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Collaborative governance in emergencies: Community food supply in COVID-19 in Wuhan, China

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A B S T R A C T
Country governments and the WHO advocated that the "whole-of-government" and the "whole-of-society" approaches are necessary to fight against the pandemic. However, it is unclear what it means in practice and its implications in the context of food security and in emergencies. This article examines the “whole-of-government and whole-of-society approach” (WOG-WOS), how the government and non-government stakeholders have quickly engaged in collaborative governance to address the community food supply challenges. This research analyzed government policies and reports, scanned grey literature and conducted in-depth interviews with key stakeholders in Wuhan working on the frontline of food supply during the first wave of COVID-19 lockdown. The findings contribute to the literature on collaborative governance in emergency management. The case of Wuhan makes the point that the government and the society are interdependent in emergencies. For the whole society to achieve its full potential, the governments need to focus on the goals, function as open-minded coordinators and adopt a flexible governing structure.

Introduction
COVID-19 has impacted all aspects of the food supply chains (Singh, Kumar, & Panchal, 2021) by affecting food availability, accessibility, and affordability (Kim, Kim, & Park, 2020). The changes happened to both supply and demand (UNSCN, 2020). A food supply chain is a series of processes that moves food from the production sites to consumption sites. Multiple actors, including suppliers of inputs, farmers, processors, wholesalers, retailers and consumers, are involved. In ordinary times, activities associated with food supply can take place in various locations, such as on farms, on processing sites (factories), in storages and markets, and in dining venues (restaurants, hotels, public spaces) and at home. In terms of geographical distance, a food supply chain can be long (starting from another country or another continent) or short (from within the communities where the consumers live) (Fredriksson & Liljestrand, 2015). Focusing on the community food supply allows us to zoom in to the final stage of food supply in urban settings and have a closer look at the actions and interactions of the stakeholders, in particular the roles of consumers and the civil society in the communities. There have been varied local contexts and forecasts of the COVID-19 pandemic, and so have the response strategies. It is necessary to understand how individual cities, particularly those in an emergency, addressed the challenges along with all segments of the food supply chain as they went through the cycles of the pandemic. The insights would be helpful to draw lessons for the past and pave the path to future urban resilience.

This article presents an in-depth case study of Wuhan and answers the following questions: how was food supply operated in urban communities during Wuhan’s multiple waves of COVID-19 lockdowns, and what lessons can be drawn from its practices? In the following section, we argue that the “whole-of-government and whole-of-society” (WOG-WOS) approach adopted in China is a form of collaborative governance in which the government and non-government stakeholders work together to deliver public good and the emergency poses extra demand for the leadership role of the coordinator to be able to take advantage of the strength of the “whole-of-society”. The case of Wuhan city was analyzed to show how collaborative governance worked to achieve different food supply goals (accessibility, affordability) for different groups of people (ordinary residents, vulnerable population and people in quarantine). This city was selected as it was the first to be hit by the virus, had experienced 76 days of the strictest lockdown and

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was followed by partial lockdowns. It experienced all the stages of initial confusion, learning by doing, adaptation and opening, which allow us to gather rich information for different lockdown scenarios. The Discussion and Conclusion sections reflect on the critical practical and theoretical lessons from the experience of Wuhan. This article contributes to the evolving literature on collaborative governance in emergencies.

**Collaborative governance in emergency: “whole-of-government” (WOG) or “whole-of-society” (WOS)?**

There has been enormous research on “whole-of-government” (WOG), “whole-of-society” (WOS) and collaborative governance. This section briefly reviews these concepts and shows how they are linked to the COVID-19 emergency management.

The “whole-of-government” (WOG) first appeared in the 1990s to suggest that government departments need to overcome departmentalism and collaborate to produce consistent policies for complex policy issues (Webb, 1991). It encourages resources, information sharing and joint decision making. There needs to be an overarching institutional structure to allow cooperation to be beneficial to all involved and from the perspectives of government service users to minimize duplication and simplify procedures. WOG was criticized for not seeing the need for other stakeholders to be represented and contribute to solving complex policy issues. A “whole of society” (WOS) approach emerged as a critique of the WOG thinking and stressed the need for non-government stakeholders’ participation (Schirch, 2012). With WOS, civil society, NGOs, businesses, and government all participate in a meaningful way to be represented in the decisions (Dubb, 2020). In theory, WOS can replace WOG as the concept includes the government. However, the WOG and WOS are often put side by side. Some researchers combined the two into a “whole of nation” approach (Figtree, Jennings, Nicholls, & Graham, 2019; Potter et al., 2017), showing the concern that in WOS, the government might be treated as a single participant and the need for intergovernmental collaboration might be neglected.

This article uses the term “the whole-of-government and whole-of-society” approach (WOG-WOS), a combination of WOS and WOG to stress the importance of collaborations within the government (horizontal and vertical) and between the government and other actors. What is more, the government and the society can be interdependent from each other, i.e. without the society, the government cannot work on its own. The WOG-WOS approach is, in essence, a form of collaborative governance in which all participants would make meaningful contributions and their interests are reflected in the decision making, reflecting a shift from government to governance in modern societies (Bekker et al., 2017a). However, it is easier to say than to achieve it. According to Bekker et al. (2017a), a WOS program, based on the experience in Holland, Canada and the UK, generally needs at least five to ten years to develop irreversible conditions for collaborative governance.

In the context of China, collaborative governance has been analyzed in different policy contexts, such as environmental and climate change governance (Jing, 2015; Yan, Zhang, Zhang, & Li, 2020), fighting against natural disasters (Mah & Hills, 2012; Ye, Chen, Chen, & Ye, 2019), housing regeneration (Liu & Xu, 2018), business innovation (Liu et al., 2020b; Mah & Hills, 2014), social service outsourcing (Teets & Jaguszyn, 2015) and urban community development (Li, Hu, Liu, & Fang, 2019). All these studies highlight the strong leadership role of the state in local governance and interdepartmental collaboration. However, meaningful participation is often a challenge at the grassroots level (Enserink & Koppenjan, 2007; Plummer & Taylor, 2013).

The collaborative governance models would be different in ordinary times and an emergency when the governance system needs to be adapted quickly to meet the emergency (Waugh & Streib, 2006). Waugh and Streib (2006) argued that collaboration is a “necessary foundation” in emergencies. What lies at the center of emergency management is the much tighter time for decision making, the extraordinary level of risks and mounting public anxiety or even panic (Kapucu, Arslan, & Demiroz, 2010). A more problem-driven approach with effective strategies and a transformational vision is necessary. Compared to ordinary time, effective leadership in emergency management would need the flexibility to overcome the constraints imposed by hierarchy or standard procedures (Karaca, Kapucu, & Van Wart, 2012). It would also need to put practical limits to participation even though it would be necessary (Waugh & Streib, 2006) Cai, Jiang, & Tang, 2021. summarised China’s responses to COVID-19 as a “campaign-style crises regime”, which included establishing leading groups and headquarters, horizontal formal and informal institutions, and vertical formal and informal institutions. The COVID-19 is an emergency in which the state does not have time to organize competitions between regions as often used by the Chinese government in other policy contexts. However, Cai, Jiang, & Tang, 2021’s research only focused on the epistemology perspective, i.e., the health aspect of the pandemic.

Rood (2012) acknowledged that public resources and knowledge could be essential to improve the effectiveness of emergency management, but at the same time also aware of the time constraints. It is challenging for collaborative governance to be organized from scratch, even with good leadership. He suggested that the process of tapping into public support can be developed in the earlier stage of policy formation.

Interestingly, Zhang and Li (2011) and Li, Huikuri, Zhang, & Chen, 2015 examined how China had used a combination of hierarchical public administration and horizontal grassroots level public involvement to implement public and environmental health improvement tasks. Such a system involves an intersectoral task force, awards and competitions, and intensive public participation (both voluntary and paid) Li, Hu, Liu, & Fang, 2019. analyzed the “state-led coproduction”, another form of collaborative governance in which the state is the initiator, the financier and the partner in governing and providing public goods in migrant concentrated neighborhoods. However, they all reveal the co-existence of the state’s strong leadership and the willingness to draw on public support. Bearing in mind that these are not emergencies, it means that there had been a significant amount of practicing of collaborative governance during the ordinary time for various purposes.

**Methodology of the research**

To understand the new challenges of COVID-19, the solution and the governing structure to achieve food security in urban communities, a case study method would be suitable for pinning down accurately what needed to be done, the tasks and responsibilities of the stakeholders and exploring how they were linked to each other. The data for this research came from several sources. To understand the emergency governance of food supply during the COVID-19 lockdowns, we systematically collected government documents issued by various levels of governments and different departments (literally translated as “bureaux” from Chinese) regarding food supply. Some were the notifications during the lockdowns and some were the post COVID or end of the year work summaries by each government departments. As all governments published documents often quite frequently to address newly emerged issues, the authors went on all the government department websites repeatedly to look for policies and reports published from 23 January 2020 to 5 March 2022 when the research team completed the final draft of this article. The government policies are crucial to establishing the WOG governing structure and the division of responsibilities between the government, the market and the communities.

A co-author of this article acted as the field researcher. She conducted interviews with twelve people working in the field, including four volunteers (one from a state-owned enterprise and three from public institutes who were dispatched to the communities), one staff member from the city management authorities (chengguan), three staff members from three communities and one group purchase software developer. The interviews were conducted post lockdown during January and March 2021. The interviewees were asked questions...
regarding their own roles during the lockdown and how they interact with other people working in the communities. These interviews are helpful to provide detailed information on the actual operation on the ground. The field researcher was also a member of two WeChat volunteer groups, each with 100 members, and she worked as a volunteer, which allowed her to recruit interviewees working on different roles during the lockdown. We did not record nor use any conversations in the WeChat groups for this research as it was impossible to get informed consent from all group members. The field researcher took notes when doing the interviews. No recording was made. The field researcher also wrote down her personal volunteer activities. For the analyses, the researchers conducted accumulative thematic coding of the interview notes, and double check with the coding of the government documents.

There have been lots of grey literature (media reports from mainstream media such as People’s Daily, Xinhua News, Hubei Daily, Chuhan Metropolis Daily, Southern Weekend, and social media coverage such as blogs and short posts published from 23 January 2020 to 12 November 2021). WeChat is the largest social media in China (over 1.15 billion active users in 2019 or about 82% of the total population in China, Change Xinxiwang, 2020). The researchers read online posts written by participants (volunteers) of food delivery activities and rapid commentaries published by academic researchers with firsthand data. The grey literature helps to triangulate the information from the interviews.

All the information was sorted according to task category, for whom, activities, actors, sector and roles Table 2, is the result of the coding: “Mapping the Collaborative Governance”. Based on the table, a thick narrative is produced in the following sections to reflect the timeline and explain the reasons behind the actions and interactions. The features of the WOG-WOS approach are conceptualised in the Discussion section.

Case background: two waves of lockdowns in Wuhan

Wuhan is a high-density city in which people live in high-rise buildings. There were 1406 communities with 7102 estates in total (Ma, 2020). On average, each estate has 1000–3000 households. Some of the largest residential complexes have nine residential sub-communities with more than 180,000 residents in total. The largest sub-community has more than 5000 households living in 30 residential buildings (Li & Lu, 2020). Therefore, it was a practical choice to lock down the city. Like many other cities in other parts of China and the world, people in Wuhan eat at home, work, or in restaurants.

In the case study, as there are lots of different stakeholders involved in the food system and their involvement are different at a different stage of the pandemic, we try to produce a description of activities taking into account the sequence of event and different aspects of food supply. The discussion section will summarize the key characteristics of the approach of Wuhan.

Wuhan is a transport hub linking to other parts of the province and the country by road, train, boat and flight. The community outbreak of the pandemic took place not long before the Chinese New Year break in February 2020. In this period, people would travel to hometowns or villages for family gatherings or travel in the country and abroad for vacations. The Ministry of Transportation estimated that the total number of journeys for 2020 would be 3 billion, the largest human migration in history (Bloomberg News, 20–01–2020). During the festive season, the peer pressure for socializing would be high. The city was shut down at 10 am on 23 January 2020. The constrictions became tighter after the initially not so tight control from 11 February 2020. Each household could only send one family member out to purchase daily necessities once every three days. The lockdown became the strictest of its kind. The whole city was under tight traffic control. Only transportation of necessities was allowed upon approval of community authorities. From 18 February, residential communities (both gated and not gated) were all locked down. Each housing estate could only keep one guarded exit. The guards were responsible for temperature measurement, registration and granting access or exit. Residents were not allowed to go out except for key workers or those needing medical care. None-residents were not allowed to enter an estate without special permission. The lockdown lasted until 7 April.

After Wuhan was fully reopened, the city life gradually returned to normal. There were occasional local cases whose close contacts and community residents required social isolation at home. A more significant outbreak happened in August 2021 when new cases emerged, and 56 workers were infected on a construction site. By 5 August, 104 estates and 11 construction sites were locked down again. After a whole city testing and contact tracing, the outbreak was under control. By 22 August, the city was opened again.

The case of Wuhan community food supply

The community food scene in Wuhan before the pandemic

Before the pandemic, in 2017, there were 53,089 restaurants in Wuhan employing about 500,000 employees. These include 969 large restaurants, 2723 medium-sized restaurants, 12,700 small restaurants, 26,074 snack bars, 2506 school canteens, and 8177 collective canteens and other catering units (Wuhan Yearbook, 2018). For older people (65+), urban communities offered community canteen services. The food was subsidized by the government (10 yuan/meal). According to the planning target, a housing estate should have access to a canteen within 15 min walking distance. The first canteen was opened in 2013, and by the end of 2019, there were 100 canteens. The customers went to the canteens to eat, take away or order food to be delivered home (Li, Hu, Liu, & Fang, 2019). Public funded social service institutes such as eldercare institutions, child welfare institutions, mental health facilities, veteran welfare institutions and schools had canteens. City relief stations offered temporary shelters for people who had nowhere to go. In Wuhan, three relief stations hosted 20,000 people each year (Hubei Daily, 2018). Not everyone would be qualified or stay in welfare institutions or city relief stations. Restaurants, markets and supermarkets often gave away food, especially after the trading hours.

For food shopping, there were 425 farmers’ markets (including wet markets) in Wuhan before COVID-19. Most of them were traditional farmers’ markets selling vegetables, meat and seafood (Hubei Daily, 2020). Some were wholesale markets. The large-scale markets might also have food stands, small eateries or even restaurants. Supermarkets and convenience stores sell both fresh produce and processed food. Digital platforms teamed up with restaurants, food stores and markets for the speedy delivery of cooked or fresh food.

As the lockdown made it not possible for people to travel and disrupted their life and work routine, there needed to be alternative solutions for a whole range of activities. In the following sections, we will discuss the different challenges to food security, the solutions to these challenges and how the solutions are implemented through collaborative governance.

Food supply during the lockdown

The sudden disruption in the food logistic system required urgent responses to food supply, otherwise the lockdown would not be enforceable. The responses were systemic.

Leadership: The governing structure had changed throughout the cycle of the pandemic. In the beginning, a Corona Virus Prevention and Control Headquarter (hereinafter as “COVID-19 Leadership Headquarter”) was set up on 20 January 2020, three days before the city was locked down. The mayor of Wuhan then, Zhou Xianwang, was the chief commander. The headquarters had eight working groups, including emergency support, publicity, transportation, market, medical treatment, epidemic prevention and control, community and overarching responsibilities (Jing & Xue, 2021). A Market Supply Guarantee and Foreign Affairs Group of the Municipal COVID-19 Leadership Headquarters was responsible for leading the food supply.
Food accessibility: challenges, solutions and governance adaptation

All communities within the city were locked down from 11 February, when only one household member was allowed to purchase daily necessities once every three days. From 18 February 2020, Wuchang District, Qingshan District, Jiangan District, and many other districts noticed that supermarkets could only cater to group purchases for communities and organizations and were no longer open to individuals. Initially, the policymakers did not give much consideration to support people’s daily lives. With the growing popularity of online shopping, the decision-makers might have assumed that people could just stay at home, order online and wait for the food to arrive. However, when the communities were locked, the deliverers could not enter the estate gates, people gathering at the entrance of the estates to collect delivery could spread the virus even more (Southern Weekend, 28–02–2020).

The state first set up street markets. In the early days of the lockdown, the government organized open-door markets which allowed farmers and businesses to sell in the street. This was when people were still allowed to do less frequent shopping in the early days. Fourteen street markets were set up outdoors (China News, 2020b). As the markets were spread out, people did not have to queue, which lowered the risks of infection. It also helped to address the issue of overstock by farmers and businesses. As the lockdown became more strictly enforced, street markets and presale-pickup were not good enough as people could not get out of home or their estates. Something needed to be done to extend the food supply chain into the gated housing estates or even buildings. However, the existing community management officials and social workers had to focus on disease control, and they could not allocate staff members to meet the need for food sorting and delivery.

Group purchases and presale first emerged in the market. Some residents afraid to do shopping started to organize "community group purchases" (Shequ tuangou) using WeChat. They registered the shopping list for each participant, ordered online and then picked up after the bulk delivery. Prior to the COVID-19 outbreak, group purchases started as early as 2016. It was a community-based practice with customers living in an area within 1–3 km (Lin, 2020). Because of the lockdown, groups were organized among residents living in the same housing estates. By 3 March 2020, the 2000 housing estates in Wuhan all started group purchase. This method was not very successful as residents could not pick up the goods in an orderly manner. In well-organized communities, people developed pickup schedules themselves or collaborated with the community social workers. In the less well-organized communities, group purchase was abandoned after resident complaints. Seeing the potential of group purchases, e-commerce platforms and supermarkets started to play with the presale model. The customers placed orders via WeChat one day in advance and picked up the food at the store later. This shopping model minimized the time the customers lingered in the shops, and the shops saved time by not putting the food on the shelves. The government saw the potential of this model and started to publicize such practices (Market Supply and Foreign Affairs Group of the Municipal COVID-19 Leadership Headquarters, 2020).

Food suppliers moved onto digital platforms. Digital platforms provided technical support for supermarkets to shift their services online. The platforms support these supermarkets in several ways. First, local supermarkets/farms were more willing to embed mobile apps in major digital platforms. Second, digital platforms provided technological support for the supermarkets to develop their apps. For example, in early 2020, Alibaba supported a local supermarket in Wuhan in developing a mobile app in one week. The mobile app was able to process community-level online orders to meet the requirement of lockdown (Changjiang Daily, 2020b).

Digital technologies assisted food delivery. Via mobile apps, major digital platforms hired even more food delivery riders after the outbreak of COVID-19. Nationwide, between 20 January 2020 and 18 March 2020, over 336,000 newly registered food delivery riders were under Meituan, a major food delivery company working for the digital platforms. Twelve thousand riders worked through the lockdown in Wuhan (Meituan Research Institute, 2020). Big-data analyses were used to enhance operational efficiency, reduce costs and control risks. For example, some platforms established preposition warehouses storing fresh vegetables and seafood in Wuhan during the lockdown. These warehouses were located close to the local community (average distance from households ranged between 1 and 3 km), and platforms could provide fresh food in one hour (Liu & Wu, 2020). The big data also supported riders to plan for the most efficient delivery routes (Changing Daily, 2020). Also, with the support of the large volume of geospatial data from platforms, households could easily monitor and track the delivery. Throughout the food logistic system, digital app had popped up in numerous areas of actions, often not even covered in the media. As mentioned by Prof G:

“There are a lot of people working as volunteers. All Party (CPC) members must volunteer, and the public can also volunteer. Employers encourage employees to volunteer where they live. Initially, we use WeChat groups to enlist volunteer. But it is difficult to record who has done what. If I do not follow the group closely, I would not notice that new opportunities would be available. At some point, people started to use a Weilinli (micro-neighborhood) app. It is attached to Wechat. I can get notifications when new tasks are announced. I just register. Each volunteer activity is recorded in my account. I can also show the record to my employer.”

Even with the lockdown, food delivery had to overcome numerous barriers. The public health professionals undertook various tasks, such as compliance check, temperature check, contact tracing, disinfection of public spaces and concentrated isolation. The lockdown enforcers were responsible for roadblocks and street patrols. The rigid traffic control and inspections resulted in most food sellers being excluded from the food supply chain. The state’s attempt to simplify the food supply process by using a limited number of food suppliers also led to public complaints about lack of choice and low food quality and grievances from the businesses excluded from the supply chain. The government departments were forced to be better coordinated. For example, to increase the variety of food, multiple departments worked together to facilitate shopping: a. The Wuhan Bureau of Commerce announced 33 online shopping platforms: b. The Transportation Bureau introduced an app for issuing electronic passes; c., the Agriculture and Rural Bureau announced a list of 63 aquaculture units, 25 suppliers for group purchase of eggs. Larger vehicles were more efficient for bulk delivery. Wuhan Public Transport Group deployed 520 buses and the Army 130 military trucks from 24 February to support 165 stores and e-commerce platform outlets and guaranteed the "last-mile" delivery (People’s Daily, 2020).

According to field research by Chen et al. (2020), on average, 8–10 staff members in each community were responsible for an average of 5 communities, which meant each staff member had to support 300 residents. All these residents staying at home all day long did not help. While multitasking, community management staff members answered hundreds of phone calls per day and faced criticisms or even verbal abuse. Several solutions were introduced to fix the labor shortage issue:

- Starting from 26 January 2020, the government demanded that Chinese Communist Party (CPC) members and government officials support the work in the communities. This practice was called the “downward despatch of higher-level officials” (ganbu xiachen) (Mei, 2020). Later, the public sector employers also instructed their employees to volunteer. There were around 580,000 CPC members who volunteered in the communities in Wuhan (Zhu & Cai, 2020).
- Property management companies that used to be responsible for estate and public space maintenance and providing gatekeeping services to property owners started to act as community coordinators to support food delivery (Qian & Hansen, 2021).
- Each building had a person in charge. There were also floor managers in large buildings with a dozen households on each floor. They lived in the same building or on the same floor they were responsible for. This was sometimes effective, but also sometimes led to conflicts with residents. The major lesson was that they should be able to communicate.

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for. WeChat groups were set up for each unit of management. The groups were responsible for addressing questions.

- Volunteers were important. They were residents in the communities and could be from various backgrounds. As the lockdown continued, more and more people were willing to volunteer, as their employers and unions encouraged. Sometimes, employers set targets to motivate employees to volunteer in the communities they live in.

The supporting labor force formed a relatively stable governing structure inside the housing estates that sorted the delivered food and organized people to pick it up orderly. Ms W, a manager of a state-owned enterprise described her experience in the community:

"Tonight, I am on the evening shift and will finish off at ten o’clock. I am responsible for 4 estates and assign tasks to the volunteers and make sure they know their responsibilities. … 4000 people live here but only a handful permanent staff members work here. The rest are all volunteers. … When food arrive, we call them to come down. They pick the vegetables first. This helps to minimise garbage. We then package the food in plastic bags and arranged food pick up. Initially we did not know how to work with the community management people and it took some trial and errors. …The residents complained about a lot of things, the speed, the quantity of the food, the quality of the food…. But the residents start to appreciate our efforts after they worked as volunteers themselves.”

The members of the public played active roles throughout the cycle of the lockdowns. They were engaged virtually through social media groups or online platforms. Their concerns and suggestions were passed on to the community-based governing system and reached beyond the communities. For example, taking the public’s opinions on board, the government started to relax the control of businesses trying to sell to the residents, and so more private companies tapped into the group purchase market. In addition, small stores in the communities started to open for convenience shopping. Within a couple of months, supermarket chains also entered communities. At a later stage of the lockdown, smaller businesses were also allowed to use their vehicles to deliver without applying for permission (Chen et al., 2020). This private business provided a larger variety of food and better served the communities without property management companies. The smaller number of suppliers also gained stronger bargaining power, which sometimes resulted in poorer quality of food. People used e-commerce platforms to rate the restaurants. As the lockdown continued, some residents started planting food inside the gated estates, such as rooftops and communal gardens. Others in the less tightly sealed communities also started private food exchange in buildings and between balconies.

**Food accessibility for vulnerable population**

The community food governance teams helped develop neighbor support for or deliver government-subsidized cheaper food to vulnerable groups such as older and pregnant women (Qian & Hanser, 2021). A network of disability support with 276 NGOs was organized to offer emergency support to people with disability after a case of death of a disabled child was exposed. Initially, social workers were sent to care for people with disability, but it turned out to be an unsafe solution. Therefore, they were also sent to quarantine stations to be looked after by professionals (Guangming Daily, 2020).

Some migrants or travellers were trapped in Wuhan as the city locked down. On 25 February 2020, the Hubei Provincial Headquarters for the Prevention and Control of COVID-19 issued a notice to provide rescue services to non-locals stranded in Hubei and needed help. In extreme Prevent and Control of COVID-19 issued a notice to provide rescue services. On 25 February 2020, the Hubei Provincial Headquarters for the Prevention and Control of COVID-19 issued a notice to provide rescue services to non-locals stranded in Hubei and needed help. In extreme

Food affordability

As people started boarding, the food price rose quickly. Buyers posted their shopping bills online to express anger, and the posts went viral. With the criticisms spreading through social media, the government realized that it had to take up the responsibility of food supply if the lockdown was to continue. The Ministry of Agriculture ordered the agricultural sector to “do everything possible” to increase production while keeping prices stable (China News, 2020b). The Hubei Government also published more details which required that starting from 22 January 2020, the prices of goods and services should be fixed at the same level as on 21 January 2020. Some shops and supermarkets that charged higher prices were fined heavily (Changjiang Grocery Media, 2020). If the purchasing price has already increased, the sellers’ markup rates should stay the same as those on 21 January. When there was no reference to the original price, the difference between purchase and sales should be capped at 15%. Price manipulators would be fined or prosecuted (Xinhua News, 28–01–2020). However, the government did not state how to enforce the rules.

Apart from price control, there were also efforts to guarantee supply. Different government departments (bureaux) and state-owned enterprises took up different tasks. For example, two giant state-owned food suppliers received government orders to source more rice, flour, cooking oil and meat to Wuhan. The Hubei government took control of slaughtermen and paid refrigeration costs to sustain the livestock and eggs. The Bureau of Agriculture was responsible for staple food production and procurement (FAO, 2020).

If the responses in the first wave were reactive, in the second wave in August 2021, the government became much more proactive. On 4 August 2021, the Wuhan Municipal Market Supervision and Administration Bureau published a document titled “The implementation plan for price supervision during the pandemic prevention and control period”, which set out the requirements for market monitoring, hotlines for reporting price manipulation, punishment, increased personnel on price monitoring (The Paper, 5 August 2021). In the second wave, the local government learnt from the previous experience and focused relentlessly on delivery.

**Health risks associated with food supply**

For a prolonged period, it was not clear how the virus spread. People worried that food handlers and deliverers could spread the virus. However, health concerns became a main issue. The platform companies quickly came up with a solution: to provide safety certification and Personal protective equipment (PPE) for food deliverers to reassure customers that the food they receive would be free from viruses and delivered by healthy people. In some “high risk” areas (e.g. hospitals), JD.com deployed autonomous vehicles. The company started autonomous vehicle research back in 2016. The autonomous vehicles were deployed to deliver essential goods to major distribution centres to hospitals (United Nations News, 2020).

For people living and working in the quarantine facilities, including shelter hospitals and some fully locked down communities, packaged food was delivered to the quarantine facilities and communities. The Wuhan Catering Association set special quality control criteria, i.e. food should be warm upon arrival (> 60 °C). The food was supplied by more than 400 private restaurants, which continued to operate during the COVID. By the end of April 2020, 13.6 million food packages were delivered to the residents in quarantine and health professionals (Changjiang Daily, 2020b). To support people who were not used to cooking at home, TV programs and social media were active in teaching
cooking methods and providing nutrition information.

When people could go out to do shopping and dining, there were also efforts to secure dining safety. Apart from restaurants, there are many canteens such as schools, universities, employers, and communities, and special instructions were issued for wearing a masque, keeping distance, encouraging takeaways, and avoiding group dining and hanging around. Since the reopening, people have had to get a health QR code (equivalent to a health passport) to travel. They also have to scan a site QR code to enter various venues (e.g. restaurants, shops), used for contact tracing once there are community outbreaks (Liang, 2020). The health code was lodged in a digital app that individuals could download onto their mobile phones. A person’s COVID-19 testing results are recorded into the health code by health professionals. The code could also record other information such as whether there is close contact and whether the person needs to quarantine. The color of the code could change if a person’s testing result and related information change. The color of the code determines where a person can safely travel to. The QR codes were initially criticized for monitoring human activities, but they were accepted once people realized that the codes were instrumental in securing safe travelling and supporting contract tracing.

Shopping malls started to return to normal businesses. With Green Health Code issued, residents living in communities with no confirmed cases could go shopping after a temperature test, wear a masque, and follow social distancing rules. This means communities with confirmed cases and those without were treated differently, and a full city-wide strict lockdown like the 76-day lockdown in the first wave was not necessary even with a Zero infection strategy.

**Discussion: coordinated governance in China’s WOG-WOS approach**

Table 1 shows the new concerns regarding food supply resulting from the lockdowns. A distinctive challenge for the full lockdown was that food could not be delivered to consumers directly, even with the well-developed digital economy. The logistic chain needs to be extended to inside the residential estates.

A core insight from Wuhan is that collaborative governance can be formed in an emergency in Chinese cities despite the tight schedule Kapucu (2015) argued that a pre-existing and trusting relationship is essential for collaborative governance. In China, WOG-WOS approach had been used in other policy contexts for many years. Before COVID-19, there was already a framework for collaborative governance to deliver all sorts of policy priorities. As discussed by Li (2022), while some people were concerned that the zero-case policy was overkill, there was not much concern that it would fail. This was based on people’s pre-existing and trusting relationship in the collaborative governance.

Obviously, there had been some initial hiccups, once the Government decided to prioritize pandemic control, the engine of emergency management was ignited (Liu et al., 2020a). The transformation happened as the intention to solve the problems align with the political scores.

Table 2 is a detailed mapping of the collaborative governance. It helps to highlight several key features of the collaborative governance using WOG-WOS approach in Wuhan apart from the usual story of all stakeholder participation.

**Table 1** Changes in point of delivery by different scenarios of lockdown.

| Level of lockdown                        | Point of delivery                                      |
|-----------------------------------------|-------------------------------------------------------|
| Strict lockdown (no travelling out of communities allowed) | Gates of estates, building entrance or apartment doors |
| Less strict lockdown (allowing travelling for necessary activities) | Markets, stores and restaurants (take away)          |
| No lockdown                             | As agreed between buyers and sellers as before COVID-19|

First, the WOG is not just about interagency collaboration horizontally, it is also about vertical collaboration. Horizontally, the leadership headquarters and supporting groups all have multiple government agencies Table 2 shows that all main tasks usually involved several government agencies. Vertically, the higher authorities dispatched the higher-level officials to the front line and worked in communities. These dispatched officers operated at the street level or even stood in the street and ran errands with frontline workers and volunteers. This practice not only strengthened the front line, but also allowed feedbacks and complaints at the ground level to be channeled upwards faster than usual for informed decision-making. To some extent, as a large number of officials being dispatched to the bottom, the government system in the city was transformed into an emergency mode with a much larger base, a leaner middle part and more tightly bound top part.

Second, the stakeholders, including the government, quickly recognized that the lockdown would not be realistic without WOG running on the side of WOS and the government also could not function well without the society. The government officials’ and government agencies’ capacity could be multiplied when they were willing to work together with other government agencies and draw inspiration from the market and societal actors. In this sense, WOG and WOS were interdependent in a WOG-WOS approach.

Third, the government kept close attention to what was happening on the ground and explored what could be scaled up. They identified good practices, promoted or even supported wider adoption of some of them. The adoption of group purchases was such an example. The creative but not always successful society initiative “group purchasing” was spotted by the policy makers. The government figured why it worked in some places but not the others with the help of community management staff members and the volunteers. It assumed the role of joining the dots together, by advising “group purchase” to all communities, suggesting community management staff to facilitate group purchase and dispatching officials to the front to support the increased labor demand, and pressing the communities to be organized.

Fourth, the WOG-WOS was enabled by active use of assistive technologies. There had been heated debates regarding privacy, data collection and the digital divide before the COVID-19. However, when it was in emergency, all stakeholders actively sought digital solutions. Consumers came up with the group purchase and used the digital shopping platforms, communities, estate management, and employers used Wechat groups to organize food pickup and volunteering. The public also used WeChat to expose ineffective community management staff putting pressure on them to be aware of the pressing issues. The businesses quickly developed or hooked up with digital platforms to market their products. The digital app companies also developed health and site QR codes. It is not an overstatement that without digital technologies to support the food logistics, the strictest lockdown would not be feasible in Wuhan and without the digital apps for contact tracing, the opening to normal shopping and dining would be much more difficult.

**Conclusion**

The case study findings supported Kapucu (2015)’s view that managing an emergency would require a combination of strong leadership and collaboration. As shown in the case of Wuhan, strong leadership demanded all actors focusing on the same goal: to stop the pandemic and make their own contribution and support others to deliver the outcomes. Paradoxically, one would not assume open-mindedness to be present in an authoritarian regime as the theories generated from ordinary time operations have alluded to Truex (2017).

Several factors may have contributed to the emergence of the open-minded authorities. The emergency situation means that the party-state has prioritized the pandemic response and time and resources are the severe constraints. Second, the Wuhan pandemic response is an intensified version of the long-term public health campaigns that have set up almost emergency like collaborative governing frameworks in almost all
| Main categories of concerns | For whom | Activities | Actors | Sector | Roles |
|----------------------------|----------|-----------|--------|--------|-------|
| **Food accessibility**     | Residents in full lockdown | Group purchase and delivery to community entrance | Bureau of Commerce<sup>3</sup> Bureau of Transportation<sup>2</sup> Bureau of Public Finance | government | Coordinate sourcing Transport control & vehicles Order and pick up |
|                            |          |           | Residents in communities Digital platforms and social media Food suppliers | household private/public | Supporting orders Sell food |
|                            |          |           | Community social workers/estate management Building or unit masters/volunteers | private/public | Sorting + scheduling pick up + Q&A |
|                            |          |           | Downward dispatched officials, volunteers | CPC members/civil society | Registration of food orders in community delivery Various tasks |
| Health Professionals and people in quarantine | Support others | Downward dispatched officials, volunteers | CPC members/civil society | Various tasks |
|                            |          |           | Community management Building or unit masters/volunteers | government | Identify and delivery |
|                            |          |           | CPC members/civil society | Identify, record, report, delivery |
| All vulnerable population   | Further arrangement for vulnerable people | Special food preparation and delivery | Private businesses | government |
| Older people, pregnant women, people with disability and children | Support others | Downward dispatched officials, volunteers | CPC members/civil society | Various tasks |
|                            |          | Community management Building or unit masters/volunteers | CPC members/civil society | Various tasks |
| Homeless people            | Provide food | Private businesses Quarantine sites City relief stations | public private/private | Public Food provision Food provision |
|                            |          | City management and police | government | Identify and send to quarantine or relief centres |
| Food affordability         | Price control | Price control | Price Bureau<sup>3</sup> | government | Set price regulation and inspection |
|                            |          | Public Businesses | Report | Follow rules |
|                            |          | City government- Corona Virus Prevention and Control Headquarter<sup>7</sup> Bureau of Agriculture<sup>5</sup> Bureau of Commerce<sup>3</sup> Bureau of Transportation<sup>2</sup> Bureau of Transportation Bureau of Public Finance | government | Overall policymaking and coordination |
|                            |          | State-owned enterprises | public | Food production, storage and supply to businesses |
|                            |          | Private businesses Donors from other regions | private/private | Food supply |
|                            |          | Farmers | private/civil society | Donation |
| Health Professionals & people in quarantine | Special food sourcing | Delivery companies | Private businesses | government |
| Health concerns            | Safe handling and delivery | Health Commission<sup>8</sup> Community management/Estate Management Building or unit masters Volunteers-sorting | CPC members/civil society | Various tasks |
|                            |          | Health Commission<sup>8</sup> | private/public | Various tasks |
|                            |          | Building or unit masters Volunteers-sorting | CPC members/civil society | Various tasks |
|                            |          | Residents | civil society | Coordinate sourcing from farmers |
|                            |          | Consumers | private | Coordinate sourcing from shops, markets and supermarkets |
|                            |          | Residents in communities Farmers | household private/private | Support food transport needs Provide subsidies and loans to businesses |
|                            |          | Digital platforms Farmers | private/private | Food production, storage and supply to businesses |
|                            |          | Media and social media | private/private | Food supply |
|                            |          | General public | private/private | Donation |
| Health Professionals and people in quarantine | Food quality | Responsible Food | household | Combined services for the troops |
|                            |          | Consumers | private | Exchange food |
|                            |          | Residents in communities Farmers | public/private | Direct sale to residents |
|                            |          | Digital platforms | Media and social media | Publish TV programs, media articles and posts |
|                            |          | General public | household | Mutual support |
|                            |          | Market Supervision Bureau<sup>6</sup> Transport Bureau<sup>2</sup> Wuhan Catering Association<sup>3</sup> Private businesses | NGOs/private | Set quality standards |
|                            |          | Bureau of Commerce and Health Commission<sup>4</sup> | government | Publish rules |
| Safe shopping and dining   | People not in lockdown | Regulation | Bureau of Commerce and Health Commission<sup>4</sup> | government | Develop apps |

(continued on next page)
major cities, and practices in those campaigns functioned as resilience exercise rehearsals (Li, Hui, Zhang, & Chen, 2015). Obviously, each emergency has its unique features. Severe restriction of human mobility at such a large scale was unheard of before COVID-19, resulting in initial confusion and chaos. This has been observed in all aspects of COVID-responses. However, if we keep following the evolvement of the events, it is not difficult to see that when the government figured out it needed to rely on the society to deliver the results, it became incredibly open-minded and took on innovations and bottom-up initiatives. A follow up issue is the sustainability of such practices.

The WOG-WOS approach adopted in China has some lasting effects and raised new questions for the post-COVID world. More private businesses decided to collaborate with the major online platforms. People were more willing to volunteer in communities after the city was reopened (Miao, Schwarz, & Schwarz, 2021) and as discussed earlier, may even be more appreciative of other volunteers and the government’s efforts. Health codes and entrance codes have been used in most cities and public venues. They are unlikely to be abandoned before the pandemic ends. However, the platform companies offered predatory discounts to attract more customers, driving smaller businesses into bankruptcy (The Wall Street Journal, 2021). The e-platforms for group discounts to attract more customers, driving smaller businesses into bankruptcy (The Wall Street Journal, 2021). The e-platforms for group
discounts to attract more customers, driving smaller businesses into bankruptcy (The Wall Street Journal, 2021).

Note: The information from this table comes from several sources. The roles of the general public and private businesses were coded by the field researcher through interview and observations. The roles of the government departments come from official documents which have been cited in the case study section. The government departments involved were listed in the documents. The authors coded the information and compiled the table.

Sources: For information on the roles of the government departments:
1. 3 Changjiang Grocery Media (2020); 2 People’s Daily (2020); The Paper (2021); 4. Southern 5 China News (2020b); 7 Corona Virus Prevention and Control Headquarter (2020); Southern Weekend (2020); 6 Wuhan Market Supervision Bureau (2021).

| Main categories of concerns | For whom | Activities | Actors | Sector | Roles |
|----------------------------|----------|------------|--------|--------|-------|
| App development and improvement | Digital companies (Health Code, site code) | Consumers | Enforce rules |
| Install device and app, and enforce rules | Businesses | | private/public |
| Social distancing, masks, scan and show results | | | |

References
Bekker, M., Helderman, J., Jansen, M., and Ruswaard, D. (2017). The conditions and contributions of ‘Whole of Society’ governance in the Dutch ‘All about Health’ programme. in Civil Society and Health, Greer, S. I., Wimmer, M., Pastorino, G., & Kosinska, M. (Eds.). 159-180, World Health Organization.

Bloomberg News (2020). China will rack up three billion trips during world’s biggest human migration, https://www.bloomberg.com/news/articles/2020-01-26/china-readies-for-world-s-biggest-human-migration-quicktake, (accessed 17 January 2022).

Cai, C., Jiang, W., & Tang, N. (2021). Campaign-style crisis regime: How China responded to the shock of COVID-19. Policy Studies, 1-21.

Changjiang Daily (2020a), Wuhan’s 13.6 million box lunches are safe and zero-accident, and the temperature of the meals is higher than 60° (Wuhan 1360 wàn fén bīngăn, anquăn líng shǐjiù dàoshou de fānǎi zhōngxīng wèndù bù yǐ yǐ 60°), China News. com, 07-04-2022, http://ss.chinanews.com/sh/2020/04-07/9149410.shtml, (accessed 17 January 2022).

Changjiang Daily (2020b) Major supermarkets entered communities to ensure supply (Ge da chaoshi xie xian shiqiu bao gongyong), 25-02-2020, http://www.wuhan.gov.cn/ sy/wbyws/202005/2020050316_961054.shtml, (accessed 17 January 2022).

Changjiang Grocery Media (2020). Extortionary price! vegetable prices have risen by 50% (Gànjué jià! shícài jià yǐ qíng bàn), The Paper (2021).; 4. Southern 5 China News (2020b).; 7 Corona Virus Prevention and Control Headquarter (2020). Interim measures for the prevention and control of the novel coronavirus pneumonia epidemic in Wuhan (Wuhan zhì bìngdú gěi de jīng jī xíng, 02-03-2020, https://www.tellerreport.com/business/20200202-stable-agriculture-full-of-confidence!-orderly-agricultural-product-improvement, (accessed 17 January 2022).

China News (2020) Wuhan organizes open-air road markets to open 14 markets (Wuhan zǔzhī liànliàn mǎlì shíchāng yìngyǐ yǐ kāi 14 gē shíchāng), 10-02-2020 http://oliu.nei https://xw.qq.com/cmsid/20200207A03C2B00, (accessed 17 Jan 2022).

China News (2020). Stable agriculture, full of confidence! Orderly agricultural production in multiple places, 02-03-2020, https://www.tellerreport.com/busine to-2020-03-02-stable-agriculture-full-of-confidence!-orderly-agricultural-product ion-in-multiple-places-K8G66Q9W.html, (accessed 17 January 2022).

Corona Virus Prevention and Control Headquarter (2020). Interim measures for the prevention and control of the novel coronavirus pneumonia epidemic in Wuhan (Wūhàn shì xīnví yùzhǐ shìpíng bìngdǐ gōnglì de fēnzhǔ yǐngxié zhìjīng bāndì), China News. com, 02/05_0217/48136.html, (accessed 17 Jan 2022).

Dubb, S. S. (2020). Coronavirus pandemic: Applying a whole-of-society model for the whole-of-the-world. British Journal of Oral and Maxillofacial Surgery, 58(7), 838-842. Enserink, B., & Koppenjan, J. (2007). Public participation in China: Sustainable urbanization and governance. Management of Environmental Quality: An International Journal.

FAO (2020). A battle plan for ensuring global food supplies during the COVID-19 crisis, https://www.fao.org/news/story/en/item/1688090/icde/, (accessed 17 January 2022).

Figtree, G., Jennings, G., Nicholls, S., & Graham, R. (2019). The Australian cardiovascular alliance—towards an integrated whole-of-nation strategy to address our major health burdens. Heart, Lung and Circulation, 28(2), 198–203.

Fredriksson, A., & Liljestrand, K. (2015). Capturing food logistics: A literature review and research agenda. International Journal of Logistics Research and Applications, 18(1), 16–34.

Guangming Daily (2020). In an emergency, they need more care (Jíjiù zhǔhuà qìngxiāng, tānmen gèng xīng fúguàn gàn), 17-02-2020, http://www.humanrights.cn/html/202 0/5/0217/48136.html, (accessed 17 Jan 2022).

Hubel Daily (2018). The Wuhan rescue station rescues more than 20,000 people every year, and there are still more than 700 people who stay in the rescue station for a long time (Wūhàn júzhǐ zhǐào mei nián júzhǐ qíao 2 wàn rén mèn qiún yìng yǔ 700 yì yuèn zǎngkǎi júzhǐ júzhǐ zhăn), http://news.sina.com.cn/o/2018-06-20/doc-ih rshphd72199452.shtml, (accessed 17 January 2022).

Hubel Daily (2020). 318 vegetable farms in Wuhan have completed standardization and upgrading, “buying a vegetable is like entering a supermarket (Wūhàn 318 jià

Supplementary materials
Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ugj.2022.03.002.

Table 2 (continued)
Meituan Research Institute (2020). Employment report of Meituan riders during the epidemic in 2019 and 2020, http://www.logclub.com/articleInfo/MjY2MzEt...

Jing, W., & Xue, W. (2021). China: The Societal Impact of the “whole of government approach. The International Journal of Social Quality, 11(1-2), 31-57.

Jing, Y. (2015). The road to collaborative governance in China. Springer.

Karaca, H., Kapucu, N., & Van Wart, M. (2012). Examining the Role of transformational leadership in emergency management: The case of FEMA. Risk, Hazards & Crisis in Public Policy, 3(3), 19-37.

Kim, K., Kim, S., & Park, C. (2020). Food security in Asia and the Pacific amid the COVID-19 pandemic. Asian Development Bank. http://hdl.handle.net/11540/12119.

Liang, F. (2020).

Li, B., Huikuri, S., Zhang, Y., & Chen, W. (2015). Motivating intersectoral collaboration in the retail industry (Língshì zhì). http://www.logclub.com/articleInfo/MjY2MzEt...

Li, B., Hu, B., Liu, T., & Fang, L. (2019). Can coproduction be state-led? Policy pilots in four Chinese cities. Environment and Planning C: Government and Policy, 32–37. Risk Governance, Springer.

Liu, C., & Li, B. (2015). Policy style, consistency and the effectiveness of the policy mix in China’s fight against COVID-19. Policy and Society, 39(3), 309-325.

Meituan Research Institute (2020). Employment report of Meituan riders during the epidemic in 2019 and 2020. http://www.logclub.com/articleInfo/MjY2MzEt...