do not belong to the Tencent platform ecosystem, Tencent either holds a substantial stock or is involved in a strategic partnership, like CCTV. This way, Alibaba and Tencent platform ecosystem each erected their walled garden with the zero-rating scheme that their integrated business and those with direct business interest can be free of additional data charge, and content outside of their walled garden will be charged additionally. It encourages the consumer to spend more time inside of their walled garden and strengthen their integration power.

Furthermore, China Unicom (2018) even links the telecom network, offline activities and online platform to provide consumer traffic directions ("微信红点引流") in this cooperation (p. 69). By utilizing data collected from land to satellite, China Unicom has created an intelligent analysis model and food traceability system for the rural government on WeChat channels and website since 2013. In March 2019, China Unicom and Tencent collaboratively opened a new innovative travel company, *Cloud View Cultural Travel*(云景文旅). It promotes 'one code travel' through the Tencent mini-program, covering all consumer travel needs from ordering food, booking a hotel, purchasing museum tickets, buying local souvenirs, and offering VR immersed travel experiences during the COVID-19 quarantine. Tencent (2020) states in the interim report that their technology and business sector enlarged 22% thanks to "greater server and bandwidth costs" (p. 11).

On the other hand, Alibaba's *Ding Talk* (钉钉卡) covers apps available on the Alibaba platform ecosystem and is designed to serve the mobile business, such as remotely watching live feeds in food factories. Furthermore, China Unicom has jointly invested in offline stores with Alibaba, deepening its entangled business interests. In 2018, Alibaba and China Unicom started a technology solution company called *Yunlizhihui* (云粒智慧), which provides a food traceability system and other technology solutions to the corporation as a complete package service, from infrastructure to customer service. They also promote technology services in their offline *Tmall Smart Life stores*. Moreover, JD also contributes to 30 million telecom service sales as China Unicom's mobile virtual network operator in 2018. China Unicom and Spanish telecom company *Telefonica* include JD as a strategic investor in the joint venture company, *Smart Steps Digital Technology Co., Ltd*, to further develop big data services in the European and Latin American regions.

Furthermore, as Van Dijck (2018) states, vertical integration's enduring influence can help the platform to sustain its dominant position and lock users in its ecosystem. Integrating the Alibaba and Tencent platform ecosystem with China Unicom infrastructurally creates path dependency to glue consumers and users inside the walled garden. Heavily integrated business interests also create an unfair advantage for those giant technology corporations. It effectively discourages users from accessing services outside of the Alibaba and Tencent ecosystem, which helps them buttress their reach into more areas of our lives and become more concentrated and enclosed. The food traceability system is embedded in the highly monopolized platform ecosystem. Therefore, technology giants have merged their commercial interests with Telecom Company, further integrating users into their enclosed ecosystem and governing them based on their political agenda and commercial interests.

3.2.1.4.3 Diversification

Areas of businesses that reside in the platform ecosystem linked to the food traceability system are multiplying. As technology corporations extend these systems into more areas of our life, they strive to monetize and datafy every move online and offline. The goal is to duplicate the food traceability system model, apply it to all products with QR code tracing function, diversify the business models, and add additional values to the services and products they carry. It also manifests the diversified business areas it covers in consumer life. Alibaba effectively used the membership system to increase subscription income and glue consumers inside the highly integrated and interconnected platform ecosystem. The Alibaba 88VIP⁴⁴ membership not only provides a discount to food products on the e-commerce platform, but it also provides access to other integrated entertainment like *Youku*, *Xiami music*, offline ticket purchase, and more than 400 other integrated services.

Furthermore, the health code under the daily services functions with the same logic as the food traceability system. JD's WeChat account, for instance, incorporates intelligent epidemic assistance for coronavirus-related information and services, which prompted citizens in over 50 cities to consult the service more than two million times in 2020. Tencent (2020) reported one billion Chinese population used the health code within the WeChat pay interface 24 billion times in 2020.⁴⁵ The WeChat mini program focuses on bolstering the business ecosystem and adding live streaming to boost e-commerce sales, like food products. By transforming every aspect of the offline sectors to the online platform, Tencent braids a giant social web to stick consumers on the platform ecosystem with path dependency.

⁴⁴ 88 VIP membership was launched on August 9, 2018.

⁴⁵ Verified in two sources: Tsinghua University and Tencent. (2020). 2020 Code Economy Report. P.5. Sina Finance. (2021). [Tencent Health Code Report](#).

3.2.1.4.4 Monopolization and Efficiency Trap

Strict food safety violation laws did not drive technology companies away from food e-commerce, but they did lead to a concentrated and monopolized platform ecosystem. Payal Arora (2019) points out an effective way to differentiate exploitative forms of commodification from the so-called 'collaboration', which is to examine "whether this is equally beneficial for the vast underclass who, supposedly for purposes of social good, have been lured into these 'inclusive' systems" (p. 70). After integrating all the food channels, JD favours their brand over other small food enterprises that depend on its channel to survive. There are 115 "Go-Go chicken (跑步鸡)"⁴⁶ for sale on JD's online Fresh market. Even though JD only runs 14 Go-Go chicken farms, it has dominated the top five sale rates and comments counts. The cheapest farm-raised chicken is on sale for 24.80 yuan (\$4.8), while Go-Go chicken from JD's farm sells for 239 yuan (\$46.86). The top five Go-Go chickens from JD's farm have more than 49,000 comments, while small farm chickens have 0 to 200 average comments. In Figure 9, all Go-Go chicken (步步鸡) with a red mark, labelled "self-operated (自营)", signifies that the chicken is raised on a JD farm. Integration and favouring platform-owned digital husbandry has accumulated more capital for JD; it also mitigates potential risks. It is easier to monitor JD employees and make sure the camera is installed instead of surveilling other companies, which leads to more integration and monopolization.

Furthermore, the Ministry of Commerce's E-commerce Report (2020) unearths that many small to medium food merchants and platforms went bankrupt because of the high cost of maintaining logistics and applying premium traceability technology to food products (p. 47). An organic farmer, Tao Zhengrong, said that adding a food traceability system to each type of product

⁴⁶ Go-Go chicken refers to chicken with a fit bit tracker on its ankle.

would cost him nearly 30,000 yuan (\$5454.54) in 2014 (Zuo, 2014). At the same period, the average rural households only have 346.01 yuan (\$62.91) as their monthly wages income. According to the latest China statistical yearbook compiled by the National Bureau of Statistics of China (2020), it increased 36% to 548.62 yuan (\$105.50) per month in 2019 (Section 6-11). Ostensibly, small food merchants are ill-equipped to absorb the high cost of food traceability designing services incurred by large technology corporations. This, in turn, reinforces concentration tendencies along the supply chain. Hence, extensive vertical integration is the best way to erect barriers to potential rivals and, thus, to drive a market towards consolidation and, in the extreme, monopoly.

Figure 9

A Screenshot of JD's E-commerce Page for Go-go Chicken

Note. This figure demonstrates JD is favouring self-operated traceable chicken over other food merchants' chicken listing.

Our environment has also become part of this commodification and datafication process in the food traceability system. Technology corporations have amassed a large amount of data across an integrated platform ecosystem that combines automated data extraction from online and offline operations. They claim that their AI and data analytic engine can generate optimal solutions that bring efficiency and convenience for operators and consumers. China Europe International Business School (CEIBS) and JD (2020) reported that 4 billion RMB labour costs and 5000 tons of paper were saved from automatic and technology management (p. iv).

Alas, instead of saving costs and energy, technology corporations tend to fall into the “efficiency trap”⁴⁷, which produces higher energy consumption and leaves a larger carbon dioxide footprint (Mosco, 2019, p. 250). Digital technologies generate a large amount of carbon dioxide and greenhouse emissions. China Unicom’s greenhouse gas emission has risen from 5.19 million tons to 13.2 million tons from 2017 to 2019. Additionally, all three technology corporations fail to report their energy consumption and annual emissions consistently and transparently. Compared to Alibaba and JD, Tencent is doing a slightly better job. Tencent started to disclose its greenhouse gas emissions (GHS) in 2017. The GHS from both Tencent buildings and data centres are still rising, with a combined emission at 855,788 tons. However, China Unicom’s greenhouse gas emission is 15 times more (see Figure 10). It demonstrates that the conflict among technology corporations acts as a distraction from the real telecom infrastructure issue in front of us. Mosco (2019) cites Christopher Hume (2018) and provides an excellent summary of the carbon footing issue, whereby perfect transparency “is a Trojan horse for technology companies. They come in under the guise of environmentalism and improving quality of life, but they’re here for money” (p. 232). While the food

⁴⁷ Mosco (2019) points out this false confidence that smart cities and other data center-oriented businesses tend to promote the concept of energy-saving but end up emit more carbon dioxide (p.250).

traceability system has yielded colossal data and capital for the state and the market, it has alarmingly come at the cost of our environment.

Figure 10

Tencent and China Unicom's Greenhouse Gas Emissions from 2017 to 2019

3.2.2 Datafication and Automization

A self-adjusting market . . . could not exist for any length of time without annihilating the human and natural substance of society. It would have physically destroyed man and transformed his surroundings into a wilderness.

—Karl Polanyi¹ (1944/57, p. 75)

The food traceability system intends to eliminate uncertainty and build perfect information by automatically connecting and datafying all aspects of the food traceability system to benefit corporations and government institutions. Even though Alibaba selects "trust" as one of the six corporate values, it describes blind trust. Without the need for supervision or verification, trust equals simplicity and efficiency and a naive faith that "what you see is what you get".

Ali Cloud optimizes the platform ecosystem connection between all integrated food sensors, satellite connections, and intelligent analysis to gain market domination and reduce risk from planet earth to outer space. Based on CAICT's (2020) *White Paper on the Development of Cloud Computing*, Alibaba (36.7%) and Tencent (11.4%) account for almost half of the total Chinese cloud computing market share. CAICT affirms that smart agriculture is the pillar of the cloud computing market (p. 29). Alibaba (2020) strives to build 1000 digital agriculture bases, lay digital infrastructure, and gain a comprehensive database to support AI-powered systems in improving productivity, increase yield production, and lower costs. Furthermore, Alibaba's Link IoT Edge and edge computing devices collect Fitbit data and other biometric data from livestock and then upload them to the Ali Cloud. The advanced application of edge computing does not require full internet coverage. It addresses the cost of bandwidth and boosts the application of Real-time Kinematic (RTK).

Alibaba did not restrain its integration on earth. They work with the Ministry of Science and Technology to store satellite images, provide instant accessibility, gain satellite connections, and conduct automatic risk detections from the sky view. They also cooperate with *XAG (极飞科技)* who set up 2,300 Real-Time Kinematic to connect with the BeiDou navigation satellite system to cover 35,000 rural villages for accurate mapping analysis, manage sprinkler drones, and other IoT sensors. According to Taobao's privacy agreement, they will use the integrated data to promote service and products, identify potential risk, and share it with relevant companies and service providers within the platform ecosystem. In the *White Paper on Blockchain Traceability Applications*, CAICT (2018) sheds light on the accelerated automation process's authentic motive. It intends to eliminate third-

party evaluation and save costs, eventually constructing a zero-trust system⁴⁸ (p. 32). Additionally, this robust technology-oriented certainty machine fails to detect food safety risks and provide a safe food environment. State Administration for Market Regulation continuously found unqualified food products during random examinations on the Taobao and Tmall platforms over a hundred times in 2020. So, food traceability systems as technology-based market solutions are trying to supersede the need for social trust to promise a more efficient certainty machine.

An automated food farm does not necessarily result in cost reduction but intends to minimize human labour. JD Digits announced an AI-powered animal raising and farming solution to boost breeding efficiency and generate more accurate and effective marketing materials to stimulate purchase. They were leveraging automatically integrated data flows, intelligent hardware, robotics operations, data analytics, and cloud computing technologies to increase scale and efficiency and to reduce inventory losses and closely monitor operation processes. As JD's Jingqishen reported, costs saved from labour and animal feed are equal to investment put into technologies. However, based on their projection, if they expand their pig farm scale, the cost-saving can become lucrative. Therefore, technology corporations maximized the automation process and minimized labour costs to pursue more capital interests while aligning with government requirements. Eventually, as the government required in the law and JD's Jingqishen (2019) reported, all product data is automatically synced with provincial traceability platforms that are then integrated into the national traceability channel. It is unclear and undisclosed how those national data will be stored and used.

Designing the food traceability system as a certainty machine works to protect corporate interests and to save costs, such as insurance premiums. In 2013, both Alibaba and

⁴⁸ 'Zero trust' suggests we cannot trust anyone or any institution. It relies on the algorithm and technical system to conduct repeated verification at all times without exception. It assigns different security scores to different technology verification. For example, facial recognition would have a higher level of access allowance than the secure password.

Tencent invested in the *Zhongan Online Property and Casualty Corporation*, the first company in China to apply IoT blockchain and facial recognition to track, record, and analyze 23 million chickens moved in the *Go-Go-Chicken* (步步鸡) project. The idea is not just to track every move of the chicken with the IoT bracelets but to reduce credit assessment costs (He, 2017). Based on Xiaowei Wang's (2020) investigation, Zhongan even tests the use of antibiotics on chicken on a bi-weekly basis. According to Zhongan's annual reports, their insurance premium income has more than doubled from 2017 to 2019, and their income from technology investment has increased 264% to 1816 million from 2018 to 2019 (p. 3). In 2019, Zhongan was rewarded with the most influential company in the agricultural industry. Like JD smart agriculture's vice manager, Jialong Li (2019) said, animal facial recognition is developed initially and primarily for the sake of insurance assessments. Further, it is mainly designed to protect technology corporations instead of consumers and citizens. Irena Knezevic (2017) proclaims when government mandates certain information or ingredient list to put on the label, it often acts as "litigation insurance" to protect manufacturer from consumer complaints (pp. 243-244). Despite the propagated claim that the food traceability system is designed to provide perfect transparency, it safeguards the technology corporations as they comply with the government mandate (Food Traceability Law, 2018, Section 19). Therefore, designated animal collars, pedometers, and facial recognition can help insurance companies assess risks, handle claims efficiently, and eliminate uncertainties as certainty machines to save corporations' costs. The government mandates food traceability information to safeguard the technology corporation instead of the consumer and citizen.

3.2.3 Commodification

The food traceability system is transforming everything within its system into a commodity. While declaring mass datafication and automation improves efficiency and generates optimum food

solutions, it produces premium food based on algorithms and decreases product diversity. It creates a demand and supply-side network effect. Then, a highly concentrated food traceability system is repurposed from being a counterfeit crime-fighter to being an integral part of customer engagement campaigns. Finally, food traceability actors have the ambition to connect the world and to deepen the market.

Initially, the food traceability system was designed to assure consumers that food was untainted. Then it was further developed into a method to commercialize and legitimize premium food products. Alibaba's vertical mall (2012) was dedicated to promoting organic food and proving that it is chemical-free and safe with food traceability technology. FAO (2019) concurred one of the reasons for the development of the food traceability system is to provide transparency evidence for "better" products like organic cotton (p. 186).

The food traceability system is advertised as the right path to achieve convenience and efficiency for the common good, but it has been designed for machines to predict and for corporations to harvest more capital. Alibaba commodified three billion products with traceability information in their platform ecosystem. Utilizing data analysis and digital food logistics, Alibaba (2018) cooperates with the Inner Mongolia government to replace a quarter of the local rice with premium rice, which is 2.45 times more expensive than the traditional rice, and it is all grown to be sold through the Ali ecosystem. They are expanding this model to predict the market demand with data analysis, then produce it in over one hundred collaborative local digital food bases.

More crucially, each food base will only produce one food product. JD developed a premium traceable fruit brand, “Bu Er Guo,” and recorded 3 million traceable food products on the sale channel. According to JD’s corporate announcement, 300 million food products were sold through the project, and 100,000 farmers live stream broadcast. Furthermore, with the granularity of

the data flow gathered from the project, JD now provides farmers with instructions on breeding. JD's "running mountain pig" builds amusement facilities for pigs to play and swim, which will allegedly lead to quality and premium meat. The integrated commodification model pushes the technology companies to change their business model from stocking up on food products to pre-order and pre-sale, which arguably can reduce the production cost, storage cost and eventually reduce product diversity. Even though sales doubled for traced poultry, the centralized and machine-instructed growing formula will decrease food diversity.

All the data generated from the food traceability system can boost merchandise margins and generate data-driven food product development. Instant rice noodles brand Baman (霸蛮) developed a unique "smelly tofu" flavoured rice noodles product, for example, based on a comprehensive analysis of customer profiles and food industry trends provided by JD. As a result, the product achieved a sales increase of nearly 130% year-over-year during this past Singles Day in 2020. Hence, the food traceability system is becoming a commodification system to promote market interests.

From building the *dotless visual code* for consumers to customizing "customer-engagement campaigns",⁴⁹ the food traceability system has drifted away from its original function. Endless commercial interests drive Alibaba to build the digital economy and connect more consumers to their platform ecosystem. Alibaba claims food traceability solution creates promotional value for food merchants, unlocks all aspects of marketing power, but it only hinders traffic within the platform ecosystem and reinforces Alipay's dominant position as the digital payment method and

⁴⁹ Kuo Zhang, director of Alibaba Group's mobile business division, states Alibaba employs QR codes to track and record information beyond food in 2015. So, the food traceability system is becoming an effective marketing tool for technology corporations to lure the consumer into scanning the traceability code in supermarkets instead of focusing on protecting consumer privacy and providing safe food.

robust marketing machine. When consumers scan food traceability codes with the Taobao mobile app, they do not get the full transparency as advertised. Instead, the food enterprise purchased a food traceability solution, which promises to customize food traceability devices and give them real-time access to that consumer's purchasing history information from the Alibaba ecosystem. The consumer does not care which playground their chicken went to, especially when it costs ten times more with food traceability information attached. They need peace of mind when they consume their food three times a day without reading the life story of their food three times a day.

Unfortunately, their insecurity was traded and exploited for profit. Participating food manufacturers and merchants are eager to read consumer's minds and hopefully reach into their pockets. Besides, Alibaba adds lucky draws⁵⁰ and membership reward programs to the food traceability system, which gives consumers more incentive to scan the product code and stay with the Ali ecosystem. Overall, though, consumers do not have a complete picture of their food, and food merchants also have an incomplete picture of the consumer preference through food traceability data. Food traceability data can hardly paint and predict the consumer portrait for all food merchants; it mainly consists of the most basic purchase information, such as family size and most often purchased type of meat. The food traceability system's design within Alibaba's platform ecosystem commercializes information produced by both the buy-side and supply-side and trades it to each side for profits, while both merchants and consumers end up with information fragments. Crucially, if the food traceability system's direction becomes a compulsory requirement, food merchants must pay extra to comply or get out of the food business for good.

⁵⁰ Signature food traceability products in Taobao Marketplace like Dawa County in Liaoning Province, crabs, tomatoes, and Evergrande Springwater

In 2015, Alibaba framed QR codes as the "fake fighter" born with the national mission to win the counterfeit war.⁵¹ The government designates the governance responsibility to the platform, Alibaba expedites the *good-faith takedown* program, and then government and platform distribute the responsibility to the consumer. The government promises that consumers can get rewards by filing valid complaint reports. Alibaba promotes the idea that the more consumers scan QR codes, the more opportunities to identify fake codes and assist the government in taking down infringers. Even though Alibaba alleges they are "a neutral e-commerce platform"⁵², the political and economic interests involved in their automated analysis and detection decisions are far from neutral. Through massive integration, Alibaba is the manufacturer, platform carrier, and content moderator all at the same time, so they fight to protect and prioritize their line of products from being counterfeited, and their intellectual property from being violated. Alibaba actively assists the Chinese government in fighting the counterfeit war through dotless visual code, blue stars program, Hema mobile app, and the quality manufacturing program, which transforms "made-in-China" into "created-in-China" with market-driven technology on Alibaba's unique channel. Furthermore, they are aggressively backing lawsuits against counterfeit manufacturers. In 2015, Alibaba and Chinese law enforcement located 200 infringers and seized 300 counterfeiting factories. Nevertheless, the National Medical Products Administration (2018) declares in the Food and Drug Supervision Statistics Annual Report that 32 percent of food product-related advertisements contained misleading and wrongful content, which demonstrates that the platform did not effectively regulate false food information on their platform despite advanced food traceability technology and automated detection.

⁵¹Erickson, J. (2015, May 27). Alibaba is turning the lowly QR code into a fakes fighter. News from Alibaba Group. Retrieved November 15, 2020, from <https://www.alizila.com/alibaba-turning-lowly-qr-code-fakes-fighter-2/>

⁵² Alibaba's spokeswoman, Jasper Chan (2011), stated it when respondents to the company's collaboration with the government to remove fake products (para. 5).

E-commerce increased in China by 226% from 2018 to 2019, and Ali Research (2020)

asserts that the underserved market played critical contributions (p. 13). The Alibaba ecosystem utilizes online and offline branding, tracking, and analysis to reach full food traceability marketing capacities in cities and rural marketplace. Taobao live streams rural farms to urban residents and global consumers; it also brings global traceable food to rural areas. For instance, Alibaba hired a French chef to cook traceable food from France in a rural household for marketing promotion in 2015. So, the food traceability system has transformed from an advertised "fake fighter" into a marketing campaign for big technology corporations to conquer urban and underserved markets.

3.2.4 Gamification and Socialization

Cell phones have become the new farming tool to satisfy a myriad of social needs beyond food safety and traceability. From interacting as a new prosumer to streaming the farmland, Alibaba and Tencent's platform ecosystem make food consumption a gamified social experience to drive the advancement of the food traceability system.

Both Alibaba and Tencent ecosystems have the gamified design of the food traceability system built inside their platform interface. Alibaba's Baba Farm (芭芭农场), JD's Dongdong Farm (东东农场), Little Mei Orchard (小美果园), and Pingduoduo's Duoduo Orchard (多多果园) all utilize gamified agriculture e-commerce activities to enhance customer interaction, loyalty, brand recognition, and to grow the high level of stickiness to the platform. All except Alibaba's Baba Farm are integrated under the Tencent platform ecosystem and can be directly accessed through WeChat Pay. Consumers need to log in daily, take care of their virtual fruits and crops, and conduct guided missions to exchange virtual fertilizers for growing selected fruit and eventually redeeming actual free traceable fruit when the game is completed. The entry point of Alibaba's Baba Farm is right next to Ali Pay (see Figure 11). Inside the game, food producers' discount coupons and sponsored French

luxury cosmetics company Clarins marketing coupons can be redeemed and used in the Alibaba platform ecosystem (see Figure 12). Additionally, symbols alert consumers to the limited live discounts in the Alibaba platform ecosystem and redirect them to participate in special live sales.

Figure 11

A Screenshot of the Ali Pay Interface

Note. This Figure demonstrates that the Baba Farm interface entrance next to Ali Pay.

Figure 12

A Screenshot of Alibaba's Baba Farm Interface

Note. This Figure demonstrates there are massive marketing notification and interactive social design.

This gamified design reinforces behaviours such as reviewing marketing items, purchasing e-commerce products, and inviting friends to participate, which all can be rewarded with virtual sunlight to grow their traceable food products. Moreover, the gamified design also provides special virtual fertilizer at 7 am, 12 am, and 6 pm only, which are prime hours correlated with consumer shopping and entertainment schedules. It can further normalize the virtual growing routine and provide marketing opportunities. This design offers instant gratification, which can increase the platform's daily active user rate, help the platform expand the user base, promote more food

products, and generate more revenue through the built-in lucky draw coupons, live sale notification and relevant food delivery specials.

Alibaba offers incentives to consumers to share gamified food traceability information in their social groups and form a "user-content merchandise growth engine" (Alibaba group, 2020). Since many scholars have identified that Chinese people share a more potent and high trust level within the family and friend circle (Wu and Shi, 2020), Baba Farm guides consumers to share relevant information within their social circle. Consumers need to choose the type of virtual tree they want to grow, such as "friend tree" or "love tree". It is designed for close friends or lovers to grow together, which adds special social glue for the consumer to see the game through to completion. It not only helps consumers form a bond over virtual food growing, but also works to obtain their consent to share social group information with the platform. All virtual farm games ask consumers to share their social group information before starting the game. It is essential to notice that once consumers play Baba Farm, they cannot remove it from their interface according to the current design and privacy agreement.

Embedded group chat and social relation bounded game design in Baba Farm amplify the opinion leader theory propounded by Paul Lazarsfeld and Elihu Katz (1957). According to Alibaba's community food purchase report, key opinion customers drove one-third of the social group's food sales. The Ministry of Commerce PRC (2020) 's E-commerce Report points out that platforms use low prices and close friend circles to track online traffic. Nonetheless, almost 45% of consumers said they had been tricked by someone familiar.

Additionally, after consumers growing awareness and brand loyalty with those big internet corporations, technology corporations start to shift ground. Alibaba's Freshippo mainly relies on consumers' daily food consumption needs rather than marketing and promotions, which have less

attractive discounts. Specifically, the fun and rewards come from the food traceability app's gamification design that leads us to social numbing and overlooking the extraction of behaviour surplus that is the foundation of surveillance capitalism, as Zuboff (2019) puts it. Also, Winston (1998) states that social aspects are the natural accelerators to aid the technology artifacts like food traceability systems to take off and get widely adopted. In this case, food traceability apps cultivate customer habitation through gamified design and intense social ties for the technology corporations' commercial interest.

3.2.5 Geopolitics: the Chinese Internet Companies Go Global While Lessening their Dependence on International Investors

Couldry and Mejias (2019) proclaim that technology-based economic and geopolitical competition is mainly concentrated between the US and China (p. xx). On January 24, 2021, the United Nations Conference on Trade and Development indicated that China surpassed the US last year and ranked number one among the Foreign Direct Investment (FDI) recipients. Notably, FDI climbed 11% in high technology industries while mergers and acquisitions increased 54%, mainly in Information and Communication Technologies (ICTs) industries. The significant and extensive scale of foreign investment in Alibaba and Tencent has been well stressed by Jia and Winseck (2018).

Notwithstanding, the proportion of technology corporations' ownership obtained by international investors has been consistently declining over the years. 47.1% of Alibaba was held by foreign entities in 2015: US-based Yahoo! /Altaba (15.3%) and Japan-based SoftBank (31.8%). By 2019, however, Yahoo! no longer held any of Alibaba's shares, and SoftBank's stake had shrunk to 24.9%. In 2020, Softbank still maintains the right to nominate a board director in Alibaba. Foreign investment is least significant at JD, where the US retail giant Walmart currently holds 9.8% of JD's share and US tech giant Google another 0.93%. JD launched the first Chinese food safety blockchain

traceability alliance with Walmart and curating retail plan for the international market with Google. At Tencent, the American banking giant JP Morgan no longer held any shares in 2018, and South African news media giant Napster's (MIH TC) share had declined from 34.33% to 30.99% between 2010 to 2020. Despite the decline of foreign ownership over time, existing foreign investors maintain the right to nominate board directors and share strategic development plans with three technology giants. The Chinese government, foreign capital, and Chinese technology corporations still form a significant three-way relationship developing the food traceability system and beyond, although the role of foreign capital appears to have declined over time.

The Alibaba platform ecosystem connects the foreign market with Chinese food products through cooperation, investment, and acquirement. In 2015, Alibaba's Tmall reached a strategic partnership with food corporations and foreign governments from 25 countries to import their food and deliver it with Alibaba's logistics capacities and Alibaba's Cainiao delivery company. In 2017, Alibaba teamed up with *PricewaterhouseCoopers* and Australian *Blackmores* to erect a food trust framework and export channel to tackle food safety and counterfeit issues worldwide. As part of this project, Alibaba acquired the largest Southeast Asia e-commerce platform Lazada, the Turkish e-commerce platform *Trendyol*, and the Indonesian e-commerce service *PT Tokopedia*. Alibaba's international commerce revenue has also shifted from wholesale to retail since 2017. International commerce retail revenue drastically increased from 392 million yuan (\$66.44 million) to 24,323 million yuan (\$4769.21 million) from 2013 to 2020 and now accounted for 5% of Alibaba's total revenue. Meanwhile, international wholesale growth has slowed down and only accounts for 2% of the total revenue. As of August 30, 2020, Alibaba has direct procurement centers and overseas

warehouses on six continents.⁵³ Furthermore, there are 170 overseas merchants financed by Alibaba's finance group. They also have data centers located in eleven countries. It further demonstrates the Chinese Internet companies go global while lessening their dependence on international investors.

The China Academy of Information and Communications Technology (CAICT) (2020) states in *A New Vision of the Global Digital Economy* that the tendency for the global digital economy to infiltrate the food industry is increasing. England has the highest penetration rate at 27.5%; in contrast, China only has an 8.2% penetrating rate (pp. 23-25). Consequently, the Chinese government relentlessly accelerates the food traceability system's standardization, automation, datafication, centralization, and nationalization process to push the digital economy to be more competitive globally. The food traceability system itself embodies China's long-term economic development strategy where advanced technological solutions and the drive of the "digital gold rush" are implementing a profound, market-driven and technocratic approach to vital public policy issues in the country.

Hence, seven platform mechanisms manifest that the food traceability system operates in a technology-driven, market-oriented, politically embedded, and highly monopolized platform ecosystem. First, those platform ecosystems operate as a walled garden and satisfy our utility needs. Moreover, through high integration, convergence, and cooperation with the Chinese Telecom company, the resulting monopolized platform ecosystem discourages users from seeking alternative content and services. Third, entangled relationships and social needs are the platform's retention strategy that makes it stickier for users to stay. More fundamentally, food traceability systems as

⁵³Alibaba Group. (2020). Tmall Import & Export - Alibaba Group Import Strategy. *Investor day*. Retrieved November 15, 2020, from https://www.alibabagroup.com/en/ir/presentations/Investor_Day_2020_Tmall_import_export.pdf

critical infrastructures are shaped by political agendas and commercial logic as the vehicle for economic growth instead of serving the public interest. Ultimately, platform ecosystems have an intertwined relationship with the state and carry national ambition to act as a world-leading portal and compete in the international market. Consumers do not dream of the day that platforms and governments can hone in on counterfeiters; instead, citizens want hassle-free and worry-free meals, which the food traceability system does not satisfy.

Although the Chinese government continues to stimulate and accelerate the food traceability system's development and mandates technology corporations and manufacturers to undertake, the food traceability system does not provide the "perfect transparency" to protect consumers' and citizens' interests. Instead, technology corporations have notably gained more robust control through excessive food supply chain integration and advanced cooperation with the telecom company. Massive technology applications and food traceability systems facilitate the automation process, commodification and adoption, and data extraction that further enlarges the information and power asymmetry between technology giants and food producers. The following chapter continues to untie the intricate social and political issues embedded in the food traceability system that is beyond food safety concerns. It expands on the pre-existing social, spatial, and labour inequalities that have deteriorated with China's food traceability system's expedited development.

Chapter 4: Uneven Development and Uncertainties

The Chinese food traceability system can be basically seen as an Internet-enabled commodification mechanism applied by the Chinese government and Internet corporations to boost the domestic food economy while streamlining consumption. While the food traceability system's underlying logic depends on consumers to vote with their wallets, it concomitantly leaves a large group of citizens outside this market-based decision-making mechanism. This is because pre-existing social, spatial, and labour inequality is being reproduced and enlarged through government policies and technology corporations' investments in the food traceability system. This chapter intends to bust the government's naive delusion that the food traceability system is an essential mechanism for furthering the construction of a new era of postal and telecom infrastructure and will identify how the approach being pursued will likely entrench long-standing information and power asymmetries. Moreover, this chapter hones in on the historical inequality between coastal and interior regions and uneven telecom and food traceability development and investments that are already visible to date. Instead of creating a situation of perfect transparency that eliminates the middleman and draws consumers closer to food producers, technology corporations introduce a new middleman within their platform ecosystem that enables the food traceability system while inserting a new screen of mediation, opacity and power. This system also magnifies the burgeoning contract employment system and leaves food producers with more uncertainties. Finally, this chapter assesses the impact of the food traceability system that converts the gold rush era into a digital gold rush era, wherein a multitude of actors rush to chase this newest fad (i.e. the fetishization of individuals developing an omniscient understanding of where their food comes from, from farm to the fridge) while ignoring the reality that nothing is really being done to foster a more fair society and improve citizen welfare. Overall, the current food traceability system spawns more uneven development in the nation while

causing even more uncertainty all along the food value chain, from food producers to consumers.

4.1 Uneven Development

The current Chinese food traceability system relies on consumer power, market adjustments, and technology implementation to expand its massive scale; however, it disregards social and spatial inequality and uneven development among different regions and classes. For instance, 658 journal articles surveyed Chinese consumers' willingness to pay for the food traceability system from 2008 to 2020, and the results were, to put it mildly, underwhelming. It is important to note, first though, that the survey interviews were mainly restricted to the coastal regions. Even in this most developed region of the country, however, as one survey in 2019 found, 76% of consumers were unaware of the food traceability system. This research suggests that by promoting the food traceability system through marketing strategies, the consumer would be willing to pay up to 59% more for traceable information on essential food like cabbage (Chen et al., 2019, p. 694). This type of survey did not address the existing disparities between interior and coastal regions and it reinforced the power imbalance and the status quo.

4.1.1 Historically Structured Uneven Development among Different Regions

Since 2013, China has been maintaining the largest e-commerce market worldwide (CINNIC, 2021, p. 3). It rose from 15,201 billion yuan (\$2.98 trillion) to 19,347 billion yuan (\$3.72 trillion) between 2018 and 2019 (Ministry of Commerce, 2020, p. 139). According to the National Bureau of Statistics's (2020) revision, the gross domestic product (GDP) of China was 98,651.5 billion yuan (\$18.97 trillion) in 2019, so E-commerce accounts for 19.6% of the national GDP. However, the significant, historically structured economic, technological and social gap between coastal/interior regions and urban/rural regions in China amplifies and reproduces regional discrimination and inequality through the food traceability system and beyond. First, the East region alone counts for

84.3% of national e-commerce sales, and the top ten coastal provinces combined account for 86.3% (Ministry of Commerce, 2020, p. 4). Even though the central region has the fastest growth rate compared to last year, it only counts for 8.8% of the e-commerce market size. Furthermore, based on the China Statistical Yearbook, the annual per capita disposable income gap between the urban households in eastern and western regions grew from 8789.6 yuan (\$1,489.76) to 14104.8 yuan (\$2,765.64) from 2013 to 2019 (See Figure 13). The annual per capita disposable income gap between urban households in eastern regions and rural households in the western region drastically expanded from 23,715.8 yuan (\$4,019.62) to 37,110.1 yuan (\$7,276.49) from 2013 to 2019. Moreover, within the rural regions, there is also a gap in the annual per capita disposable income between eastern and western regions. Though the Government attests that they reached and helped to instill a new phase of growth in all 823 villages with extreme poverty conditions as of 2019, its efforts continue to be highly concentrated in the coastal regions (p. 12). The Ministry of Commerce also reports that 62.6% of rural e-commerce is concentrated in the eastern region, while the western regions of the country only hold 13.6% (p. 5).⁵⁴ Therefore, the historically structured social gap has not only has gotten worse between the eastern and western regions, but it also has deteriorated between urban and rural areas. In other words, given these trends, the food traceability system appears to be amplifying the market-based emphasis on coastal regions and interests, while leaving rural and western regions relatively neglected.

⁵⁴ National Bureau of Statistics of China renders ten cities, Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan, as the eastern regions of the country. There are 12 cities in the Western region: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Xiangxi, Gansu, Qinghai Ningxia, and Xingjiang. Six cities in the central region are Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan. Only three cities in the northeast region, which are Liaoning, Jilin, and Heilongjiang.

Figure 13

Annual per Capita Disposable Income of Urban and Rural Households in China's Eastern and Western Regions from 2013 to 2019 (yuan)

Note. Data are compiled from China Statistical Yearbooks from 2013 to 2020.

As e-commerce has exploded in the country, so have the e-commerce platforms' profits, with overall profits for e-commerce platforms rising from 0.04 trillion to 4.47 trillion in 2011 to 2019, respectively (Ministry of Commerce, 2020, p. 8). Concurrently, the profit rate increased from 0.65% to 12% during the same period. E-commerce in rural regions has also grown from 0.18 trillion yuan (\$0.03 trillion) to 1.79 trillion yuan (\$0.35 trillion) between 2014 and 2020 (Ibid, p. 20). That said, however, while rural e-commerce accounts for roughly 5% of the total value of e-commerce transactions in China as of 2020, it is important to remember that rural internet users account for 31% of the national Internet user base.⁵⁵ In other words, rural people's economic value is

⁵⁵ Chinese E-commerce report (2020) indicates the national e-commerce market was 34.81 trillion yuan in 2020.

significantly under-represented relative to the brute size of their population numbers. Moreover, unlike the diverse needs met through e-commerce in the urban regions, all top eleven e-commerce rural market needs are food-related products (p. 5). According to the China Statistical Yearbook (2021), average rural households spent 2.44% more of their disposable income on food consumption than average urban households. This may seem to be a marginal difference, but, in fact, urban households earned more disposable income over the year and saved more money after deducting their consumption expenditure, so the difference is actually quite significant given the fact that household income in rural areas is a lot smaller than it is in the big cities (see Figure 14). Also consider, for example, that rural households' per capita consumption expenditure rose from 79.4% to 83.2% of disposable income between 2013 and 2019 and amounts to a much higher level than in urban areas. In urban areas, in contrast, the proportion of discretionary income allocated to household spending declined from 69.9% to 66.3% over the same period. In short, that gap between rural and urban areas increases in terms of income spent on meeting basic needs. In other words, as governments and corporations stimulate the mandatory development and full-scale application of the food traceability system, rural households are suffering more from the negative side effects of these developments. As a result, the income gap between urban and rural areas is being magnified. To sum up this point, regardless of government officials and corporations' rosy proclamations, food traceability and innovative technologies have not reduced the social gap and benefitted rural regions. Instead, the social and spatial gap between urban and rural regions is widening.

Figure 14

Annual per Capita Disposable Income and Consumption Expenditure of Urban and Rural Households in China from 2013 to 2019 (yuan)

Note. Data are compiled from China Statistical Yearbooks from 2013 to 2020.

4.1.2 Telecom Uneven Development

The real censorship on the wires is the cost of transmission. This in itself is enough to limit any expansive competition or any significant independence.

——Walter Lippmann (1996, p. 43)

According to CNNIC, Chinese Internet users have grown from 688 million to 988 million between 2015 and 2020; this accounts for 20% of the world's internet users.⁵⁶ CAICT (2019)

⁵⁶ According to Internet World Stats, there are 4,949,868,338 Internet users globally as of December 31, 2020. <https://www.internetworldstats.com/stats.htm>

acknowledges that smart agriculture development requires solid support from a gigabit broadband network, as AI-based multiple-camera networks require Internet speed in the 200Mbps range or more (p. 33).⁵⁷ CNNIC (2021) indicates that the number of Internet users connected to high-speed internet with speed higher than 100Mbps has increased from 38.9% to 89.9% from 2017 to 2020 (p. 15). However, the speed is not reliable and stable. In 2020, CAICT tested ten cities for download speeds, upload speeds, and streaming services. The result shows that it is even unstable in coastal regions like Guangzhou due to outdated infrastructure, building blockage, and rush hours (p. 19-24). The inner and rural regions were not even in the testing group, however, largely because they did not meet the minimum benchmark levels being examined. While the government promised to achieve the same speed Internet coverage all over the country, it did not address the fact that only 25.7% of rural residents currently connect to home internet service with an average download speed of 70Mbps at the end of 2020, based on data provided by the Ministry of Industry and Information Technology of the People's Republic of China (MIIT, 2021).⁵⁸ Moreover, the average upload speed in the rural region was not even disclosed in any of the reports from CNNIC and MIIT.⁵⁹ We are still far away from reaching the same speed coverage across the whole nation.

More importantly, when food traceability systems and other essential services are transformed into online systems and become the only option, exclusion issues are exposed and come with alarming consequences, especially in rural regions. For example, 62.7% of rural residents in China are not Internet users; even among 36.3% of rural internet users, some only have home internet services. This means they cannot pay for groceries with their cell phone or run errands or

⁵⁷ See White Paper on the Commercial Application Scenarios of Gigabit Broadband Networks.

⁵⁸ MIIT (2021) indicates there were 141.9 million home internet users in rural regions, and the Chinese Statistical Yearbook (2021) recorded 551.6 million rural residents in 2020, which counts for 39.4% of the national population.

⁵⁹ CNNIC did not report rural Internet upload and download speed in the 46th and 47th China statistical report on Internet development. MIIT only reported the rural home internet service's download speed and failed to include the mobile wireless service in 2020.

enter public spaces that require a health code tied to an Internet service (CNNIC, 2021, p. 22). Furthermore, based on CAICT (2020) and CNNIC (2020), WeChat (Tencent) and Weibo (Alibaba) each have 140,837 government public service accounts that aim to replace all in-person public service functions with online versions, a process that is certain to increase platform dependency.⁶⁰ Instead of breeding trust, therefore, the Chinese food traceability system overlooks citizens' basic welfare needs. Hence, unequal resource distribution and Internet access are infused with social inequality.

4.1.3 Corporate Uneven Investment

The majority of the corporate investments in China are located in the coastal regions. This, in turn, has accelerated the integration of food traceability markets in these regions and the application of automation processes across diverse supply chains, from food and services industries to automotive and other manufacturing sectors. The result, once again, is a process of magnifying social inequality, power, and information asymmetries. For instance, between 2017 and 2020, Alibaba's Freshippo (Hema) consolidated a proprietary grocery retail chain, 555 direct procurement sources, 41 ambient and freezer warehouses, 16 food processing centers, six seafood facilities, and three cold chain warehouses—all of which are located in the coastal regions. Rural regions have a faster growth rate but on a much smaller base. To illustrate the point, rural regions, while accounting for 39.4% of the population, only accounted for 24.8% of the total food sold on Alibaba's e-commerce platform in 2018. The Taobao village's development map (see Figure 14) also reveals their development strategies are concentrated on the coastal regions. Arora (2019) asserts that technology corporations are expanding the rural and marginalized consumer base at an alarming rate to satisfy their own commodification needs and fail to address the inequality issues arising as a result. Once again, this

⁶⁰ In comparison, there are only 82,958 Toutiao public service accounts and 26,098 Douyin (Tiktok) public service accounts.

reality clashes with utopian rhetoric about how the food traceability system would empower rural farmers and ameliorate inequalities. Unfortunately, the Chinese food traceability system's uneven development reflects, reproduces, and aggravates social inequalities and exclusions.

Figure 15

The Taobao village development in China from 2014-2020

Source. Ali research (2020, p. 13). 1% of the change: Research on the Chinese Taobao Village 2020. *Ali health*.

4.2 Uncertainties

The China Academy of Information and Communication Technology (CAICT, 2020) indicates that the fast-growing "social media platform plus premium product"⁶¹ model contributes to developing the rural digital economy and steering the financial and postal service upgrade in rural regions (p. 9). More specifically, it helps to "speed up the information infrastructure development

⁶¹ Social media platform plus premium product model refers to adjusted additional premium charged on food products and beyond, with accelerated implementation of technologies, such as AI, big data, cloud computing, live streaming through social media platforms.

and merge online and offline industry and push for full upgrade and development" of the food traceability system and national digital economy (p. 50). However, leaving things in the market's hands—and especially in the hands of a few internet giants—only serves to reinforce and exacerbate the information and power asymmetries that already exist. According to the 47th *Statistical Report on Internet Development in China* (2021), the top ten Internet companies account for 86.9% of the total Chinese market value, and all of these companies' headquarters and operations are concentrated in Beijing, Shanghai, Guangdong, Zhejiang, and other coastal areas (p. 3). This further illustrates how private capital shapes the public sphere, and it is certainly not heading into a fair and equal society that prioritizes the public interest. While the online infrastructure development was accelerated, rural postal service development only started picking up speed. Ali Research (2020), for example, also notes that 74.9% of the villages do not have an e-commerce delivery site. It is hard and challenging to ship products from rural areas to dinner tables in the city as a result (p. 44). To help address this problem, in 2019, the national postal office fast-forwarded the work permit approval process for rural postal services. However, since internet giants mainly have investments concentrated in the coastal regions, most of the newly constructed rural postal services will also be concentrated in the coastal regions. Once again, inequalities between China's relatively rich coastal regions and rural areas—this time at the infrastructural level—are being magnified. Therefore, internet giants and the government's own investments and infrastructure development projects appear to favour their own investment plan and capital interests instead of taking care of citizens' long-term welfare in the whole nation. The food traceability system did not contribute to the postal service construction; it only reinforced the existing power asymmetry.

4.2.1 Digital Gold Rush and Digital Employment Era

The voice of individual citizens becomes hard to hear in the relentless drone of data-fueled power, as an older public knowledge gets outsourced to corporate processes. Meanwhile, much of the social sciences has aligned itself with this devaluation of social knowledge and so provides a poor site from which to resist data colonialism.

——Nick Couldry and Ulises Mejias (2019, p. 191)

Technology corporations like extravagant slogans, while research that exposes reality seldom conforms to the hype. In this case, corporate and government hype cannot obscure the reality that food producers' subsistence is being threatened by applying high tech to a basic human need: food production and getting food from the farm to people's bellies. ATJ (Alibaba, Tencent, and Jingdong) claims that their platforms provide more job opportunities and increases overall productivity, yet most of the work positions they offer are based on flexible contract opportunities with limited welfare protection. The ATJ behemoths also share the same tone when touting the massive on-demand gig job opportunities that their apps allegedly provide: easy employment, benefits to society, and maximizing productivity, they all proclaim. For example, in this vein, Tencent (2020) announced on its Mini Program's third anniversary that "a total of 79.4% of small to mid-merchants in China are WeChat Pay users while WeChat has been identified as directly and indirectly creating 26.1 million job opportunities" and further declared an emerging era of digital employment for all in May 2020. The emphasis on the number of job opportunities and the easy access features overlooks the quality of the employment positions on offer, however. Ultimately, those job opportunities are creating more instabilities than opportunities, as the following paragraphs suggest.

On the one hand, ATJ is implementing and stimulating intelligent shift scheduling and a flexible employment system. JD, for example, has cut human labour at retail stores, call centers, logistic chains and various positions as it has equipped 270,000 JD retail stores for AI customer service. JD (2020) proclaimed in their annual report that their AI platform handled 90% of all call

center inquires in 2018 (p. 74). Alibaba's fresh produce retail, Freshippo, has employed data analytics and remote surveillance technology to replace 40% of inspection labour.⁶² It also claims that by accurately predicting the number of staff needed at the exact time and place, they can hire contract employees with more flexible schedules that suit the corporation's needs.

On the other hand, food production has adopted pre-order and on-demand business models, employment positions for food producers also transform to on-call and on-demand base. This temporary job position makes corporations and workers more dependent on the platform to survive without giving workers more reliability and bargaining power. Examining these developments and trends, CIACT (2020), for example, found that 60% of the job opportunities advertised on WeChat involved part-time positions, and 43.6% of the positions are attracting workers from central and eastern regions in the country where many people had lost their jobs due to the food market consolidation, big technology companies' massive integration, and industry automation (p. 14). As Zhao (2011) observed, these market-oriented development approaches tend to consolidate the market and bankrupt small rural operations, limiting their options and prolonging cheap migrant labour for coastal expansion. According to the International Labour Organization (2019), there are only 43.9% of female workers compare to 56.1% of male employed persons.⁶³ Also, the number of employed people who work in agriculture drastically dropped from 50% to 17.5% from 2000 to 2018 (p. 2). The number of female workers who get a job through the WeChat channel counts 47.5%, but they are mainly contract and flexible positions. These so-called sophisticated divisions of labour did not

⁶² See Alibaba Group. (2020). Freshippo — Innovating the Future of New Retail.

⁶³ According to China Statistical Yearbook (2020), there are 48.87% of the female population and 51.13% of China's male population in 2018 (Section 2-1).

offer more opportunities for people; instead, they are creating more harmful and precarious job positions that leave people with more uncertainty.

Furthermore, even with the massive amount of information available online, those workers are further alienated from what they produce, and food workers are transitioning from farms and food factories to food information factories. With respect to this point, Ali Research (2020), for example, states that 60 billion yuan (\$11.53 billion) in digital farm produce sales were generated from Taobao's integrated live streaming service (p. 42). It is essential to note that food is one of the most popular live-streaming sale products, yet only accounts for 1.3% of online food retail sales. Alibaba's massively integrated food traceability system claims it shortens the distance between consumers and food producers, but in reality, it is inserting the companies' platform as the new middleman at the heart of the food value chain. From farmers to live streamers, the Taobao integrated live streaming platform. It has not created better working conditions for farmers and has failed to reduce the distance between consumers and farmers. The nature and uncertainty of temporary job positions, in fact, have created the need for temporary workers to be present and available at all times.

In 2020, Taobao Live aimed to double the number of the 100,000 registered rural live streamers by the end of the year. A flower farmer, Li Jinxing, said, "[o]nce you start live-streaming, you really cannot stop." This is because Jinxing—and the tens of thousands of others like him/her—need to work longer hours to bond with his followers on JD Livestream. Also, a live streaming platform like Taobao Rural live streaming does not disclose how their algorithm determines which videos get a place under the spotlight. When farmer's livelihood is contingent on the decision of platform, as Couldry and Mejias (2019) observe, "[t]oday's vast infrastructures of connection, like all forms of power, build on existing inequality. But they also create new forms of inequality through

various means: inequalities of data capital" (p. 24). Furthermore, Alibaba (2019) collaborates with 100 TV stations to curate novel methods to "marry content with e-commerce".⁶⁴ Those professional TV stations and social media influencers work as the new middleman who has interconnected relationships with technology giants, which is something small food producers cannot afford and bear the long-term costs of.

As the food traceability systems automate agriculture, despite ATJ's contradicting message, they are replacing low-end human labour with machines and leaving already marginalized people with limited job options that put them in a disastrous position with minimal welfare protection and more uncertainty. Thus far, the food traceability system has not become a tool of empowerment for Chinese citizens. Instead, it has enlarged the asymmetrical informational power between the state and technology corporations on one side, and citizens on the other.

The food traceability system is neither a fighter nor saviour of the Chinese food market as the Chinese government and major technology corporations propagate. Alarming, the social gap between eastern/western regions and urban/rural regions has deteriorated with the accelerated development of the food traceability system as a market solution. Government and technology corporations prioritize their own commodification needs that see high levels of resources and investments being concentrated in the coastal region. Concurrently, government policies have neglected the growing class disparities and have failed to guarantee rural regions' utility needs, such as quality internet connection and delivery services. The unlimited expansion and integration of technology corporations in the food market has also driven farmers and small food merchants out of business and has forced them to migrate into the coastal region. As a result, they are pushed into

⁶⁴ See Alizila (2019). Taobao is helping farmers reap gains in the Livestream boom.

cheap, unstable, and platform-dependent contract labour. For instance, food streaming, food delivery, data labelling, and data cleaning job positions provide no certainty or welfare for the already marginalized citizens. The next chapter addresses some temporary measures implemented by government regulations and the community countermovement against technology giants' monopoly in China. Finally, it will conclude with three recommendations to cultivate trust in imagining a new Chinese food system at this critical juncture.

Chapter 5: Cultivating Trust or Constructing Technocratic Certainty Machine

As this chapter emphasizes, we are arriving at a critical juncture that could see a radical configuration of China's governing system as the food traceability system expedites the development of a technology-oriented and market-driven society. From a narrow and technocratic view, it can be seen, for instance, that there are three significant problems, privacy violations, biased price algorithms, and unfair low price market competition and monopolies, which stem from food traceability systems and e-commerce platform (Ministry of Commerce, 2020, pp. 70-71). The Chinese government's efforts to draft a new set of anti-trust laws (2020) and modify the existing anti-monopoly law (2008) have pointed to address those concerns while promoting a more centralized national food traceability platform that gives the state more control. Meanwhile, from a more politically charged people-oriented perspective, the food producer community has started a countermovement to stop providing food supplies to big technology corporations. This chapter reviews each of these developments and then concludes with three alternative ways to cultivate trust in the Chinese food system. First, this chapter proposes constructing community-based mutual values that prioritize inputs from previously neglected and marginalized citizens who generally reside in western and rural regions. Second, it suggests transforming the community's agreed ethical values, such as trust should be the fundamental value for us to use in the process of reconstructing the Chinese food safety system into natural habits and everyday practice with well-nourished protection from law and third-party peer-review. Finally, this chapter underlines the need to shift the focus from stock market value to social value, from a techno-centric approach to a human-centric approach, as a means of fostering a fair society with quality government services and citizen supports.

5.1 Temporary Measurements

5.1.1 Government Regulations

Big technology platforms use lower-than-cost prices, false marketing, and platform-induced transactions to lure consumers into their platform and nurture platform food purchase behaviours.⁶⁵ Attempting to ramify this kind of behaviour, the State Administration of Market Supervision has repeatedly fined those big corporations for improper pricing and monopolistic behaviours. In December 2020, JD, Alibaba's Tmall, and VIPS.N (Tencent and JD hold the largest combined share of 17.1%), for example, were each fined 500,000 yuan (\$98,039) for improper pricing. However, Tmall sold 498.2 billion products on China's most lucrative shopping day—the so-called double eleven (i.e. November 11, or 11/11)—while JD made 271.5 billion sales, and VIPS.N did not disclose its sales results from the record-breaking sales last year's double eleven super shopping day. As big technology corporations continue their business, as usual, the Chinese government is sticking to its old regulation patterns. In March 2021, the State Administration of Market Supervision issued a range of fines from 500,000 yuan (\$98,039) to 1.5 million yuan (\$290,000) at five group-buying platforms owned or invested by Didi, Meituan, Pingduoduo, Alibaba, and Tencent. Again, each fine was for improper pricing or, in other words, for selling goods too cheaply as part of their strategy of driving out competitors and locking in their own market dominance. However, the truth is that a 500,000 yuan (\$98,039) punishment can hardly play any deterrent role given the massive profits from their sales.

The Chinese government does not lack the means and precedent to regulate those technology corporations. In *China's Anti-monopoly Law Enforcement Annual Report 2019*, the

⁶⁵ Shanghai State Administration for Market Regulation (2020) reported 5,226 such illegal and dishonest platform induced e-commerce activities from the first ten months of 2020. It also fined those illegal businesses 88.83 million yuan. https://www.sohu.com/a/430044207_561670

State Administration of Market Regulation (SAMR, 2020) recorded that they issued 6.1 billion yuan (\$1.2 billion) as a historical record high punishment fine toward US chipmaker Qualcomm in 2015 (p. 168). Essentially, Alibaba, Tencent, JD, and other internet giants only got fined 0.04% of the anti-monopoly and anti-trust punishment that Qualcomm paid for conducting the same market domination, aggressive integration, improper pricing activities. Therefore, the insignificant punishment toward ATJ shows the government's priority to stimulate internet-related digital transformation in the food industry and other areas of our life, instead of addressing critical citizen concerns at hand and allowing market consolidation to deteriorate.

Aside from issuing a nonsufficient fine, the Chinese government also announced vague platform regulation rules. In December 2020, the State Administration for Market Regulation (SAMR) announced nine forbidden rules ("九不得") to regulate group-buying food platforms. The sixth, seventh, and eighth rules are imperative but also vague and lack actual enforceability. The sixth rule states that technology corporations should not use their collected data and algorithms to harm consumers' legal rights. In other words, taking advantage of the existing customer ("杀熟"); however, it does not indicate who would be accountable to ensure consumers are adequately protected or who would oversee how algorithms operate on their platforms. The seventh rule commands that platform operators do not use their terms of service (TOS) to enforce unreasonable restrictions on complementors who run their business through the platform. Unfortunately, it does not restrict platforms to exploit contract workers, nor does it forbid corporations to force workers to sign waivers for working overtime. It also fails to provide an alternative to empower complementors⁶⁶ properly. The eighth term indicates it cannot illegally collect consumer information

⁶⁶ Complementors play essential roles in the platform ecosystem, Poell, Van Dijck, and Nieborg (2018) categorize them as software developers, data brokers, and parties contributing to the platform's construction.

that can potentially bring safety hazards. Alternatively, all platforms require consumers to give renewed consent for collecting their information; otherwise, they would be locked out of the platform. According to CAICT's (2018) *Data Security and Personal Information Whitepaper*, 80.2% of the survey participants wished to have the ability to uninstall or remove their account information. However, it is often complicated, intertwined with access to a wide swathe of services, and impossible to remove (at least easily). At present, users often find that platforms demand more information than is necessary to provide the service they want, do not have the option to remove sensitive information, and cause endless frustration (p. 18). Hence, those rules are very ambivalent and are unlikely to be effective.

Other than ineffective regulations, the Chinese government continues to push for the national food platform system to take-off. The Ministry of Commerce (2020) suggests that consumers' privacy risks are often leaked by four channels: third-party platforms, merchants, delivery companies or their staff, and hackers. It proposes stimulating the construction of a centralized national platform that converges all shopping data and credit information to obtain better internet oversight (pp. 71-73). It also throws into sharper focus the seemingly intractable problem of gaining access to valuable quality data that is needed to unveil the opaque and complicated politics of the commercial and technology systems that constitute the heart of the Chinese food traceability system. However, centralized platforms are still mainly in control of the government and corporation; researchers and citizens still do not get to peek inside the 'black box'.

5.2 Countermovements from food producer community

The food producer community has also initiated a countermovement to combat big technology corporations that monopolize the food industry. Meituan, for instance, uses algorithms to detect essential food products that community residents must have and offers them at a price way

below the market price or for free. SAMR (2019) also criticized 20 big platforms like Meituan for forcing merchants to cooperate in exclusive platform listing arrangements that restrict merchants only to sell their products on one platform.⁶⁷ That move, in turn, however, is being resisted by the food producer community. In addition, independent and traditional food suppliers, like Cangzhou Hua Seed, now prevent their food factories from providing food supplies to big e-commerce platforms such as Meituan. Cangzhou Hua Seed took this move after the latter apparently started a price war to swallow the market (Zhao, 2020). Like Karl Polyanyi's (1944/57) double movement theory suggested that various social collectives can fight for public welfare that can challenge the market-centred solution's legitimacy. Cangzhou Hua Seed initiated the countermovement against big technology platforms on December 12, 2020 and the government-issued a fine against ATJ eighteen days later. It is still too early to say how this countermovement will resolve, but big technology corporations have already integrated the food supply chain and have more resources than smaller food producer communities to take on the long fight.

5.2 Cultivating Trust

When the community lacks shared ethical values and long-term prosperity, giant technology corporations can easily downplay user rights and pull off gimmicks to frame a trade-off between citizen welfare and efficiency. Sen (2001) and Zak (2011) establish that a low trust society will encounter scalable challenges and low efficiency. To mitigate winner-take-all-effects and to cultivate trust, it is imperative to construct community-based, mutual ethical values. First and foremost, food producers' voice has been absent, commodified, and packaged as the big technology corporation-dominated food traceability system has been brought into being, all with government backing to the

⁶⁷ Li, P., & Horwitz, J. (2019). China regulator warns e-commerce platforms to stop monopolistic practices. *Reuters*. <https://www.reuters.com/article/us-china-alibaba-singlesday/china-regulator-warns-e-commerce-platforms-to-stop-monopolistic-practices-idUSKBN1XG1KP>

hilt. However, it is essential to restore them—and their voice—in the development of the food traceability system and, in fact, to prioritize them in constructing mutual community values that could underpin this system. Arora (2019), for example, suggests that "to cater to the poor, they appear to suggest, and one must think like them, speak to them, and work with them." (p. 70). This thesis suggests food producers need to be the ones who design this system as well. A 65-year-old egg farmer, Shengchen Wang (2016) from Shanxi, for example, spent 10 yuan (\$2) to make an egg stamp that helps the consumer to know their purchased egg come from his chicken farm. Any consumer who finds egg quality issues can come back and trade one problem egg for two more. This simple process is inclusive, identifies where food comes from to benefit farmers and consumers, and establishes a fair bargain for food that fails to meet people's expectations.⁶⁸ Shengchen believes his handmade stamp represents his trust in his egg products and a good community relationship can breed and prosper. Feenberg (2011) points out that democratic interventions such as public participation in technological design can counter the trade-off scheme framed by technology corporations and provide a feasible new direction for the technologically advanced country. Polanyi's (1944/57) *double movement* theory also suggests countermovement stem from social groups that fight for public welfare can surpass capital's endless chase for profit. So, we need to include food producers and marginalized communities as the center of ethical value representation to cultivate community shared trust for the new food safety system.

Once we have established mutual-community values, it is quintessential to transform them into long-term natural habits and to have government policies protect the well-nourished system. Feenberg (2010) points out that well-established law and regulation can prevent big corporations

⁶⁸ See the picture of Farmer Wang and his stamped eggs. https://m.sohu.com/n/456958319/?wscrid=32576_5

from framing binary trade-offs between social value and cost-convenience. Currently, government policies are pushing for nationwide food traceability adoption, making it critical for us to amend it to include community shared trust as the center of the policy. Furthermore, Nissenbaum (2011) states that information wrapped with technology coat layers cannot formulate trust. We need to consistently test, adjust, communicate, guard the community value, and establish an independent review system that's open for public scrutiny to breed trust and guard a well-nourished system. Once community shared trust grows into natural habits, as Chun (2016) emphasizes those good natural habits no longer need reward or punishment for reinforcement. Food safety is a fundamental human right, and we should broaden the regulatory scope to protect it as a public good and guarantee safe and equal access for all citizens.

Lastly, it is vital to steer policy from the techno-centric approach toward human-centric and community-based ethical values to build trust and form shared long-term goals. As Paul Zak (2011) points out, "trust falls when there is wage discrimination based on noneconomic factors; that is, trust is higher in 'fair' societies" (p. 296). Food consumption is not a privilege. Therefore, we cannot entrust the market to self-regulate, and it is critical to de-commercialize the Chinese food safety system and focus on establishing a fair society. In the meantime, Zhao (2014) highlights the crucial method to rejuvenate the domestic market, and it is by improving the living standard of the Chinese middle and lower social class and constructing an equal society. Spatial and social inequalities are drastically increased due to selected development priorities favouring coastal market development; this critical juncture provides us with a good opportunity to correct our discourse in boosting welfare for lower socio-economic classes. Furthermore, Bjørnskov (2007) and Zack's (2011) empirical research shows that social and income inequality is tantamount to a low trust society. Couldry and Mejias (2019) suggest that we need to think about basic income, new tax structures, and educational

reform before tackling the impact of technological automation in various areas (p. 67). The Chinese government has gradually adopted some of those recommendations, such as promising the same speed internet between rural and urban regions and drafting rigid food safety regulations; nevertheless, this is far from enough. The technology-based and market-oriented food traceability system has been behind the wheel as the main driver to change the Chinese food safety landscape for a decade. Let us add more democratic forces to constructing an equitable and sustainable Chinese food safety system where citizens' well-being and cultivating long-term societal trust as the central focus.

The Chinese food system should be about citizens, not consumers. It should be safeguarding the fundamental human rights that one can enjoy a safe meal with peace of mind, instead of second-guessing, food history checking, and food traceability surveillance stream watching. It should commit to protecting citizen and community shared ethical values, not promote corporate and government-produced hype. It should be producing a fair society where food producers can have a guaranteed basic income and do not have to worry about their job's stability or feel the need to pamper consumers on social media sites. A fair society has a high level of trust, and trust should be the essence of the Chinese food system, not the certainty machine and market profit. This is the critical juncture for all citizens to act and change the direction of the Chinese food system's development toward trust, citizens-centric, and a democratic approach.

Chapter 6: Conclusion

Unease about the numerous food safety incidents in China has unleashed public rage, outcry, and continuous discussion on new public alternatives and government measures. The Chinese government and Chinese technology giants stimulate the development of the food traceability system through unique identification codes attached to food packages that supposedly enable customers to know the whole life story of their food and to put their minds at ease. However, as a market-driven and technocratic approach, the food traceability system tends to carry three common delusions that government and corporate hype has embedded in their mechanisms. The first delusion is that the food traceability system is the optimum choice for solving China's food safety issues. It embodies a "certainty machine" (Zuboff, 2019) to supersede the necessity of trust and to construct the "illusions of perfect information" (Winseck, 2002) whereby the consumer is encouraged and incentivized to take on the role of screening and investigating their food to combat complex social and public health issues in China. Another delusion is that a highly integrated food traceability system can increase efficiency and convenience in Chinese society through a relentless automation system and AI-powered data analytics engine. The final delusion is that stiffened food traceability laws and regulations can cause technology giants to withdraw their business involvement in the food industry due to increased responsibility and potential financial liabilities. After critically examining several primary and secondary sources to decipher the multi-faceted relations between the Chinese government, Chinese citizens, foreign capitals, and three Chinese Internet giants (Alibaba, Tencent, and JD), this thesis expounds on these three troubling delusions.

The first common delusion propagates the food traceability system as the ultimate solution to bring perfect transparency and certainty. Unfortunately, it brings more uncertainties to Chinese citizens. First, the food traceability system's essence is to generate layers of technology-wrapped

information, such as a pig's step counts, a pig's voice, and a pig's face ID, to "bypass the need of trust" (Zuboff, 2019, p. 413). However, more information is not tantamount to more certainty and trust. It often leads to more confusion. Second, the robust certainty machine is constructed as a market solution, and only a fraction of the Chinese citizens can afford these essential services as a result. The historically structured economic, technological, and social gap between coastal/interior regions and urban/rural regions is still widening. The food traceability system reproduces regional discrimination and inequality that harm already marginalized groups. Additionally, rural residents spend 2.44% more of their disposable income on food consumption than average urban households. As the food traceability system becomes mandatory, food with traceability information will generally cost 59% more than regular food products. Moreover, instead of serving citizens, the food traceability certainty machine was constructed to help technology giants harvest consumer data, integrate into more areas of citizen lives, and expand the horizon of their business as a walled garden.

The food traceability system was not only designed for the consumer to get more food information, but it was also meant for merchants to pay service fees to technology giants for insight into consumer data. While technology giants like Alibaba, Tencent, and JD (ATJ) commercialize information produced by both the buy-side and supply-side and trades it to each side for profits, both merchants and consumers end up with only information fragments. Technology giants hold the ultimate control of the data, algorithms, and platform design, while merchants, complementors, and citizen remain outside of the 'black box'. Moreover, the food traceability system is also designed for technology giants to save on insurance premiums and work as litigation insurance as a means of shielding them from consumer complaints while complying with government requirements. ATJ also integrated the whole food supply chain, invested in the telecom industry, and diversified its business

to cover online and offline, from farmland to satellite images. Massive integration and diversification help technology corporations erect the certainty machine for more data, more control, to mitigate risk exposure, and to cultivate better platform ecosystem optimization. Accordingly, the food traceability system as a market solution and certainty machine is designed in the corporation's interest; it does not have citizens' or small food producers' interests in mind.

The second delusion is that a large-scale automation process and AI-powered analytics engine can increase efficiency. However, it falls into the 'efficiency trap', which is fixated on short-term interest, opaque about carbon dioxide footprint, and can cause further harm toward already marginalized people. Among the three technology giants, Tencent is the only company that disclosed its carbon dioxide footprint, yet emissions are not reducing. Instead of sounding an alarm, the Chinese government advocates and legitimizes market consolidation and technology-centred automation to increase efficiency and boost production. While technology corporations took over the supply chain, they displayed their own line of food products on the platform's prime viewing locations over other food merchants who still operate on their platform. The information and power asymmetry, as well as regional disparities, have been further amplified. Small food merchants are not merely driven out of business (Ministry of Commerce, 2020) but are also pushed into more contract-based, unstable, and platform-dependent digital economy positions that induce them to migrate into the coastal region. Both the Chinese government and Internet giants disproportionately concentrate their investment in coastal regions, where their capital interests reside and continue to enlarge regional disparities. As a technology-centric food traceability system, it requires essential utility services like delivery services and quality internet access; however, only 25.7% of rural residents had a home internet connection in 2020. Hence, the development of the food traceability system

continues to neglect long-term sustainability, which in turn harms our environment and already marginalized groups of citizens.

The last delusion projects that stringent regulations can cause technology giants to drop food businesses from their platforms. The current policy prefers the food traceability system as a market solution and spurs technology giants to further their integration in a global and underserved market. On the one hand, ATJ reached countless strategic cooperation deals with international corporations, institutions, and government in the food industries and beyond. On the other hand, the foreign ownership of ATJ has been declining over time; nonetheless, existing foreign investors reserve the right to nominate board directors and share strategic development plans with three internet giants. Technology giants pursue endless expansion and integration that give them firm control over upstream and downstream of the operating environment, reach economy of scale, efficiency gain, and dominant market power. Even though the Chinese government has the precedent and means to regulate internet giants and discourage monopolies adequately, they have only issued half-million in fines as a warning. It also kept delegating more responsibilities to technology giants while mandating accelerated development of the food traceability system and government-owned national traceability platform. Alas, this thesis argues that all of these attempts waste resources and energy in the wrong direction since a society with a low trust level would end up with low efficiency. Layers of information within the certainty machine cannot replace trust. Most importantly, a society with a drastic social gap tends to have a low trust level. So, slightly stringent laws did not drive technology corporations away from carrying food business but have intensified the social gap and market consolidation.

Therefore, by analyzing the three common delusions presented here, this thesis illustrates how food safety and traceability law, regulation, and practices were framed in a technology- and

corporate-based market system favouring capital interests at the cost of public interests. Despite the corporate and governmental ambition to march forward with the development of food traceability systems at full speed, automation and datafication processes generate more energy consumption, and they leave a large carbon footprint as a result. It falls into an efficiency trap that comes at the cost of our environment, sustainable long-term development and leaves marginalized citizens in the rural and west regions to foot the bill. There is a critical juncture at hand that provides an excellent opportunity to cultivate trust and give the voice back to marginalized groups of citizens. At this juncture, we need to redirect the focus of the food traceability system from techno-centric to citizen-centric, and through this, we can safeguard fundamental human rights and guarantee safe and non-commercialized equal access to essential utilities like food and internet access, writ large.

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Appendix

Appendix 1

List of documents reviewed

Category	Institution	Document	Language	Date Published
Corporate Annual Report	Tencent (HKEX)	Annual Report (AR) 2009-2020	English	2010-2020
	Alibaba (SEC)	AR 2014-2020	English	2015-2020
	Alibaba (HKEX)	AR 2019-2020	English	2020
	Meituan (HKEX)	AR 2018-2020	English	2019-2020
	JD (NASDAQ)	AR 2014-2020	English	2015-2020
Law and Regulation	Apple	Annual Report 2019 (United States Security and Exchange Committee [SEC])	English	Sep 28, 2019
	Chinese State Council	The Food Safety Law of the People's Republic of China. 1st version	Mandarin	July 8, 2009,
		Revised in 2015	Mandarin	Apr 24, 2015
		Revised in 2019	Mandarin	Oct 11, 2019
	GOV	The Thirteenth Five-Year Food and Drug Complaint Management Measures	Mandarin	Feb 21, 2017 Jan 12, 2016
Government Report	Shanghai government	The Law of Chinese Food Safety	Mandarin	Oct 1, 2015
	Ministry of Agriculture of the People's Republic of China [MAPRC]	Measures for rewards for reporting food and drug violations	Mandarin	Aug 9, 2017
	State Statistical Bureau [SSB]	China statistics yearbook 2019	English	Sep 24, 2019
	The Supreme People's Procuratorate of the People's Republic of China	Supreme People's Procuratorate work report	Mandarin	May 25, 2020
	China Food and Drug Administration [CFDA]	Announcement of the General Administration of China on the nonconformity of five batches of food	Mandarin	Mar 13, 2018
	State Administration for Market Regulation	A total of 297,700 food violation cases were investigated and handled	Mandarin	April 1, 2019

Category	Institution	Document	Language	Date Published
	National Health Commission of the People's Republic of China	nationwide last year National Food poison quarterly reports	Mandarin	July 20, 2008 -April 1, 2016
	Chinese State Information Center & China Internet Association Sharing Economy Work Committee. [SIC]	Report on China's Collaborative Economic Development 2020.	Mandarin	Mar 9, 2020
	China Internet Network Information Centre [CINIC]	The 45 th China Statistical report on Internet Development	Mandarin	Apr 28, 2020
		The 46 th	Mandarin	Sep 29, 2020
		The 45 th	Mandarin	Apr 28, 2020
		The 44 th	Mandarin	Aug 30, 2018
		The 42 nd	Mandarin	Aug 20, 2018
		The 40 th	Mandarin	Aug 3, 2017
		The 38 th	Mandarin	Aug 3, 2016
		The 36 th	Mandarin	July 22, 2015
		The 34 th	Mandarin	July 21, 2014
		The 33 rd	Mandarin	Jan 1, 2014
		The 29 th	Mandarin	Jan 20, 2012
		The 28 th	Mandarin	July 19, 2011
		The 26 th	Mandarin	July 15, 2010
		Research Report on Chinese Social Media Users' Behaviors (2016 年中国社交类应用用户行为研究报告)	Mandarin	Dec 27, 2020
		2016 Research Report on Chinese Internet Users' Searching Behaviours (2016 年 中国网民搜索行为调查报告)	Mandarin	Jan 9, 2018
	Personal Information Protection Task Force on APPs	APP Special Governance Report on Illegal collection and use of personal information [2019]	Mandarin	May 26, 2020
	Ministry of Agriculture and Rural Affairs of the People's Republic of China	Price of six essential foods in different regions	Mandarin	Everyday

Category	Institution	Document	Language	Date Published
Collaborated Report from Corporations and Government	The Food Safety Commission of the State Council [Feb 6, 2010—March 2018, commission closed]	Food Safety education brochure (食品安全科普宣传大纲)	Mandarin	June 20, 2012
	China Academy of Information and Communications Technology [CAICT]	WeChat's Economic and Social Impacts in 2016	Mandarin	Apr 17, 2017
	CAICT	WeChat Economic and Social Impact Report 2017	English	Apr 2018
	CAICT	WeChat Employment Impact Report	Mandarin	May 15, 2020
	Peking University	Introduction to 2015 China Development Report on Food Safety	Mandarin	Dec 2015
	Peking University	Introduction to 2016 China Development Report on Food Safety	Mandarin	Dec 2016
	Peking University	Introduction to 2017 China Development Report on Food Safety	Mandarin	Dec 2017
	China Social Sciences Press	Introduction to 2014 China Development Report on Online Public Opinion of Food Safety	Mandarin	Dec 2014
	Tsinghua University & Tencent	2020 Code Economy Report 码上经济战疫报告	Mandarin	June 2020
	Tencent	Corporate News	English	1999-2020
Corporate Sites		Stock information	English	2004-2020
		Corporate social responsibility report	English	2013-2018
	WeChat	Mini Program	English & Mandarin	2020

Appendix 2

List of sources used to verify corporation information

Category	Institution	Applied	Language	Date Published	Link
Chinese Government Agencies	Trademark Office of National Intellectual Property Administration, PRC.	All of FPA Companies	Mandarin	2020	http://wcjs.sbj.cnipa.gov.cn/txnRead01.do?Flt3WMZ5=qqc9ZYf48NcD6qq7W4nVU_NwbjkfdXQ9zio9IU37OLZqk8Oo.QNrZ6Q3QWMRsREIG2QYgDdFhXber35hTeDAjw9HQY0u9AffScUt9qALlhKromPEd1x9EnffXpQp94xTg9pMyk5xRmFc12tCe62AtB5EfvLR2J6ytnYrQhGEWwUigGr7
	Ministry of Industry and Information Technology of the People's Republic of China	All of FPA Companies	Mandarin	2020	http://www.miit.gov.cn/gxdataCenter/?keywords=%E8%85%BE%E8%AE%AF
	National Bureau of Statistics of China	Cross check food safety, income, other data	Mandarin	2020	http://www.stats.gov.cn/english/; www.stats.gov.cn/tjsj/tjgb/ndtjgb/ http://www.stats.gov.cn/tjsj/ndsjs/2019/indexeh.htm
State Agencies	State-owned Assets Supervision and Administration Commission of the State Council	Law and statistics	Mandarin	2020	http://en.sasac.gov.cn/;
	XinhuaNet (农业农村部、国家市场监督管理总局、国家网信办联合新华网)	Food safety incidents	Mandarin	2015-2020	http://www.xinhuanet.com/food/sppy/index.htm
	National Development and Reform Commission (NDRC)	Food safety incidents	Mandarin	2020	https://so.ndrc.gov.cn/s?qt=%E9%A3%9F%E5%93%81%E5%AE%89%E5%85%A8&siteCode=bm04000007&tab=all
	Cyberspace Administration of	Office of the Central	Mandarin	2020	http://www.cac.gov.cn/2020-

Category	Institution	Applied	Language	Date Published	Link
	China	Cyberspace Affairs Commission			04/27/c_1589535470378587.htm
	Organization for Economic Cooperation and Development (OECD)	Data	English	2020	https://data.oecd.org/searchresults/?q=CHINA; https://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy-monitoring-and-evaluation_22217371; https://data.oecd.org/china-people-s-republic-of.htm; https://www.oecd-ilibrary.org/search?value1=CHINESE+FOOD&option1=quicksearch&facetOptions=51&facetNames=pub_igoId_facet&operator51=AND&option51=pub_igoId_facet&value51=%27igo%2Foecd%27&publisherId=%2Foecd&searchType=quick; www.fao.org/home/en/
	Food and agriculture organization of the United Nations	Cross check	English	2020	
	The State Council: The People's Republic of China	All of FPA Companies	Mandarin	2020	http://www.gov.cn/zhengce/2020-11/03/content_5556991.htm http://sousuo.gov.cn/s.htm?q=%E9%A3%9F%E5%93%81%E8%BF%BD%E6%BA%AF&n=10&p=4&t=govall&timetype=&mintime=&maxtime=&sort=&sortType=1&nocorrect=; http://gsxt.gdgs.gov.cn/
	National Enterprise Credit Information Publicity System	All of FPA Companies	Mandarin	2020	
	China Judicial Process Information	All of FPA Companies	Mandarin	2020	https://splcgk.court.gov.cn/gzfwfw/gto

Categor y	Institution	Applied	Lang uage	Date Published	Link
Corpora tion	Online				
	Tencent/ WeChat	Wechat index	Mand arin	2020	https://chinachannel.co/wechat-index-search-trends-opens/
	Baidu	Baidu index	Mand arin	2020	https://index.baidu.com/v2/main/index.html#/trend/%E9%A3%9F%E5%93%81%E5%AE%89%E5%85%A8?words=%E9%A3%9F%E5%93%81%E5%AE%89%E5%85%A8,%E9%A3%9F%E5%93%81%E6%BA%AF%E6%BA%90

Appendix 3

Yearly average exchange rate for CAD \$1 to Chinese yuan (CNY), 1990-2020

Year	CNY Average Rate
1990	4.1
1991	4.6
1992	4.5
1993	4.4
1994	6.3
1995	6.0
1996	6.1
1997	6.0
1998	5.6
1999	5.5
2000	5.5
2001	5.3
2002	5.2
2003	5.9
2004	6.3
2005	6.7
2006	7.0
2007	7.0
2008	6.5
2009	6.0
2010	6.5
2011	6.5
2012	6.3
2013	5.9
2014	5.5
2015	4.9
2016	5.0
2017	5.2
2018	5.1
2019	5.2
2020	5.1

Appendix 4

The complete list of food safety and traceability regulations in China

Categor y	Institution	Law/ Regulation	Date	Link/ Key changes
State	Trademark Office of National Intellectual Property Administration, PRC.	All of Companies	FPA 2020	http://www.qihangsoft.com/shi an/1193.html
State	China Association for Quality	All of Companies	FPA 2020	http://www.cqn.com.cn/search/servlet/SearchServlet.do
State	State Administration for Market Regulation	Guidelines of the State Administration for Market Regulation on Strengthening the Supervision of Marketing Activities through Online Live Broadcasting	Nov 5, 2020	http://gkml.samr.gov.cn/nsjg/g gigs/202011/t20201106_32309 2.html Online platforms that provide the paid service of guiding customer flow and other services for commodity suppliers (including service providers, hereinafter inclusive), and publicize and promote online marketing activities which constitute commercial advertisement, shall fulfill the responsibilities and obligations of advertisement carrier or agencies in accordance with the provisions of the Advertising Law of the People's Republic of China.
State	State Cyberspace Administration	Disposal of 13,600 illegal "eat and broadcast" accounts	Sep 4, 2020	http://www.xinhuanet.com/food/2020-09/04/c_1126451314.htm
Provinci al governm ent	Ningbo Provincial government	Three-year action plan of Ningbo to accelerate the cultivation and innovative application of the Blockchain industry (2020-2022)	May 27, 2020	https://www.chaindd.com/3315976.html Use the blockchain to record real-time and complete product logistics information, solve logistics information security, traceability and other issues, and improve the efficiency of the logistics supply chain

Category	Institution	Law/ Regulation	Date	Link/ Key changes
Provincial government	Hainan Provincial Department of Industry and Information Technology (海南省工信厅)	Several policies and measures of Hainan Province on accelerating the development of the blockchain industry	May 25, 2020	http://iitb.hainan.gov.cn/iitb/xxcy/202005/f973655c9d444b028629231e8d7b18a5.shtml Planning and publishing a batch of blockchain application demonstration projects in the areas of commodity traceability, copyright protection, and trading, and launching global launch activities
Provincial government	Ningxia Agricultural Products Quality and Safety Center (宁夏农产品质量安全中心)	"Two products and one standard" "Three products and one standard" ("两品一标", "三品一标")	Feb 28, 2020	https://mp.weixin.qq.com/s/AaapANC8nazjOjCxxhkTOdg http://www.aqsc.agri.cn/sypb/ Relying on the 22 counties (cities, districts) of the district's grass-roots agricultural product quality and safety supervisors, implement online monitoring of agricultural input product sales entities and enterprise production entities' agricultural product quality and safety traceability information and updates
State	The State Council of the People's Republic of China	"Regulations on the Implementation of the Food Safety Law of the People's Republic of China"(中华人民共和国食品安全法实施条例)	Dec 1, 2019	http://www.gov.cn/zhengce/content/2019-10/31/content_5447142.htm
State	The State Council of the People's Republic of China	Opinions on deepening reform and strengthening food safety work	May 9, 2019	http://www.gov.cn/zhengce/2019-05/20/content_5393212.htm Establish the most rigorous standards; implement the most stringent supervision; implement the most severe penalties; adhere to the most serious accountability; implement the main responsibility of the producers

Category	Institution	Law/ Regulation	Date	Link/ Key changes
y				and operators (Thirty-one) Promote "Internet + Food" supervision. Establish a food safety information platform based on big data analysis, promote the application of big data, cloud computing, Internet of Things, artificial intelligence, blockchain and other technologies in the field of food safety supervision, implement smart supervision, and gradually realize online investigation of food safety criminal clues Convergence and case online transfer, online acceptance, online supervision, and enhance the informatization level of supervision work.
State	Order of the President of the People's Republic of China No. 21	Food Safety Law (Revised in 2018)	Dec 29, 2018	http://www.customs.gov.cn/customs/302249/302266/302267/2369620/index.html
State	Ministry of Agriculture and rural affairs of the People's republic of China	Opinions of the Ministry of Agriculture and Rural Affairs on the linkage of agricultural product quality and safety traceability with major agricultural and rural creation, selection of agricultural product quality brands, agricultural product certification, agricultural exhibitions, etc.	Dec, 20, 2018	http://www.moa.gov.cn/nybgb/2018/201812/201901/t20190106_6166192.htm Link agricultural quality and safety traceability with major agricultural and rural creation certification, agricultural brand selection, agricultural product certification, and agricultural exhibitions, and launch them as mandatory work.
State	Ministry of Agriculture and rural	Notice of the Ministry of	Oct 20,	http://www.moa.gov.cn/nybgb/2018/201810/201812/t2018121

Category	Institution	Law/ Regulation	Date	Link/ Key changes
y	affairs of the People's republic of China	Agriculture and Rural Affairs on the comprehensive promotion and application of the national agricultural product quality and safety traceability management information platform	2018.	8_6165124.htm The Ministry of Agriculture and Rural Affairs decided to promote and apply the National Agricultural Products Quality and Safety Traceability Management Information Platform (hereinafter referred to as the "National Traceability Platform") nationwide . Realize the traceability of "one step forward" and "one step backward", and promote the traceability management of the whole process of edible agricultural products from farmland to table.
State	Walmart, JD, IBM, National Engineering Laboratory of Electronic Commerce Transaction Technology, Tsinghua University	Established China's first safe food blockchain traceability alliance	Apr 28, 2018	http://www.caict.ac.cn/email/hydt/201804/t20180428_163598.html It will promote accountability and provide suppliers, regulators and consumers with a deeper and clearer understanding of how food flows from farm to table through the entire food supply chain.
State	Food and Drug Administration	Guiding Opinions on Carrying out the Traceability Standardization of Important Products	Sep 27, 2017	http://images.mofcom.gov.cn/www/201710/20171023154501503.pdf By 2020 , the role of standardization in supporting the establishment of a traceability system for important products will be significantly enhanced. Basically, an important product traceability standard system with national, industry, local, group and corporate standards coordinated, comprehensive, focused, and structured has

Category	Institution	Law/ Regulation	Date	Link/ Key changes
State & JD	Jingdong and Ministry of Commerce, Ministry of Industry and Information Technology, General Administration of Quality Supervision, Inspection and Quarantine, China Chain Store & Franchise Association, China Quality Association, etc.	"JD Quality Traceability Anti-Counterfeiting Alliance"	June 13, 2017	been basically established. (p.7) http://www.xinhuanet.com/info/2017-06/13/c_136361139.htm Many well-known domestic fresh food companies including Horqin, Shuanghui, Jingqishen, Huasheng, Shengdile Village, Sandu Port, Xinyulong, and Zhangzidao became the first batch of cooperative enterprises "One-click traceability" or directly scan product traceability. 400 brands, covering 12 thousands products, with more than 1 billion product traceability data on the chain
State	State Food and Drug Administration (CFDA) (国家食品药品监督管理总局)	Several Provisions on the Establishment of Food Safety Traceability System by Food Production and Operation Enterprises	Mar 8, 2017	http://www.cpzs.net.cn/newsite/m/277788898
State	The State Council of the People's Republic of China	The State Council's issue of the "Thirteenth Five-Year" National Food Safety Plan	Feb 21, 2017	http://www.gov.cn/zhengce/content/2017-02/21/content_5169755.htm Community Co-Governance Plan "Investigated and handled 958,000 food safety violations, and solved more than 80,000 food safety crimes"
State	State Food and Drug Administration (CFDA) (国家食品药品监督管理总局)	Opinions of the General Administration on Promoting Food and Drug Manufacturers to Improve the Traceability System (Food and Drug	September 22, 2016.	http://www.chinafoods.org.cn/news/2016922/2020211162350.shtml

Category	Institution	Law/ Regulation	Date	Link/ Key changes
Corporate	Alibaba	Administration [2016] No. 122) Establish the Traceability Platform	May 10, 2016	http://jiankang.cctv.com/2016/05/10/ARTIZ8MbKFrpuvd1qx9ZSuzb160510.shtml?spm=a21f6.8078389.0.0.52f26857G8ypch&lwfrom=user_dingfriend
State	Ministry of Commerce PRC.	Notice of the General Office of the Ministry of Commerce on Accelerating the Construction of Important Product Traceability System	March 1, 2016	http://www.mofcom.gov.cn/article/h/redht/201603/20160301266680.shtml
State	State Food and Drug Administration (CFDA) (国家食品药品监督管理总局)	Measures for the Administration of Food and Drug Complaints and Reports	January 12, 2016	http://www.gov.cn/gongbao/content/2016/content_5070769.htm
State	The State Council of the People's Republic of China	The General Office of the State Council on Accelerating Opinions on the establishment of a traceability system for important products. Guobanfa (2015) No. 95	December 30, 2015	http://www.gov.cn/zhengce/content/2016-01/12/content_10584.htm Section Ten. Encourage production and operation enterprises to use information technology to establish a food and drug traceability system. Encourage information technology companies to act as third parties to provide professional product traceability services for production and operation companies. Food and drug regulatory authorities at all levels shall not compulsorily require food and drug production and operation enterprises to accept traceability services from designated professional information technology

Category	Institution	Law/ Regulation	Date	Link/ Key changes
y				<p>enterprises.</p> <p>Section Eleven. Support industry associations to organize enterprises to build traceability information query platforms, and promote the interconnection and information sharing of information systems among associations, enterprises, and governments.</p> <p>Section Eighteen. Promote comprehensive management of quality and safety. Promote the integration of the traceability system with the inspection and testing system and the internal quality management system of the enterprise to create a strict quality and safety control chain throughout the process. Give full play to the use of traceability information sharing switches, innovate quality safety and public safety supervision models, and explore the implementation of intelligent "cloud supervision" throughout the product process. Build a big data supervision model, improve the forecast and early warning mechanism, and strictly prevent the occurrence of regional and systemic security risks for important products. Fully excavate the application value of traceability data in enterprise quality credit evaluation, and improve the self-discipline mechanism of quality credit. Establish mechanisms for intelligent product quality and safety</p>

Category	Institution	Law/ Regulation	Date	Link/ Key changes
Provincial Government	Shanghai government	Shanghai Food Safety Information Traceability Management Measures	Oct 1, 2015	<p>complaints, positioning of responsible entities, sales scope and impact assessment, recall of problematic products, and emergency response to mobilize the public to participate in quality safety and public safety governance.</p> <p>Section Nineteen. Promote the transformation and upgrading of consumption. Intensify publicity, spread the concept of traceability, cultivate a traceability culture, and promote the formation of a social atmosphere that cares about and supports traceability. Gradually establish a marking system compatible with certification and accreditation to facilitate consumer identification. Explore the establishment of product quality and safety files and "blacklists" of untrustworthy quality, and timely release consumer reminders to guide consumers to consume rationally. Increase the promotion of traceable products, promote large supermarket chains, hospitals, and group consumer units to actively purchase traceable products, and create a market environment conducive to the consumption of traceable products.</p> <p>http://www.shanghai.gov.cn/nw2/nw2314/nw2319/nw2407/nw33192/u26aw44656.html</p> <p>Where producers and operators of traced food and edible</p>

Category	Institution	Law/ Regulation	Date	Link/ Key changes
State	The State Council of the People's Republic of China	Food Safety Law of the People's Republic of China (Chairman Order No. 21)	Apr 25, 2015	<p>agricultural products deliberately upload false information, the food and drug supervision, market supervision, agriculture and other departments shall impose a fine of 5,000 to 20,000 yuan in accordance with their respective duties.</p> <p>http://www.gov.cn/zhengce/2015-04/25/content_2853643.htm</p> <p>China established the food traceability law for the first time.</p> <p>Article 42. clearly stipulates that a food safety traceability system shall be established. Food producers and operators shall establish a food safety traceability system in accordance with the provisions of this law to ensure food traceability. The State encourages food producers and operators to use information technology to collect and retain production and operation information and establish a food safety traceability system. The Food and Drug Administration of the State Council, together with the agricultural administration of the State Council and other relevant departments, establish a food safety traceability and coordination mechanism.</p> <p>Article 62. Providers of third-party platforms for online food transactions shall register real-name food operators on the</p>

Category	Institution	Law/ Regulation	Date	Link/ Key changes
y				<p>Internet to clarify their food safety management responsibilities; if a license should be obtained in accordance with the law, the license shall also be reviewed. If a third-party platform provider of online food transactions discovers that online food operators have violated the provisions of this law, they shall stop and immediately report to the food and drug regulatory department of the county-level people's government where they are located; if serious violations are found, they shall immediately stop providing online transactions platform services.</p> <p>Article 131 A fine of not less than 50,000 yuan but not more than 200,000 yuan. If serious consequences are caused, the business shall be ordered to suspend business until the license is revoked by the original license-issuing department; if the legitimate rights and interests of consumers are harmed, they shall deal with food businesses. The person bears joint and several liability. Consumers who purchase food through a third-party platform for online food transactions and whose legal rights are harmed can claim compensation from the online food business operator or food producer. If</p>

Category	Institution	Law/ Regulation	Date	Link/ Key changes
				the online food transaction third-party platform provider cannot provide the real name, address and effective contact information of the online food business operator, the online food transaction third-party platform provider shall compensate. After the third-party platform provider of online food transactions pays compensation, it has the right to recover the compensation from the online food business operator or food producer. If a third-party platform provider of online food transactions makes a promise that is more beneficial to consumers, it shall fulfill its promise.
Provincial Government	Gansu Provincial government	Measures for the Traceability Management of Agricultural Products Quality and Safety in Gansu Province (for Trial Implementation)	Jan 5, 2015	http://www.gsrdw.gov.cn/html/2015/zlaq_0105/10685.html
State	The State Council of the People's Republic of China	Our country's meat and vegetable circulation traceability system pilot program has covered 50 cities	July 17, 2014	http://www.gov.cn/xinwen/2014-07/17/content_2719411.htm In order to ensure food safety and realize that the source of meat and vegetables can be traced, whereabouts can be traced, and the responsibility can be investigated, my country has launched a pilot program for the construction of a meat and vegetable circulation traceability system in 50 cities in four batches, basically covering municipalities and provincial capitals.

Category	Institution	Law/ Regulation	Date	Link/ Key changes
				More than 2000 distribution companies have been included in the construction of the traceability system. On average, more than 1 million pieces of information are traced to more than 30,000 tons and more than 300 kinds of meat and vegetable foods every day. The coverage includes slaughterhouses, wholesale markets, vegetable markets, supermarkets and purchasing groups.
State	The State Council of the People's Republic of China	A pilot work meeting for the establishment of a food and drug quality and safety traceability system	May 10, 2013	http://www.gov.cn/gzdt/2013-05/10/content_2400037.htm
State	The State Council of the People's Republic of China	Notice of the General Office of the State Council on Issuing the Priority Work Arrangements for Food Safety in 2013	April 7, 2013	<p>Aim to achieve real time traceability at the end of 2013.</p> <p>http://www.gov.cn/gongbao/content/2013/content_2390159.htm</p> <p>(7) Build a national food safety information platform, and complete the overall planning and design of the main system and subsystems by the end of 2013. Overall planning and construction of food safety electronic traceability systems, unified traceability codes, to ensure the integrity and compatibility of the traceability chain, and focus on speeding up the construction of electronic traceability systems for infant formula milk powder and raw milk powder, meat, vegetables, wine, and health food</p>
State	The State Council of the People's Republic of China	Decision of the State Council on Strengthening Food	July 3, 2012	http://www.gov.cn/zwgk/2012-07/03/content_2175891.htm

Category	Institution	Law/ Regulation	Date	Link/ Key changes
State	The State Council of the People's Republic of China	Safety Work State Development (2012) No. 20		"Promote the full traceability of food safety" "Accelerate the construction of the food safety electronic traceability system, establish a unified traceability method and technical platform, and improve the convenience and effectiveness of the traceability system."
		Outline of Food Safety Publicity and Education (2011-2015)	Apr 16, 2012	http://mil.news.sina.com.cn/2012-04-15/0432687633.html Establish a long-term mechanism for food safety publicity and education, and form a work pattern involving the government, enterprises, industry organizations, experts, consumers and the media. By the end of 2015, increase the public awareness rate of basic food safety knowledge to over 80%, and increase the awareness rate of basic food safety knowledge of primary and secondary school students to over 85%
State	Ministry of Industry and Information Technology	Food Product Industry "Twelfth Five-Year" Development Plan (食品工业“十二五”发展规划)	Dec 1, 2011	http://www.gov.cn/gzdt/att/att/site1/20120112/782bcba7035f1078ab6301.pdf In the "Twelfth Five-Year" phase, it will promote the construction of a food traceability system, promote the demonstration and application of Internet of Things technology, further strengthen the information service system of food production enterprises, and prioritize the food traceability development of the milk powder, meat, vegetables, alcohol, health products, etc.

Category	Institution	Law/ Regulation	Date	Link/ Key changes
State	Ministry of Commerce, and Finance Department	Notice on Guiding Opinions on the Pilot Construction of the Traceability System of Meat and Vegetable Circulation	Sep 26, 2010	http://www.mofcom.gov.cn/article/fgsjk/201009/20100902655721.shtml -Start to build ten food traceability trail cities in the nation and use consumer feedback to force food companies to change. -Use marketing strategies to guide consumer to favor traceable food products first. -Food traceability corporation need to have more than ¥ 20 million registration capital
State	the 7th Meeting of the Standing Committee of the Eleventh National People's Congress	The Food Safety Law of the People's Republic of China	Feb 8, 2009	http://www.gov.cn/flfg/2009-02/28/content_1246367.htm Food purchase inspection records should be true, and the retention period should not be less than two years
Provincial Government	Shanghai Government	Temporary food product safety measurement (上海市食用农产品安全监管暂行办法)	July 23, 2001	http://www.shanghai.gov.cn/nw26170/20200820/0001-26170_27373.html Propose a food traceability system at every circulation stage.
State	Decision of the Standing Committee of the National People's Congress	Food Hygiene Law of the People's Republic of China	Oct 30, 1995	http://www.gov.cn/banshi/2005-08/31/content_68767.htm Packaged food must have proper label indicate relevant information

Note. All documents listed are available in Mandarin