



Commentary: The Impact of the Coronavirus Pandemic on Supply Chains and Their Sustainability: A Text Mining Approach

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A Commentary on

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Recent lockdown measures imposed by the Shanghai government (in late March 2022) remind us of the fact that the resilience of our supply chains is still weak. After more than 2 years of the COVID-19 pandemic, many economic struggles remain when a major urban hub goes under a lockdown or becomes a restricted zone. This is also one of the reasons that local governments of larger cities like Shanghai try to evade lockdown measures, as the economic impacts are immense. In cases like Shanghai, they focus on district-level measures to contain the disease or divide the city into different parts with different lockdown measures. But more recently, the whole city has been experiencing a lockdown situation again. Nonetheless, the most significant impact is on the supply chains, which are disrupted at multiple scales in all cases. Not only that the sustainability of supply chains remains weak (Meyer et al., 2021), but we also see complications with managing and sustaining productions, distributions, and supply chains themselves. Pimenta et al. (2022) identify seven types of supply chain resilience capabilities in the existing literature. They are visibility, redundancy, flexibility, collaboration, agility, adaptability, and sustainability. More specifically, visibility refers to having the information on the availability of chain environment, operations, risks, and coordination mechanism (Pimenta et al., 2022), linking to information dissemination and transparency. Redundancy means utilizing safety stock to keep the capacity to respond to any supply chain disruption, relying on information effectiveness and time sensitivity. Another critical aspect is agility, which is the ability to react fast to market changes and other supply chain interruptions (Pimenta et al., 2022). Besides those three supply chain resilience capabilities, the rest are derived from the concept of resilience and are easy to interpret (i.e., flexibility, collaboration, adaptability, and sustainability).

According to Barman et al. (2021), there are multiple supply chain barriers regarding COVID-19's impacts on the food supply chain, including lockdown, lack of labor availability, delay in activities, social media, customer behavior change, online consumption, and so on. These barriers highlight the importance of e-commerce, social media, and/or information communication technologies (ICTs) in reducing supply chain barriers during the pandemic. For example, a study

on regional food supply chains in Texas and Iowa in the USA found that employing scale-appropriate ICTs can dramatically increase collaboration among regionalized food supply chains (Marusak et al., 2021). In addition, collaboration is regarded by Pimenta et al. (2022) as one of the supply chain resilience capabilities. It can tell that localization and/or shortening the food supply chain can improve the overall supply resilience. In a case study of Singapore's food supply chain during the pandemic, Song et al. (2021) also emphasize that securing smooth communication along the supply chain and minimizing panic buying are the key to reducing delays and the mismatch of demand and supply during the pandemics. This implies that besides reliable transportation systems, effective distribution of goods and labor forces, good governance and policy enforcement, and harmonious collaboration are also important. Moreover, strategies dealing with efficient information spreading and communication enhancement are critical during the particular period of the pandemic to support supply chain resilience capacity-building.

Amid the COVID-19 pandemic, supply chain disruption is recognized as one of the key drivers of economic shocks (Shi et al., 2021). The impacts are on populations across multiple scales of local, regional, national, and international. And remarkably, food supplies are affected the most due to their possible high-level risks for infection (Pravst et al., 2022), mainly due to import and export mechanisms in food supply chains, production, packaging, distributions, etc. (Cheshmehzangi, 2020). In addition, other disruptions are food losses caused by labor force shortages and essential agricultural supplies like fertilizers, seeds, and so on due to travel restrictions. A significant example is the closure of HORECA (Hotel, Restaurant, and Catering) channels due to pandemic prevention policies (Rivera-Ferre et al., 2021). Such disruption implies that the longer the supply chain, the heavier the negative impacts introduced by the pandemic. Conversely, Barman et al. (2021) argue that decentralization can boost the supply chain's adaptability. It could allow consumers to get natural and fresh products with the minimum transportation and storage costs and the least carbon footprints.

On the other hand, Rivera-Ferre et al. (2021) state that disruptions and impacts from the side of food consumption have also been witnessed. The leading factors include panic buying, home cooking, and increasing non-perishable and local food consumption. Such factors lead to growing pressure on food stability and security. During the national lockdown period, Italy's Agriculture Research and Economic Council recorded a food consumption increase, such as fruit by 29%, vegetables by 33%, legumes by 26.5%, and olive oil by 21.5% (Barman et al., 2021). Song et al. (2021) claim that dramatic changes in food consumption and consumer behaviors can trigger unprecedented sharp rising in food prices, resulting in food stability disturbances and further economic and social stability. It is argued that consumption aspects of supply chain resilience reflect the impacts of customers' decision-making concerning supply chain performances, which includes adapting actions to explore and choose new markets as an alternative (Pimenta et al., 2022). For instance, the growing trends of

e-commence during the lockdown as people are switching from grocery shopping at supermarkets to online buying due to multiple COVID-introduced direct and indirect impacts as well as supply chain disturbances. Like the USA, about 70% of customers reduced grocery shopping frequency and switched to online purchasing during the COVID pandemic (Barman et al., 2021).

Although the recent lockdown in Shanghai was slightly delayed, its ripple effects are seen elsewhere, with a significant impact on food supplies. With the launch of phase II lockdown in Shanghai, growing concerns are related to four factors: containing the recent outbreak, keeping people safe, sustaining economic stability, and reducing the impacts on supply chains. Due to significant disruptions in production, logistics, and services, the latter two points are now at a critical level. The negative COVID-introduced impacts are like the virus spreading from the food supply chain to others. The ripple effects are seen elsewhere, from the absence of dairy products in the region to limited export levels of essential and non-essential commodities in the international market. With growing domestic and international demands, the financial economy is now in decline, posing a major regional threat for all industries.

Despite the growing concerns about the unsustainability of our food supply chains, we see there have been few adaptive measures in import and export operations. The measures are mainly for safety and security procedures, which are insufficient for food supply chain management. On the other hand, the resilience of food supply chains is weak, with little room for alternative supply sources (Schmidt, 2020) to minimize the shocks and immediate supply shortages. Unfortunately, supply chain recovery still cannot respond effectively (Alicke et al., 2020) to sudden reoccurring outbreak events, which show little adaptive thinking in the crucial contexts of major economic hubs like Shanghai.

A common flaw is having a centralized approach to supply chain management, which undermines the values of supply chain networks, adaptive production, multiple distribution sources, and alternative modes in the supply chains. Such a centralized approach to economic growth and development has been a major challenge for both developed and developing nations. Disparities between south and north in the UK, west and east in China, coastal and inland areas of the US, and many other examples indicate systematic deficiencies that require further attention. Hence, amid crises like the recurring outbreaks, the impacts are seen at a larger scale, decreasing the region's economic stability, disrupting the supply chain networks, and affecting the viability of productions and services. We would encourage consideration of decentralized economic development patterns by allowing diversity in supply chains and achieving better supply chain management through adaptive, resilient, and sustainable measures. In short, to foster supply chain resilience capacity for future unexpected disruptions like the COVID pandemic, it is necessary to utilize a decentralization approach with diversification and adaptive management. Such approach could improve management for offsetting and mitigating future supply chain disruptions, particularly for cities like Shanghai. Such cities rely heavily on importing essential supplies from

others. Hence, a city like Shanghai acts as the sole economic and industrial hub in the entire region and/or county.

AUTHOR CONTRIBUTIONS

AC wrote the paper. TZ and ZS provided reviews and did revisions. All authors contributed to the article and approved the submitted version.

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