

The role of e-commerce in the urban food system under COVID-19: lessons from China

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Abstract

Purpose – The purpose of this study is to investigate e-commerce as a new means to ensure that the urban demand for food can be met during the coronavirus disease 2019 (COVID-19) outbreak. Because a number of COVID-19 e-commerce models have emerged, this paper discusses whether and (if so) why and how e-commerce can ensure the food supply for urban residents if social distancing becomes a norm and the transport and logistics systems are hindered.

Design/methodology/approach – This study used qualitative research methods following the lack of empirical data. The authors referred to relevant literature, statistical data and official reports and comprehensively described the importance of e-commerce in ensuring the safety of food supply to Chinese urban residents under the impact of the epidemic. Corresponding to the traditional case study, this study presented a Chinese case on ensuring food supply through e-commerce during an epidemic.

Findings – The authors found that three e-commerce models played a substantial role in preventing the spread of the epidemic and ensuring the food supply for urban residents. The nationwide e-commerce platforms under market leadership played their roles by relying on the sound infrastructure of large cities and its logistics system was vulnerable to the epidemic. In the worst-affected areas, particularly in closed and isolated communities, the local e-commerce model was the primary model, supplemented by the unofficial e-commerce model based on social relations. Through online booking, centralized procurement and community distribution, the risk of cross infection could be effectively reduced and the food demand could be effectively satisfied. The theoretical explanation further verifies that, apart from e-commerce, a governance system that integrates the government, e-commerce platform, community streets and the unofficial *guanxi* also impels the success of these models.

Originality/value – Lessons from China are drawn for other countries struggling to deliver food to those in need under COVID-19. The study not only provides a solution that will ensure constant food supply to urban residents under the COVID-19 epidemic but also provides some reference for the maintenance of the food system of urban residents under the impact of a globalization-related crisis in future.

Keywords E-commerce, Urban food system, COVID-19, China

Paper type Research paper

1. Introduction

In the late 2019 and the early 2020, the coronavirus disease 2019 (COVID-19) swept across China, posing a serious threat to public health. After Wuhan went on lockdown on January 23, 2020, the entire country implemented strict traffic control and social distancing measures (Mahase, 2020; Wu *et al.*, 2020). The number of new confirmed cases in China began to

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decrease in mid- and late-February after a sudden increase in January. The strict traffic control and personal isolation measures were effective in hindering the spread of COVID-19 in China. However, the outbreak of COVID-19 overseas has started in the early March and placed continued pressure on China's prevention and control situation.

Social distancing measures are likely to affect the logistics system and pose challenges with respect to the food supply for Chinese households, particularly for urban residents. On the one hand, urban and rural transportation channels did not operate smoothly during the epidemic period, resulting in increased transportation costs for agricultural products, a shortage of fresh agricultural products in the market and increased prices for agricultural products in certain cities. On the other hand, COVID-19 has also caused disruptions to the agri-food supply chain that have exacerbated difficulties in bringing food to market in sufficient quantity to meet surging demand (Chang and Meyerhoefer, 2020). The traditional agricultural supply methods, such as agricultural markets, large supermarkets and convenience stores, increase person-to-person contact and thus, the infection risk. These difficulties indicate that traditional agricultural supplies cannot meet the food needs of city dwellers under quarantine measures. The direct impact of COVID-19 and the series of measures adopted to mitigate its spread would have a major effect on China's agricultural and food production, supplies and consumption. The latest data show that in China, despite the effective measures taken by the government to stop the spread of the virus, the total retail sales of consumer goods in the first two months of 2020 was 521.3bn yuan, down 20.5% year on year and gross domestic product (GDP) in the first quarter of 2020 was down 6.8% year on year [1].

To reduce the necessity to leave the home and thus to curb the spread of the virus, purchasing food through the Internet has become a national trend, and e-commerce platforms have become the new "food basket" for consumers. New research has found that the share of confirmed COVID-19 cases increases the possibility of consumers purchasing food online (Gao *et al.*, 2020). In the meanwhile, consumer practices have changed as a result of social distancing, e-shopping and infrequent shopping have become common; takeaway and home delivery have become an alternate to closed restaurants (Bakalis *et al.*, 2020; Wang *et al.*, 2020). In contrast to the decline in total retail sales during the epidemic outbreak, the online retail sales of physical goods for the same period cited above reached 11,233 bn yuan, up 3.0% year on year, accounting for 21.5% of the total amount of consumer goods [1]. A number of studies noted an importance of e-commerce in food marketing and indicated that e-commerce innovated with respect to how agricultural and food products were supplied and created more possibilities (Li *et al.*, 2007; Qi *et al.*, 2019; Bao *et al.*, 2012; Leong *et al.*, 2016; Parker *et al.*, 2016; Zeng *et al.*, 2017; Verdouw *et al.*, 2014). However, there is no research that examines how e-commerce can play a role in ensuring the supply of agricultural and food products for the urban residents and help prevent the spread of disease.

The contribution of this paper is twofold. First, during the COVID-19 crisis, when consumer demand and buying behavior changed fundamentally, e-commerce became particularly important in ensuring the food supply for residents. For example, people must isolate themselves at home and reduce physical contact to prevent infection. Therefore, agricultural e-commerce needs to develop and strengthen its online business according to different models. In addition, among all the countries affected by the epidemic, China is the first country seriously affected by the epidemic and the first country to recover (Wang *et al.*, 2020). With the global spread of the epidemic and the normalization of epidemic prevention and control (Cheng *et al.*, 2020), it is more necessary than ever to investigate the major patterns and roles of e-commerce in China's epidemic prevention efforts. The practice of e-commerce in China has provided sufficient evidence to ensure the safety of food supply in the case of similar global crises in future, which is crucial for the survival of residents amid the COVID-19 crisis. Through studying China's e-commerce model, the safety of the residents'

food supply under the COVID-19 preventive measures such as social distancing in countries and regions still affected by the pandemic can be guaranteed. In the long run, with the development of globalization, the impact of unexpected natural disasters or other unexpected events will be felt worldwide (Miguel *et al.*, 2015). The study does not only aim to provide a solution that will ensure constant food supply to urban residents under the COVID-19 epidemic but also to provide some reference for the maintenance of the food system of urban residents under the impact of a globalization-related crisis in future.

Second, following the lack of empirical data, this study uses qualitative research methods to summarize several models of food supply guarantee through e-commerce in epidemic prevention and control in China. Further, the study theoretically analyzes the crucial reasons for the success of these models. This echoes the research study on China's market, governance and *guanxi* theories. Compared with the quantitative analysis, the qualitative method does not explicitly interpret the magnitude of the impact of these models. However, the qualitative method can better describe how the effect occurs. We find that, apart from e-commerce, a governance system that integrates the government, e-commerce platform, community streets and the unofficial *guanxi* also impels the success of these models. This also expands the framework of governance theory comparatively, hence reflecting the theoretical innovation and value of this paper.

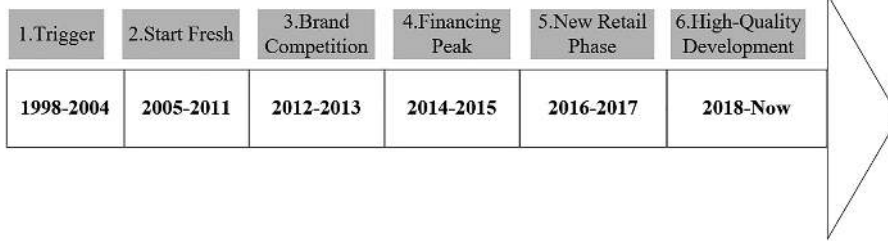
However, the lack of data associated with e-commerce amid COVID-19 results in the lack of the econometric model, which is the main limitation of this paper. With the gradual enrichment of the follow-up data, further exploration can focus on how to verify the main findings identified by qualitative methods in this paper. This remains the task of future research. Despite this limitation, this paper nevertheless is of great reference value to China among other countries as it helps to formulate reasonable food supply policies in order to deal with similar public security incidents.

The remainder of this paper is organized as follows. [Section 2](#) describes the development of e-commerce in China. [Section 3](#) presents several specific models of the role of e-commerce in the urban food distribution system under COVID-19. [Section 4](#) provides a theoretical framework that discusses why e-commerce could ensure the smooth operation of the urban food distribution system amid COVID-19 in China. [Section 5](#) concludes and provides policy recommendations.

2. Review of e-commerce development in China

Defined as commercial activities and transactions electronically conducted over the Internet, e-commerce combines traditional economic behavior and the rapidly expanding cyber infrastructure and provides a linkage between the real world and cyberspace through flows of capital, ideas and goods (Zhang, 2019). China has quickly become the world's largest e-commerce market, which has brought great convenience to the daily lives of its people. The COVID-19 outbreak represents a significant challenge to logistics and the flow of people between regions, exposing the limitations of the traditional supply chain of agricultural products. Therefore, the role of e-commerce in ensuring the supply security of agricultural products during the outbreak is worth further discussion.

To understand the impact of e-commerce on the food supply of urban residents in China amid the COVID-19 outbreak, we must first understand the development of e-commerce in recent decades (Figure 1). E-commerce in China began in the early 1990s, not much later than the introduction of the Internet to China. China's agricultural goods began to experience increased sales in 1998 with the introduction of online grain trading through the Zhengzhou Commodity Exchange. Subsequently, the online trading of agricultural products, such as grain and oil, which are easy to store and transport, became increasingly active. A new stage of innovation appeared with the 2005 establishment of Yiguo-Fresh and subsequently, a large



Note(s): Figure 1 is based on a report entitled the Development of Rural E-Commerce in China 2019, released by China's Ministry of Commerce

Figure 1.
Development of agricultural e-commerce in China

number of e-commerce enterprises dealing in fresh agricultural products emerged. Fresh agricultural products can be traded on the Internet, thus overcoming the spatial limitation that has restricted direct connections between smallholder producers and consumers for thousands of years in China. In Japan and South Korea, such trading has also started to break through the closed agricultural association and wholesale market model established in the modernization process of those nations, which can be described as a “revolution.” As e-commerce in fresh agricultural products increased rapidly on the Internet in China, the famous orange brand “Chu Orange” began selling navel oranges from Yunnan province to consumers in Beijing and other Chinese provinces at the end of 2012 using its brand story and influence. Subsequently, many e-commerce enterprises dealing in fresh agricultural products began to investigate brand-based sales operations. New technologies, such as big data and cloud computing, were gradually introduced into the industry. Many brands of fresh agricultural products appeared and market competition became increasingly fierce. With increasingly more e-commerce enterprises entering the fresh agricultural products business, capital has gradually entered the market. From 2014 to 2015, the number of enterprises obtaining financing increased significantly. Additionally, the density and intensity of financing has been increasing. In this process, a large number of small agricultural products’ e-commerce platforms have been created.

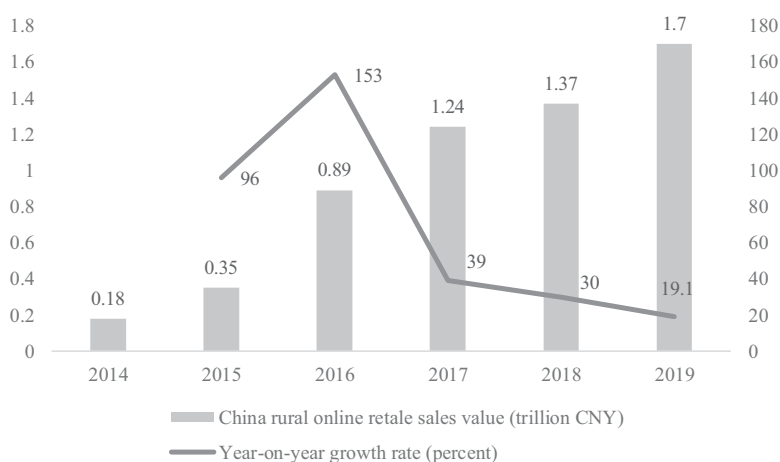
In 2016 and 2017, Chinese e-commerce giants Alibaba and Tencent launched FreshHema and Yonghui offline stores, respectively, a new retail model for e-commerce in fresh agricultural products. Based on a strong fresh supply capacity, this model has cut into the catering sales of supermarkets, extending the product flow while aiming for high gross profit. The new era of fresh retail is characterized by a high degree of integration between online and offline sales as well as high-quality service in the last mile. With the online and offline giants investing heavily in fresh agricultural products’ e-commerce, Pinduoduo, as a typical case, has begun to pursue high-quality and sustainable development, which also means that this industry will enter a stable era of high-quality development.

The rapid development of China’s agricultural e-commerce in recent decades cannot be separated from the policy support of the Chinese Government. In 2005, the General Office of the State Council issued opinions on accelerating the development of e-commerce, which legitimized e-commerce as a national strategy to promote China’s economic growth. In addition, new legislation was passed to regulate and ensure the security of Internet e-commerce. In the following decade, the Chinese Government issued support policies related to e-commerce nearly annually. The foci of these policies ranged from stimulating the rapid growth of e-commerce to individual marketing [2], shifting to using e-commerce to serve agriculture, rural areas and farmers [3], encouraging innovation in the distribution of

agricultural products and encouraging enterprises in e-commerce, logistics and trade to participating in the development of agriculture-related e-commerce platforms [4]. In addition, the government has actively investigated new agricultural e-commerce models, such as the so-called “basis in the urban community” control of fresh agricultural products [5], further strengthening the coordination of production and marketing and giving full play to the important role of the circulation of agricultural products in promoting agricultural production and ensuring household consumption [6]. The Chinese Government supports the establishment and development of e-commerce for agricultural products in all its aspects and is seeking to fully develop the rural digital economy. By implementing the “Internet plus” project to move agricultural products from villages to cities, the Chinese Government is seeking to strengthen facilities for processing and packaging, to improve the cold chain and storage of agricultural products and to cultivate brands of rural e-commerce products [7]. Thus, a series of policies conducive to promoting the construction of rural roads, the Internet and other infrastructure have been promulgated, narrowing the gap between urban and rural food delivery supply chains and promoting the connection between urban and rural areas. This effort is also the basis that enabled e-commerce in agricultural products to guarantee the urban food supply during the epidemic.

A review of developments over the past decade reveals that the improvement of China’s information-based infrastructure and of the country’s logistics system that has been steadily promoted, thus establishing a solid foundation for the development of e-commerce for urban and rural residents. In recent years, China’s rural e-commerce has developed rapidly. Internet platforms have played a large role in combatting the spread of the epidemic. From the perspective of an Internet development foundation, compared with the severe acute respiratory syndrome (SARS) outbreak in 2003, the Internet penetration rate in China has been greatly improved. As of June 2019, the Internet penetration rate in China is 61.2% (CNNIC 2019). The Internet has become an inseparable part of people’s lives. Rural online retail sales surged to 1.7 trillion yuan in 2019 from 0.18 trillion yuan in 2014, accounting for 15.2% of China’s online retail sales, according to information released by the China International Electronic commerce Center (CNNIC, 2019). As shown in Figure 2, from 2015 to 2018, the year-on-year growth rate exceeded 30% for four consecutive years. As the urban middle class expands and the Internet becomes more accessible from mobile devices, urban residents are increasingly demanding fresh produce. According to information released by the China International Electronic Commerce Centre (CIECC) [8], online retail sales of agricultural products have exceeded 230.5 bn yuan, up 33.8% year on year and 9.9% higher than the national average in 2018. China’s express delivery network covers 92.4% of the country’s total annual delivery volume of 12 bn items, providing a solid foundation for the development of e-commerce in agricultural products.

With the spread of the epidemic, China’s agricultural e-commerce has played a large role because of the advantages it enjoys. Compared with traditional offline business, e-commerce has exhibited superiority in the food supply area during the epidemic period. The security and convenience of e-commerce enable consumers to fully perceive the value of the services provided by the fresh retail platform. E-commerce in agricultural products could be considered a useful way to solve the problem of ensuring a secure food supply for urban residents during the outbreak. E-commerce platforms and online sales developed quickly as the fight against the epidemic gained momentum. Many e-commerce platforms launched “contactless delivery” services for the first time, strictly controlling first-level delivery and broadening channels, which contributed to fighting the epidemic. The “contactless delivery” service gained unprecedented attention and developed rapidly. Chang and Meyerhoefer (2020) pointed that e-commerce platforms may both provide customers with convenient options and generate positive externalities in the form of lower infection rates and reduced



Note(s): Figure 2 is based on the report entitled China Taobao Village: 2009–2019 by AliResearch

Figure 2.
2014–2019 Chinese
rural online retail sales

health-care costs. According to relevant statistics, between January 26 and February 8, 2020, “contactless delivery” orders accounted for more than 80% of the total order quantity and “contactless delivery” service users accounted for 66% of all users [9]. This door-to-door delivery method places items in designated locations to reduce human contact and the likelihood of infection. During this period, e-commerce played an important role in ensuring and supporting people’s livelihoods, which enabled more consumers to become used to and trust this retail model.

3. How e-commerce functions: several models

Amid the COVID-19 epidemic, various types of e-commerce have played a significant role in broadening the distribution channels of agricultural products and ensuring the normal and orderly operation of urban food supply systems. Some recent studies have examined how China has successfully combated COVID-19. For instance, *Miao et al., (2020)* examined the importance of community volunteers and their effective deployment during a crisis; *Cheng et al., (2020)* showed how community-based organizations were in the three distinct stages of Zhejiang’s responses to COVID-19. However, none of the studies have related these governance issues to the food supply issues. Moreover, no studies have highlighted the role of the government and unofficial channels in shaping the role of e-commerce in ensuring food supply during the COVID-19 crisis in China.

This study uses qualitative research methods following the lack of empirical data. We refer to relevant literature, statistical data and official reports and comprehensively describes the importance of e-commerce in ensuring the safety of food supply to Chinese urban residents under the impact of the epidemic. Compared with the quantitative analysis, the qualitative method does not explicitly interpret the magnitude of the impact of these models. However, the qualitative method can better describe how the effect occurs.

During the COVID-19 epidemic, the market, government and unofficial forces were highly involved in the development of an agricultural products e-commerce supply chain during the COVID-19 outbreak, which extended a variety of e-commerce organization models. On this basis, the operation mode of e-commerce to guarantee food supply is divided into three

models (Table 1). One is based on the market as the guidance of the main channel to deputies to the national e-commerce platform online sales of fresh agricultural products in China has a broad market scope and a large volume. Such platforms offer a full range of agricultural products suitable for long-distance transportation. However, in the case of a very serious epidemic situation, this e-commerce model plays a very limited role because of the lack of smooth logistics. Second, the organizational model of local government participation in agricultural products e-commerce is based on cooperation with local e-commerce platforms. This e-commerce model relies on both the traditional e-commerce platform and the support and coordination of the local government. Despite the fewer food categories compared to the national e-commerce model, the possibility of virus transmission is reduced in this model due to the simplification of logistics links. This model's market scope is centered on the area in which the local government is located and exhibits regional characteristics. In addition to the national and local e-commerce models, the unofficial e-commerce model is also actively involved in the e-commerce agricultural products market. This model is based on the social network platform, which expands the market share through social relations. This e-commerce model can only provide basic food and food quality cannot be strictly monitored. However, due to the very few logistics links, the possibility of virus transmission is very low, suggesting that this is a very effective e-commerce model in epidemic prevention and control.

Figure 3 further shows the specific process and the leading role of these e-commerce models for agricultural products in China under the impact of COVID-19. For example, the nationwide e-commerce including comprehensive e-commerce platforms, vertical e-commerce platforms, supermarkets and delivery service platforms are dominated by the market power; the government and grassroot organizations matter for the local e-commerce platforms; the unofficial models are mainly influenced by the social relations. It will be highlighted in Sections 3.1, 3.2, and 3.3, respectively.

3.1 The nationwide e-commerce model

With the transition toward a more market-oriented economy, China's nationwide e-commerce platforms have played a pivotal role in the contactless delivery of food. For most of these platforms [10], after people order fresh food and pay online, the delivery person delivers the food to a collection agent at the entrance to a residential area within one hour. Compared to the traditional agricultural products supply model, e-commerce can limit close contact with others outside the household in indoor and outdoor spaces. This capacity supports the effect of social distancing on epidemic prevention and control. Even prior to the epidemic, nationwide e-commerce platforms had attracted much attention from capital. Meanwhile, thanks to the promotional boost provided by the early stage of the epidemic, e-commerce platforms have a large number of daily active users and dominate agricultural products e-commerce. During the outbreak, the e-commerce platforms also have further developed their supply chains in the agriculture sector (Fei *et al.*, 2020), which encouraged more long-term strategies to closely collaborate with the agricultural production end and support farmers. Nationwide e-commerce platforms can be divided in a general way into comprehensive e-commerce platforms and vertical fresh agricultural e-commerce platforms.

After years of development, comprehensive e-commerce platforms, such as Taobao, Tmall, Jingdong, Suning and Pinduoduo, have become industry giants covering all categories of e-commerce and represent the first choice for urban residents seeking to purchase food online. In the field of fresh agricultural products, the main approach of vendors in this model is to attract various agricultural product suppliers to work with the platform and then to connect these suppliers with online consumers through trans-regional cold chain distribution and a complete logistics system, such as Alibaba's Cainiao Station and Jingdong Logistics. At the beginning of the epidemic, these comprehensive platforms, with their strong supply chain

Organizational model	Leading role	Species of food	Food quality requirements	Price	Market scope	Volume	Product source	Logistics links	Possibility of virus transmission
Nationwide e-commerce model	Nationwide e-commerce platforms	Most	Highest	High	Large	Large	National	Complicated	High
Local e-commerce model (third-party platforms)	Government + grassroots organizations	General	General	General	General	General	Local	General	General
Unofficial e-commerce model	Social networking	Least	Uncertain	Low	Small	Small	Local	Simple	Low

Table 1. Comparison of different organizational models of e-commerce

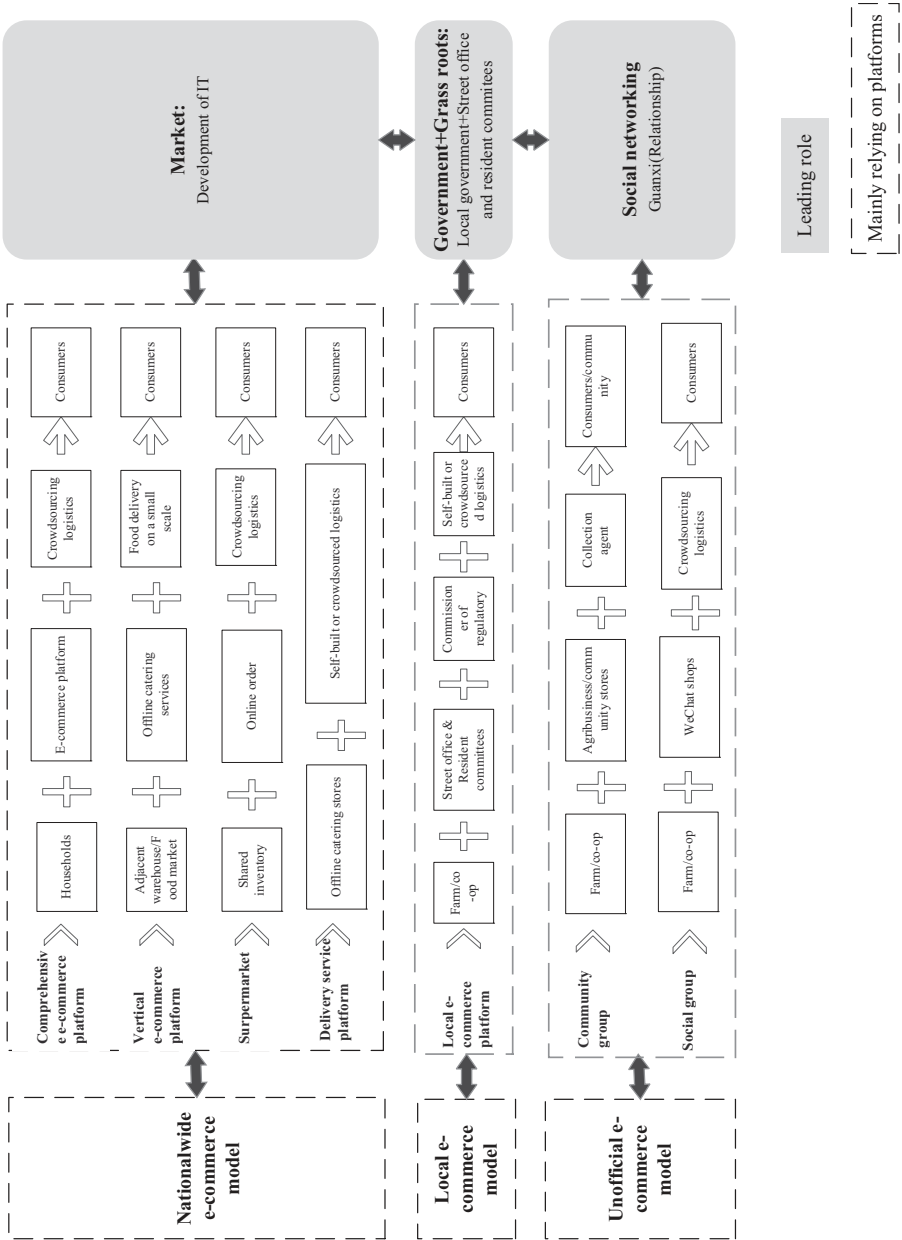


Figure 3. China's agricultural e-commerce models under Covid-19

system, large flow, price advantage and multicategory selection became substitutes for offline trading entities, such as agricultural products trading markets.

However, as the COVID-19 epidemic spread across China from January to February, the comprehensive e-commerce agricultural supply chain confronted many challenges. For example, suppliers of fresh agricultural products on a comprehensive e-commerce platform may come from all over the country and the production areas are far from the selling areas. Affected by traffic controls and the Chinese New Year holiday, the logistics speed was two to three times slower than usual. In addition, most fresh agricultural products in China are supplied by small farmers and retailers. There are few large and medium-sized participant enterprises in the branch. During the COVID-19 outbreak, certain agricultural products suppliers suffered from serious problems related to unsalable merchandise. Such problems revealed the difficulty large-scale comprehensive e-commerce platforms face in fully meeting the needs of urban residents isolated at home. In the middle and late stages of the epidemic in China, the comprehensive e-commerce logistics supply chain gradually recovered. To address the problem of unsalable agricultural products, the major comprehensive national e-commerce enterprises used their national profiles to establish a special publicity channel for the areas with unsalable agricultural products and to broaden the sales path of agricultural products. During the outbreak, China's comprehensive agricultural products e-commerce, by virtue of its own advantages, was able to a certain extent unblock the production of and the marketing information and distribution channels for agricultural products across the country, thus guaranteeing the sales of agricultural products on the supply side.

The other type is vertical fresh agricultural e-commerce platforms, which are active in larger cities in China, such as Daily-Fresh, DingDong and FreshHema. Prior to the epidemic, vertical fresh agricultural products e-commerce differentiated itself from the comprehensive e-commerce giants and avoided competition with them by providing high-quality agricultural products and meeting the special needs of a small group. Daily-Fresh and DingDong, which are leading vertical fresh e-commerce companies, use a business model based on establishing a so-called front position. They set up small warehouses close to urban consumers, which enable them to deliver food to addresses within three kilometers of the warehouses in 30 min. Another vertical e-commerce operation, FreshHema, uses an integrated commodity warehouse and restaurant model, providing both offline catering services and food delivery. During the epidemic, vertical e-commerce orders surged and the major e-commerce platforms launched "contactless delivery." Delivery speed was reduced. However, the timely delivery of orders in the same city could still be completed within two days. DingDong added as many as 40,000 new users daily during the epidemic [11], bringing opportunities as well as unprecedented challenges to the vertical e-commerce supply chain. People did not pay attention to prices when purchasing. In addition, they raised their quality requirements for agricultural products. In the late period of the epidemic, due to supply shortages, each major vertical platform introduced a preorder buying model. However, most of the warehouses and stores of the vertical e-commerce enterprises only provide delivery services in large cities and they offer selected agricultural products with higher prices, which are suitable for families with higher incomes in cities.

The surge of online sales orders in the agricultural products market has prompted e-commerce platforms and enterprises to actively stock up on supplies. In addition to comprehensive and vertical e-commerce platforms, offline convenience stores and takeout service platforms have also entered agricultural products e-commerce. Online supermarkets have rapidly expanded their online presence by operating applications and actively cooperating with multiple platforms. At the same time, offline physical supermarkets have opened online portals. Major chains, such as Carrefour and RT-MART, have increased the purchase volume of goods in their stores by four to five times compared to the same period last year and expanded their delivery services to support customers accessing them online.

During the outbreak period, delivery service platforms connected offline restaurants with consumers through the “contactless delivery” service.

3.2 *The local e-commerce model*

During the epidemic, the combination of online and offline modes expanded further. Urban resident purchasing of agricultural products is characterized by proximity and network. Limited by transportation, packaging and storage, the most important characteristic of fresh produce is its limited distribution radius. According to industry average data, the distribution radius of fresh produce is no more than 300 kilometers.

To solve the problems of fresh agricultural product transportation and the high loss rate, local governments cooperated with third-party enterprises to construct local e-commerce platforms for fresh agricultural products and launched “contactless distribution” services for urban residents. In this process, to ensure the safety and freshness of vegetables provided by the platform, most of the fruits and vegetables delivered to urban residents came from the local farming base. The online platform connected the agricultural products of local farmers with the local urban residents. At the same time, the grassroots government organizations dispatched specialists to supervise the quality and distribution of agricultural products. Active action by the government ensured food safety for urban residents during outbreak.

In addition, to solve the problem of unsalable agricultural products, many local government officials recommended their hometown agricultural products via live broadcasts on various e-commerce platforms. With this accessible approach, local officials not only helped farmers sell but also helped create an attention-getting online brand image for their regions. For example, in Anhui province, the heads of six poverty-stricken counties went into live broadcast studios to promote their agricultural products to netizens across China. The products they promoted sold out within a few hours, with total sales exceeding 20.1 m yuan [12]. The government entered the market, endorsed otherwise unmarketable high-quality agricultural products and expanded the sales channels through e-commerce, efforts that represent an important turning point in the development of agricultural e-commerce.

3.3 *The unofficial e-commerce model*

Various regions in China have implemented different levels of prevention and control measures according to the extent of the COVID-19 epidemic. In regions with strict epidemic prevention and control measures, it is difficult for the market and the government to play a timely role in ensuring the food supply for urban residents. The spontaneous participation of unofficial entities in e-commerce has resolved this problem. Such entities use social networking platforms, driven by social or community relationships, as carriers to effectively meet the diverse and multilevel food needs of small and medium-sized cities.

One such entity involves a group pattern, in which the resident community represents the unit. Individuals living in the same community are subject to the same outbreak management measures. They are not permitted to go out on their own to buy fresh food in the event of a severe outbreak. Community owner committees or community organizers used community Internet groups to unite community residents and connect with local farms or agricultural cooperatives for group procurement. This approach may apply to agricultural enterprises or community store distribution logistics transportation and distribution networks through a community collocation agent to purchase agricultural product distribution services. Direct connection to farms in the community represents a useful connection model that could be adopted in a small area to satisfy the food needs of residents during an epidemic.

Another example is the small online business model based on social connections. Here, sellers use social networking platforms to establish small online stores and expand their target customer groups through social relationships. For instance, during the COVID-19 outbreak, certain farmers and farms had problems with unsalable agricultural products. Farmers used their personal social accounts to post agricultural product information or update commodity information in online shops on social platforms, thus attracting friends in social circles interested in buying agricultural products to place orders online and make use of crowdsourced logistics for distribution. The small range symmetry of agricultural product information is realized on the social platform, which also solves the problem of supply and demand of agricultural products to a certain extent.

4. Why e-commerce worked for supplying food to urban residents under coronavirus disease 2019

As mentioned above, market, government and unofficial forces are highly involved in the construction of e-commerce supply chain of agricultural products, which ensures that e-commerce of agricultural products in China can still play its role in ensuring the safety of food supply for urban residents under the impact of the epidemic. The three e-commerce models, dominated by different forces, complement each other and ensure that people in different regions with different degrees of isolation can solve the problem of food demand through e-commerce online. Below we show a theoretical framework – that echoes with the research study on China’s market, governance and *guanxi* theories – to explain why these models work in China.

4.1 *The role of market: changing China’s nationwide e-commerce platforms*

The progress of e-commerce in China in recent years is primarily attributable to the development of information technology, e.g. popular mobile Internet applications. This development has led Chinese e-commerce to participate in the sale of fresh agricultural products (Luo *et al.*, 2019). As a part of the market power dynamic, the competition of e-commerce enterprises brings efficiency and welfare gains for both buyers and sellers (Liu and John, 2019). In addition to large agricultural enterprises, smallholders have also been able to gain access to the market with the help of third-party trade platforms (Yang *et al.*, 2020), suggesting that local agricultural products are likely to be sent by them to consumers in need. The national e-commerce platform has played a very good connection role in this process.

Compared with the traditional agricultural products supply method (Figure 4), the national e-commerce platform based on the open market shortens the intermediate process of transactions; moreover, it not only reduces transaction costs (Medema, 2017) but also reduces the gathering of personnel and comparatively maintains a certain social distance. Additionally, in order to decrease the likelihood of exposure to the virus, e-commerce, compared with the traditional agricultural products supply model, has other advantages such as more extensive consumer distribution, a larger sales radius, shorter transit time, higher circulation efficiency, lower circulation costs and a smoother information feedback flow. This assertion is consistent with several studies that focus on Chinese e-commerce in the agricultural sector (Wang *et al.*, 2016; Yao *et al.*, 2019).

4.2 *Connection between local government and grassroots organizations: street offices and resident committees*

After the Chinese Government attempted to contain the spread of the virus and decrease the number of overall infections, transport in China, including railways and motorways (which

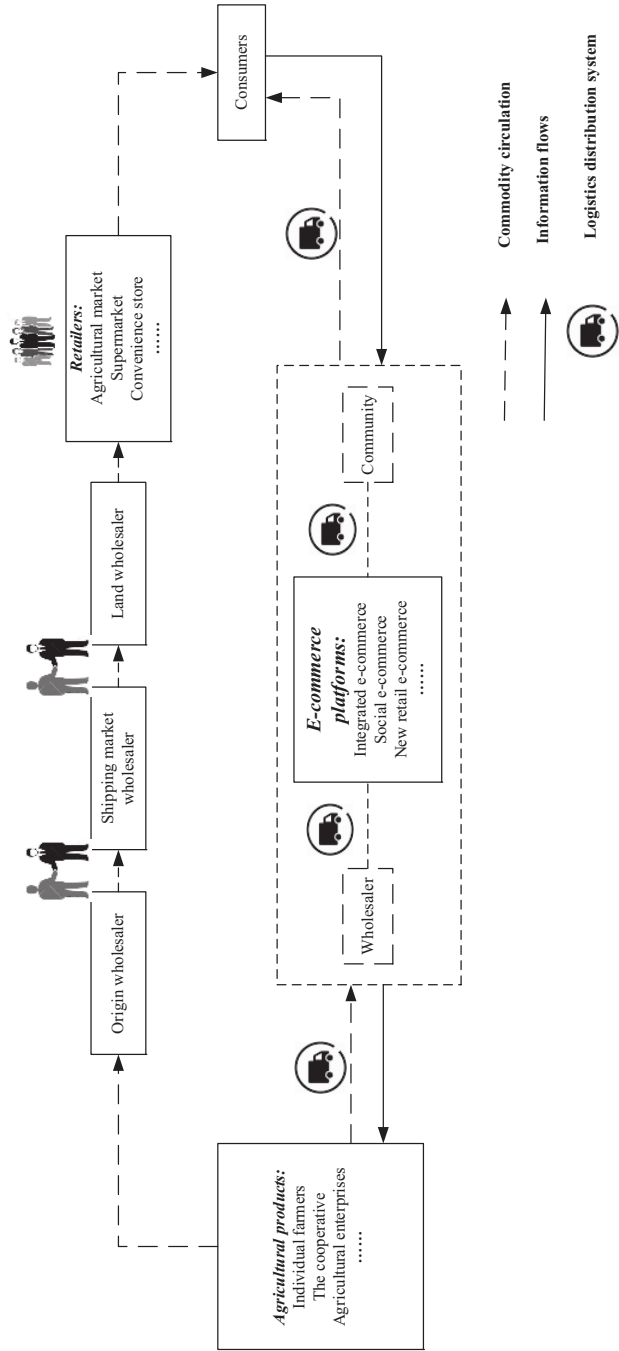


Figure 4.
Agricultural products
supply modes:
traditional vs
e-commerce

used to be dominant in the logistics system) experienced a precipitous decrease in demand during the early days of the pandemic. Thus, national e-commerce platforms also faced major challenges. Local governments helped address this issue, an effort that represents a change in Chinese urban governance. Territorial organizations within urban districts, including the street offices and resident committees, played a pivotal role in facilitating direct connections between consumers and farmers. According to recent research by many scholars, the participation of community-based organizations is the key determinant of the containment of the epidemic (Cheng *et al.*, 2020; Lu *et al.*, 2020). Resident committees are closely related to the base-level government because they receive financial support from the government under the budget for the administrative expenditure (Ma and Li, 2012) and undertake many government-assigned tasks, including the provision of basic welfare and the maintenance of public order (Duckett, 2006).

As shown in Figure 5, street offices and resident committees played a key role regarding food supply during the COVID-19 pandemic. They acted as a complementary channel to the market-oriented e-commerce platforms. Under the supervision of the base-level government, the officials in the street offices and resident committees regularly collected food demand information from each household every few days and directly connected with local agricultural product providers, including individual farmers, agricultural cooperatives and enterprises. After food was delivered to the collection agency of the resident area (*shequ*), the official staff members of the street offices and resident committees were responsible for allocating the food to each household under their jurisdiction.

As can be observed in urban governance theory in China, a pivotal characteristic of urban governance is the promotion of neighborhood self-governance through the building of communities, e.g. through the “community construction” policy (*shequ jianshe*), with the aim of strengthening leadership at the grassroots level (Shieh and Friedmann, 2008). However, under the guidance of local government, this self-governance displays certain characteristics of the government-oriented channels through which food supply issues are addressed and the burden of welfare provision under COVID-19 is alleviated.

4.3 Beyond government and market: *guanxi* and personal relationships

As previously stated, the seemingly *Shequ*-based self-governance model is in fact government oriented and relies on guidance from the local government. However, this

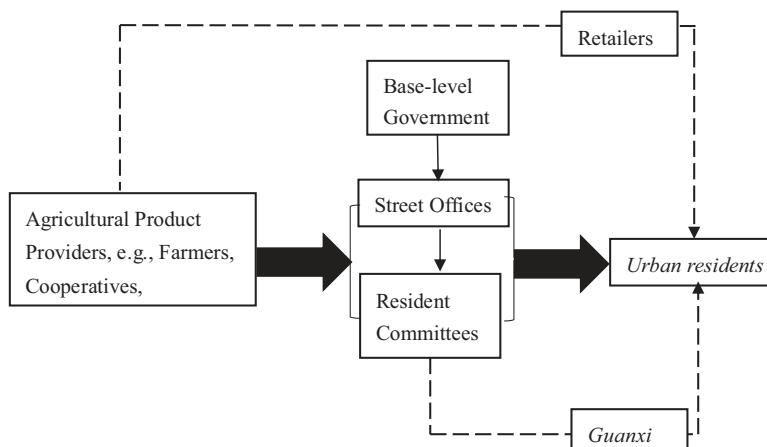


Figure 5. The role of local government and grassroots organizations

model also exhibits features of grassroots organization, i.e. relation-based e-commerce. [Martinsons \(2008\)](#) developed a theory to explain how a lack of dependable rules encourages *guanxi* and relationship-based commerce, finding that “personal trust, contextual and informal information, and blurred boundaries between business and government have shaped e-commerce.” Martinsons holds that because e-commerce depends critically on supporting infrastructure and institutions, e-commerce in China faces substantial challenges due to infrastructural obstacles and deficiencies in socioeconomic institutions. Thus, rule-based e-commerce is not dominant in China and the reliance on *guanxi* or relationship-based e-commerce inevitably stems from deficiencies in institutions rather than a preferred behavior or culture choice.

However, in recent years, infrastructural obstacles have been removed to a certain extent and e-commerce in China has developed at extraordinary speed ([Li, 2017](#); [Lin, 2019](#); [Lin et al., 2016](#); [Qi et al., 2019](#); [Zhang, 2019](#)); it seems that *guanxi*- or relationship-based e-commerce represents a supplement to rules-based e-commerce with regard to ensuring the food supply under COVID-19 (and probably in other similar public crises). One way urban residents purchase food is to directly connect with agricultural providers or retailers through acquaintances. This method has two components: personal trust and a social media platform. Residents normally receive food information from acquaintances (e.g. relatives, friends and neighborhood acquaintances) who have had a satisfying experience buying food from a specific agricultural provider or retailer. Buyers and sellers will then build a regular connection via social media, such as WeChat. Certain agricultural providers or retailers have established WeChat groups through which individuals interested in buying food on a regular basis can receive recently updated information.

Although it is unclear whether this type of *guanxi*- or relationship-based model will continue to function after COVID-19, it has played a pivotal role in ensuring the food supply for urban residents. As shown in many studies, because uncertainty exists in online transactions, consumer trust is an important factor affecting the successful proliferation of e-commerce ([Gefen 2000](#)). [Teo and Liu \(2007\)](#) further noted that given the physical separation between buyers and sellers, it is of substantial significance for vendors to develop a trustworthy relationship to foster customer loyalty. In the previously discussed relationship-based model, *guanxi* helps form a trustworthy relationship between buyers and sellers through a recommendation from a third party. This phenomenon not only reflects China’s deepening marketization reform and the improvement of the grassroots governance capacity but also the characteristics of a “relationship society.”

Based on the discussions above, [Figure 6](#) presents the theoretical framework that explains the success of China’s e-commerce in ensuring food supply to urban residents during the COVID-19 pandemic resulted from the combined power of the market, government and grassroots organizations and unofficial (*guanxi*-based) channels. This phenomenon not only reflects China’s developing marketization reform and the improvement of the grassroots governance capacity but also the characteristics of a “relationship society.” The market-oriented e-commerce model gathers agricultural products from all over the country and meets the needs of consumers in most parts of the country for various food products. The e-commerce of agricultural products with the participation of the government can overcome more transportation obstacles and make the information of local agricultural product supply and demand more symmetrical. Unofficial forces through the third-party e-commerce platform should supplement the first two models of the vacancy in the emergency in a more humane organization and community mutual assistance. To move agricultural products from the field to the consumer’s table, major e-commerce platforms based on information technology have played an intermediary role, through the participation of the market, government and nongovernment forces, in order to ensure that people’s food needs can be met in the event of an outbreak.

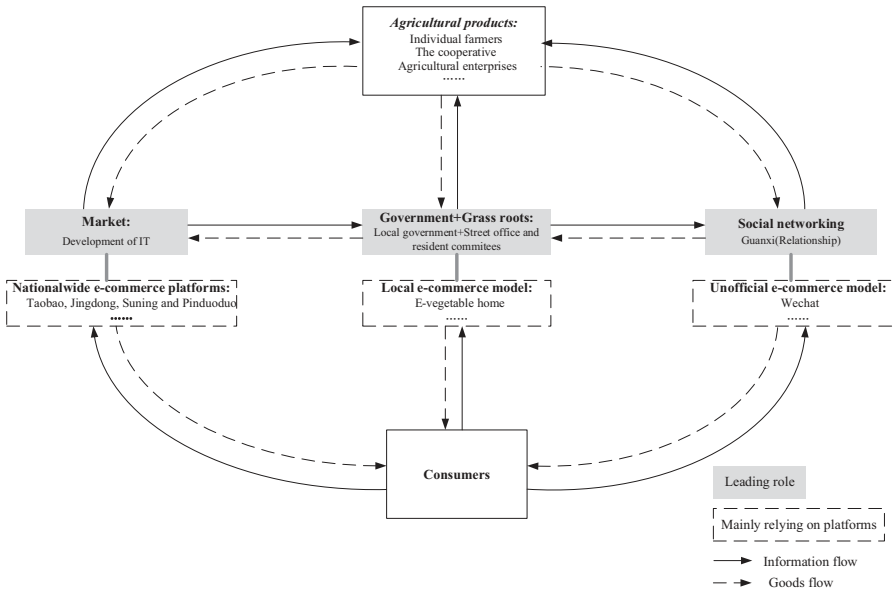


Figure 6. Power of market, government and grassroots organizations and unofficial channels

5. Conclusions and policy implications

The COVID-19 outbreak has spread around the world faster than anyone imagined. Many countries have adopted social distancing policies and imposed restrictions on logistics and human movement. Ensuring food supplies and security under such circumstances has become an emerging issue globally. In China, the function of the traditional agricultural and food supply chain has been severely disrupted as a result of the prevention and control measures adopted to fight the spread of the disease. E-commerce, which includes the capacity to maintain social distance through online activities, has emerged as a critical force in ensuring the delivery of agricultural and food supplies to urban residents during the outbreak. Drawing on the recent COVID-19 pandemic, this paper discusses whether and (if so) why and how e-commerce ensures the food supply for urban residents when social distancing becomes a mandatory requirement and the transport and logistics system are hindered.

We find that three e-commerce models played a substantial role in preventing the spread of the epidemic and ensuring the food supply for urban residents. After the outbreak of the epidemic, more urban residents bought food online to meet their living needs, particularly in large cities and the worst-affected areas. However, the role of e-commerce platforms is heterogeneous with respect to area and epidemic control levels. The nationwide e-commerce platforms under market leadership must play their roles by relying on the sound infrastructure of large cities, while local agricultural products e-commerce led by the government must be supplemented in small and medium-sized cities. In addition, in the worst-affected areas, particularly in closed and isolated communities, the local e-commerce model was the primary model, supplemented by the unofficial e-commerce model based on social relations. Through online booking, centralized procurement and community distribution, the risk of cross infection could be effectively reduced and the food demand could be effectively satisfied.

Building on governance theory, we explain why these models work in China, finding that apart from e-commerce, a governance system that integrates the government,

e-commerce platform, community streets and the unofficial *guanxi* also impels the success of these models. This also comparatively expands the framework of governance theory, hence reflecting this study's theoretical innovation and value. The deepening of marketization reform and the subsequent development of e-commerce platforms provided a basis for sustaining the food supply chain amid the COVID-19 outbreak. This basis was further reinforced by an improvement in governance capacity, i.e. improved interaction between government and grassroots organizations (e.g. street offices and resident committees). Effective governance is a pivotal factor to ensure food supply, under such as has been demonstrated by other studies (Fei *et al.*, 2020). In addition to these official channels, it is found that unofficial channels, which rely on Chinese *guanxi* and social media, also shaped the functioning of e-commerce when the entire society was confronting COVID-19. E-commerce has not only affected the rural community, as shown in several studies (Li *et al.*, 2019), but also contributed to ensuring the food supply in urban China under COVID-19 by overcoming the conflict between offline food shopping and social distancing requirements.

Based on the main findings, we provide guidance regarding ways in which e-commerce can help ensure food supply amid the pandemic and other similar public crises. First, the government can utilize e-commerce platforms to relieve the pressure stemming from the conflicts between the traditional model of food purchase and social distancing requirements for areas where e-commerce is well established. Second, the capacities of grassroots organizations deserve more attention in areas where e-commerce is incessantly underdeveloped. Guided by the local government, resident committees can establish direct connections with local agricultural product providers, supermarkets or retailers who can regularly deliver fresh agricultural products. This approach underscores the importance of resident representatives and volunteers who help collect household food demand information and simultaneously negotiate with agricultural product providers. The local government could consider providing these people with subsidies from the extra government financial budget. Third, the local government should pay more attention to the important role of unofficial channels – which is a supplement to the national e-commerce platforms – in ensuring food supply. Because a lot of food obtained through informal channels has a price advantage, this has a greater significance for the poor households subject to risk. This is also linked to the connection between community residents and agricultural providers (as stated in the second point above).

The applicability of these policy implications is twofold. On the one hand, although the outbreak of the epidemic is uncertain and many of its impacts are for short term, this paper's conclusion on how to ensure constant food supply during the epidemic period based on the e-commerce platform and the well-functioned governance system is not only of short-term practical significance. In the long run, these models will play an important role in the face of similar epidemics or other future public security crises. This is crucial to the improving China's public health system. On the other hand, this paper's conclusion is of great reference value to other countries suffering from the epidemic, including how large e-commerce platforms, such as Amazon, can maximize the role of food supply amid the epidemic. However, following China's unique development path and special cultural background, some of these measures, such as the role of street communities and the informal temporary e-commerce model based on *guanxi*, may not be directly applicable to other countries. This study does not aim to encourage each country to adopt the same coping strategies as China. The study rather aims to provide some pioneering ideas. Each region should formulate appropriate policies based on its own background to ensure the basic food supply in the case of similar epidemic events.

Notes

1. Data source: <http://data.mofcom.gov.cn/article/zxtj/202003/52241.html>, http://www.stats.gov.cn/tjsj/zxfb/202004/t20200417_1739602.html.
2. 2007.06 National Development and Reform Commission: “The 11th five-year plan for the development of e-commerce.”
3. 2011.10 the Ministry of Commerce: “The 12th five-year plan for the e-commerce development guidance.”
4. 2015.01 CPC Central Committee and the State Council: “Suggestions on strengthening reform and innovation and accelerating the modernization of agriculture.”
5. 2016.01 MOA of the People’s Republic: “notice on the issuance of pilot program of agricultural e-commerce.”
6. 2016.01 General office of the MOA: “Circular on the issuance of the pilot programme on agricultural e-commerce.”
7. 2019.05 General offices of the CPC Central Committee and the State Council: “Digital rural development strategy outline.”
8. The China International Electronic Commerce Centre (CIECC) is the executive organization and technical support entity for the informatization construction of the Ministry of Commerce of the People’s Republic of China.
9. “Contactless delivery” service users refer to those who choose this service at all the time. See the National Bureau of Statistics of China: http://www.stats.gov.cn/tjsj/sjjd/202003/t20200316_1732420.html.
10. Details are introduced in the next section.
11. Data sources: <http://finance.ifeng.com/c/7utBkZ39rGl>.
12. Data sources: <http://finance.people.com.cn/n1/2020/0324/c1004-31645303.html>.

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