



The Impact of Covid-19 on the Food Supply Chains in China

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Abstract. During the COVID-19 pandemic, people's movement was under restrictions due to lockdowns. The food supply chain is then largely affected with disrupted supply and changed demand patterns. This paper mainly assesses the impact of Covid-19 pandemic on the food supply chains in China. In the demand side, the changes include consumers panic buying behavior and the shift of commerce platforms to purchase food. At the same time, in the supply side, processing and distribution of food are disrupted and governments are taking actions to mitigate the situation. In this context, some innovative approaches also emerge to facilitate the functioning of the food supply chain, including the development of livestreaming selling and the shared labor model platform. The innovative solutions offered by JD to help with the normal food supply during the pandemic is also reviewed. In the future, it is expected that digitalization will become increasingly important for the food supply chains resilience and the growth of online food purchase and delivery will continue for consumers. This paper can serve as a reference for the government and organizations to make changes to improve the supply chain resilience later in the post-pandemic era.

Keywords: Food supply chain · Covid-19 · Impacts

1 Introduction

During the outbreak of COVID-19, people's movement was restricted due to lockdowns. Consumers' traditional way of accessing food is changing. The normal processing and selling of fresh food is also affected. These have brought challenges to the resilience of local and global food supply systems and even put them in crisis.

China is the first country suffering from the outbreak pandemic and is gradually returning to normal operation with effective containment measures. In the post-pandemic era, China is still experiencing a regional recurrence of the pandemic. COVID-19 has had a profound effect on the food supply chains of China. Food supply chains are facing demand-side shocks like dramatically changed food buying behaviors, and the supply of food is suffering from delivery labor shortages and inventory build-up for unsalable agricultural products [1].

This paper aims to review the impact of the COVID-19 pandemic on the food supply chains in China and some emerging innovative approaches to help with the stability of

the food supply chains. Innovative solutions offered by JD to help with the food supply chain will also be discussed. Moreover, the expectations and trends for the future food supply chains will be explored. Therefore, this paper sheds some light for governments on making more effective policies and strategies to improve the supply chain resilience in the future. In addition, for the organizations, they can have a more completed view of the situation and the future trends so that they can make better decisions in enhancing their food supply chain flexibility and resilience.

2 Demand-Side Shocks

The most obvious impact on the demand side is consumers' panic buying behavior, particularly during the early outbreak of the pandemic and the sudden regional recurrence of the pandemic. This hoarding behavior from consumers is triggered by the fear that the food supply systems will be largely affected by the social distancing policies implemented. They are in the panic that they may lack sufficient food to support themselves during the future lock-down period. The stockpiling behaviors have led to dramatic scenes. Many of the shelves in the supermarket went empty. Consumers were rushing to buy vegetables, meats, instant noodles, canned and frozen foods [2]. Even though the government officials and other authorities quickly responded by stressing that the food in the system is sufficient and abundant, the panic buying behaviors cannot be curbed in the short-run. Nevertheless, the surge in the demand for food across a wide range of categories still created short-run stockouts, for most supermarkets are built on a just-in-time supply system [3].

Another significant impact on the demand side is the closure of restaurants, coffee shops, and hotels during the lockdown, with people working at home. In 2020, the early stage of the pandemic outbreak, the annual scale of the catering industry dropped to 3.95 trillion yuan, nearly a fall of 1 trillion yuan from 2019 [4]. The immediate impact of this sharp decrease in consumption in the catering industry is the shift of purchases to the food retailing sector, adding more demand pressure on the food retailing system. However, when the lockdown ended, consumers' pent-up demand incurred retaliatory consumption on the catering industry and brought recovery to the catering industry. Additionally, the consumer vouchers released by local governments with the aim of stimulating the economy after the lockdown also facilitated the recovery of food demand [5].

The panic buying behaviour and the drop and recovery of consumption in the food catering industry are short-term problems. In the longer term, with the decrease in consumer income, demand will be affected across all food categories [6]. A typical example is that consumers are expected to be more price sensitive and the demand for foods that are highly price elastic may fall significantly with consumers' demand shifting away from more expensive items. In addition, consumer patterns may change in the long run. Many consumers have formed the habit of ordering take-out delivery, purchasing fresh food via e-commerce platforms, and simply cooking semi-finished food at home during the lockdown period [5]. Therefore, their motivation to dine out is weakened even though there are no longer social distancing measures.

3 Supply-Side Disruptions

The supply-side disruptions of food supply chains are mainly caused by labour shortages and disruptions to transportation networks. However, these restrictions have resulted in severe negative impacts on the distribution of food from farms to consumers. Labour shortages due to movement restrictions have affected the food processing and distribution networks [7]. Foods including fruits, vegetables, and animal husbandry products tend to decay quickly. They are more likely to suffer from labour shortages across various stages of the food supply chain, including production, sorting, packaging, and processing. The production stage is affected by the disrupted supply of seeds and fertilizer. Also, distribution channels were disrupted at retail and wholesale points and hit by plummeting demand from the shutdown of restaurants and canteens.

The “Green channel” has been established and opened by the government to facilitate the smooth transportation of farm products and supplies [8]. The channels allow the trucks transporting agricultural products to pass quickly without incurring additional costs. However, in some places, there are still a large number of seasonal vegetables and fruits that cannot be sold due to the movement restrictions during the lockdown. They are overstocked or even unpicked on the farms. To further support the distribution and sales of farm products, the government promoted cooperation between technical institutions and e-commerce firms. By developing specialized platforms for agricultural products and labour, the mismatch in supply and demand was alleviated. The government has also mitigated the situation by appealing to big companies to shoulder more responsibility. Some of the companies then provide support by buying a large number of unmarketable products, especially emphasizing on helping the worst-affected farmers [9]. Dedicated channels and funds are also established to facilitate with the sales of the products.

When farmers, related wholesalers, and retailers are worrying about the selling of their products, citizens under lockdown are also suffering from the poorly supplied food. A typical and extreme example is the severe lockdown of Shanghai from March 2022, when residents are not even allowed to leave their homes. When the lockdown has lasted for nearly three weeks, many people’s hoards have become depleted, and the food distributed by the government is far from enough. With the restricted movement, individual residents can then only acquire food through online retailing platforms like Dingdong and Meituan and get food delivered to their neighbourhood. However, owing to the shortage of delivery capacity, many products are sold in a way that only suits group purchases. For example, when buying milk on the platform, at least 50 cases should be bought per order. This forces residents to join the group purchase. The group purchase works by aggregating the demand for some essential foods that are provided in the specific group on social media like Wechat. Then, the ordered food that is on a large scale will be delivered to the neighbourhood from local stores.

4 Innovations

During the COVID-19 pandemic, due to the movement restrictions, nearly every step of the food supply chain has been making innovative changes. For farmers and wholesalers, digitalization has been playing a critical role in diversifying the food distribution channels

and increasing sales. Apart from the traditional sales channels, farmers and wholesalers can now take advantage of the online channels. Therefore, under the circumstances of restricted movement, they can increase the accessibility of food to customers and lower the risk of food decay. Some of the online channels include livestreaming and promotion on social media platforms such as WeChat and TikTok. These channels only require farmers and wholesalers to master some basic online marketing skills and then sell their products directly to consumers. Many farmers and wholesalers have been enjoying increased sales by employing the online channels and making these channels as long-term strategy [10].

As for many e-commerce platforms like Hema and Dingdong, which sell food online and get it delivered to the doors of consumers, they have been attempting to establish their own food supply chains, from farmers to end customers. By having their own food supply chains, these platforms will have more control over each step of the supply chain, such as production, sorting, packaging, and processing. Therefore, they are able to have more resilient and flexible food supply systems and better supply-demand matches during the special period. Concerning innovation in delivery, contactless delivery has been increasingly popular. The delivery staff only needs to place goods at designated locations, such as the front desk of the company and at the door of the house. This can ensure the safety of users and riders during the meal collection process by reducing face-to-face contact and avoiding the risk of cross infection.

Innovation is also revealed in other aspects with respect to the food supply chain. To deal with the food loss caused by unsalable fruits, more and more fresh fruits and vegetables are packed and processed into snacks, which improves the shelf life and expands the market as well [9]. To alleviate the labor shortage caused by the lockdowns, the “shared labor” model is created by the e-commerce companies [11]. The lockdown has led to the shut-down of many businesses, especially in the catering and retailing industries, and a large number of unemployed workers. Under the food delivery model, the temporarily idled employees can register on the platform and then be hired by the employers where they will be redeployed to other positions that are in high demand within food supply chains, such as serving in warehouses and the food delivery sector. In the short term, this ‘shared labor’ model can serve as an effective way to ease the urgent need for labor within the food supply chain. In the long run, this model may develop into a local employee sharing system, helping the registered idle labor to be hired to sectors and positions of urgent demand within a short period.

5 Innovative Food Supply: A Case Study of Jingdong

In order to help more small and medium-sized farmers and fresh food merchants solve the problem of unsalable agricultural products during the epidemic, JD launched a project called “Jing Heart Helping Farmers” [12]. Additionally, in February 2020, JD released the “Notice to National Farmers” to collect information on unsalable agricultural products. The company then opened a dedicated “National Fresh Product Green Channel” to promote unsalable agricultural products [13]. This channel helps to connect the farmers that have unstable agricultural products with all channels such as e-commerce, offline stores, and community group purchases in the national wide market. This significantly

helped farmers to increase their income and overcome the selling difficulties during the pandemic. By October 2020, the “Jing Heart Helping Farmers” project has helped to sell three hundred million pieces of agricultural products, covering more than eight hundred agricultural industrial belts and two thousand poverty-stricken villages across the country [12].

The logistics was restricted during the pandemic, which caused the overstock of a large number of agricultural products. JD Live Stream established a panel to help farmers. It united many streamers in the platform to provide free services for the merchants to sell the overstocked products in their streaming room. In addition, Jingxi, JD’s discount shopping platform, launched a livestream of “Helping Fruit Farmers,” featuring 11 fruit producing regions in eight provinces [14]. Sichuan’s Baba tangerine, Liaoning’s Dandong strawberry, and Hainan’s Imperial mango are all included. It was the first time for these vendors to have the unsaleable fruits to use the live streaming channel to sell their products. The achievement was significant. With more than 100 live broadcasts, Yunnan’s perfume pineapple sold more than 5 tons in 4 h [12].

6 Expectations and Trends for the Future Food Supply Chain

During the pandemic, digitization has played an important role in enhancing existing food supply chains and promoting supply chain restructuring. In the future, to further motivate the food supply chains to be more resilient in the face of movement restrictions, supportive government policies and influential companies should play critical parts. From a more integrated and strategic perspective, more investments are needed in establishing more decentralized and increasingly connected food supply chains. Besides, more funds should be devoted to building cold chain logistics, warehousing, packaging, and processing capacity that are closer to the production areas, which can help to gain more benefits from the digitalization of the supply chain [15]. Besides, the proportion of farmers who use e-commerce platforms is still small so far [16]. To facilitate farmers’ access to e-commerce platforms, increased production standardization and further development of logistics systems in rural areas are required. Private businesses should be given more support in integrating e-commerce into the food supply chain since they have more advantages in this aspect.

This increase in online food shopping is expected to continue in the future. According to the survey, even after the pandemic, 55 percent of Chinese consumers will continue buying groceries online [17]. Despite the fact that most of the Chinese mainland has recovered from the epidemic, many consumers have developed the habit of purchasing groceries through e-commerce platforms. It is anticipated that grocery online retail penetration will continually increase, rising from 5% in 2018 to 16% by 2024 [18].

In addition, as the pandemic exposed the problems of the mainstream food supply chains, there is an increasing trend that local food supply chains have become an alternative for more consumers [19]. The long queues and empty shelves in the supermarkets during the initial stage of the pandemic have made a deep impression on many consumers. It reflected the problem of the mainstream food supply chains that they responded sluggishly to the unprecedentedly radical demand surge caused by the consumers’ panic buying behavior during the initial stage of the pandemic. On the contrary, local suppliers

can be more agile and more resilient in the face of the same short-run demand surge [20]. Therefore, many consumers now have the tendency to purchase more food from the smaller stores and local suppliers in their neighborhood. It is predicted that consumers will show their increased interests in the locally sourced foods in the short to medium term.

7 Conclusion

To conclude, as for the impact of the COVID-19 pandemic on the food supply chains in China, on the demand side, the most significant influence is the consumers' panic buying behavior resulting from the restriction movements. This further led to short-run stockouts in a large number of supermarkets relying on just-in-time replenishment. Moreover, influenced by the COVID-19 pandemic, consumer buying behavior may be changed in view of how and where they buy foods in the longer term. At the same time, on the supply side, the distribution of food from farms to consumers is adversely affected, and there is a large amount of unsaleable vegetables and fruits due to the movement restrictions. In this context, the government is formulating policies and facilitating the cooperation of the related firms to help with the supply-demand matching of food.

Innovations also appear to safeguard stable food supply chains. Digitalization played an important part in diversifying the food distribution channels and increasing sales for farmers and wholesalers during the pandemic. For instance, farmers and wholesalers can now take advantage of the online selling channels by livestreaming and social media promotion. Another innovation—the “shared labor” model, is also hailed as an effective way to fulfill the urgent demand for labor along the food supply chain.

Jing Dong, as a leading e-commerce enterprise, played a spearhead role in taking innovative approaches to help maintain the stability of food supply chains. The supported the farmers' having unstable agricultural products by connecting them with all the selling channels. The related project “Jing Heart Helping Farmers” and green channels for fresh foods have made a substantial contribution to maintaining the stable supply of food during the pandemic.

As for future expectations for the food supply chains in China, digitization will be given more emphasis to further enhance the resilience of the food supply chains. Therefore, in the future, more investments are needed in building cold chain logistics, and establishing more decentralized and connected food supply chains. Furthermore, on the demand side, the popularity of online food delivery services is expected to continue in the future. Apart from this, consumers have shown increased interests in locally sourced foods for their nimbler supply chains in the short term.

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