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Understanding the role of self-organizations in disaster relief during COVID-19: A case study from the perspective of co-production

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ABSTRACT
This article examines the role of self-organizations, the spontaneous emergence of order in natural and physical systems in disaster relief during the outbreak of COVID-19 in Wuhan China. By investigating a selection of involved self-organizations, it adopts a co-production perspective by focusing on two cases during the process of delivering emergency responses with the government and citizens to combat the health crisis. Observations and case analysis have found that both government and citizen channel play a role in delivering disaster responses. In particular, self-organizations emerged in the process of delivering relief services are observed as a critical actor of change in terms of mobilizing resources and collaborating citizens to achieve personal safety and community resilience. First, government channels are primarily manifested in residential communities in obeying emergency orders and tasks. Second, citizen channels are practiced through the co-production of disaster responses mainly delivered by residents, nonprofit organizations and enterprises. The finding suggests that self-organizations in the co-production of disaster responses with the government and residents in Wuhan has been effective that eventually brought the health crisis under control. Policy implications generated from this health crisis may provide insightful lessons for government policy making and disaster management.

1. Introduction
The COVID-19 outbreak reveals that solving such a complex public health crisis requires immediate responses of both the government and the society. Such a response requires the coordination of not only health professionals but also disaster management system [1]. Current situation of COVID-19 worldwide has suggested that it is not an issue that a single organization can solve. Instead, it calls for a joint response engaging public, nonprofit and even private organizations. To address wicked problems like the COVID-19 pandemic, there have been increasing studies that indicated the paradoxes and challenges that nonprofit organizations and government are facing in terms of managing and collaborating with informal volunteers [2–5]. In different countries, it may have different forms of volunteering in delivering disaster responses. In China, apart from the government and designated nonprofit organizations, fighting against COVID-19 also involves newly emerged self-organizations, a new phenomenon which rarely occurred in previous disastrous situations. According to Kauffman [6], self-organization represents the spontaneous emergence of order in natural and physical systems. These organizations have also been observed in networks of community organizations that emerge after natural or technological disasters [7–9].

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The active participation of self-organizations in disaster relief activities during COVID-19 in Wuhan and other affected regions and their contribution to supporting the government and citizens has been mainly reflected in mobilizing resources and connecting residents for effective service delivery and community safety. According to Zhao and Wu [10], self-organizations in China have the following features: first, they are not formally registered organizations; second, they act flexibly and sensitive to demands of residents and families; third, they are composed of different social groups and volunteers, often initiated by one or a few individuals who are committed to practicing philanthropic values for the common good. The participation of self-organizations during COVID-19 in China suggested that they have played an essential role in designing and providing services to residents and families in most affected communities and regions. Their role has been particularly evident when some officially registered non-governmental organizations failed to deliver goods and supplies. Even though the official channel did not always perform well, efforts from individuals and other organizations have grown dramatically which practiced as an informal act of volunteering during the crisis. Globally, volunteering has been inspired in disaster and crisis in recent decades, characterized by the decline of formal organizational-led volunteering [11,12]. This stream of literature has focused on how individuals, communities and nonprofits are involved in the provision of public services [13-16]. In the context of COVID-19, due to its fast spreading across the population, immediate responses became vital to combat the crisis. Facing the decline of traditional volunteering [17], self-organizations emerged as a significant channel established to coproduce disaster relief services with local governments, residents and other nonprofit organizations.

Exiting research has identified self-organizations engaged in fighting against COVID-19 (see Zhao and Wu), however we have little insights into the interactive dynamics between self-organizations and other actors in disaster relief. Although our knowledge of disaster management and volunteering is increasing, little is known about how self-organizations emerge and interact with the government and citizens to combat disastrous situation. Therefore, this article adopts a co-production perspective to examine the role of self-organizations in disaster relief during COVID-19 in Wuhan China. It aims to provide insights into how self-organizations engage in disaster relief and interact with wider local communities, residents and government organizations. It contributes to the literature of co-production and self-organizations in disaster management and public policy. The core question addressed in the article is how self-organization emerged in disaster relief and what are the factors that impact their co-production. To answer this question, a case study approach is adopted by examining involved self-organizations in fighting against COVID-19 in Wuhan. In particular, it examines cases of Wakanda and NCP Life Support Network with special attention to the evolution of self-organizations in co-production of disaster relief services, which is relatively unexplored in literature. This is critical to explain the process of co-production under disastrous situations. In particular, the process in which different actors coproduce could generate new interactions and relations evolved in a fast changing environment, thus provide useful lessons for organizations to adopt in disaster management. At the meantime, this article does not embrace an ambition to generalize the findings outside Wuhan. It is set within the construct of a specific context where the research of focus is placed. By utilizing an updated conceptualization of Comfort [18], self-organizations in disasters is perceived as a continuous process featured by the capacity for resistance, change and learning. The concept of self-organization emerged from the natural sciences and they could have an impact on public policy. Existing literature has defined self-organization as the emergence and maintenance of structures, which is caused by a multitude of complex and non-linear interactions between various elements [19,20]. This process is framed to be associated with elements of communication, selection and adaptation.

Built on this framework, this article examines how self-organizations emerged during COVID-19 and what factors explain their participation in disaster relief activities. Section 2 presents the literature in which co-production and convergence in disaster situations are discussed. Section 3 discusses the method adopted for case study analysis, specifically, the two cases of Wuhan. A clear rationale for selecting Wakanda and NCP Life Support as the representative examples is provided in order to build a solid base for the case study. Then an overview of both cases is introduced with a purpose of understanding the situation of self-organization engagement in disaster relief activities in Wuhan. Furthermore, a detailed exploration of the two cases is presented to explain the construct of co-production and the distinct features between the two organizations in providing disaster responses. Section 4 presents the analysis of the case study. The selected cases are reviewed and explained with a comparison to understand their distinct feature in providing disaster responses in Wuhan. Section 5 provides critical insights generated from the case study and the main lessons learned from co-production of the government and informal organizations. In conclusion, some concluding remarks and prospects for future research are provided.

2. Literature review

2.1. Co-production in uncertain times

Co-production of public services demonstrates a high value in recent years. The term co-production was first coined in Ostrom and her colleague’s work [21]. It is used to emphasize the role of citizens in the delivery of urban services. According to Ostrom, the active involvement of service users can add value to public services, which is often ignored in public service provision. In line with this argument, existing literature has maintained that citizen contribution to public service delivery could generate positive outcomes and improve the quality of public services [22–25]. Recent literature has produced an increased number of studies on the role of co-production in public service delivery [26–28]. These studies are often related to themes of disaster management, civil society development and citizen participation in different policy arenas. These practices often occur in cross-sector settings and require the collaboration of various actors. In public service delivery, governments have been increasingly using governance tools to produce good quality services [29]. For example, the voluntary sector and nonprofit organizations are also involved in the provision of public services and thus research on this topic emerged in the past two decades. Scholarly attention on this field has been paid to the role of these organizations and their relationship with the government in the delivery of public service delivery [30–33]. In this article, co-production is defined as a process in which public service organizations and citizens making better use of each other’s assets, resources and contributions to achieve improved outcomes of public services [34].
2.2. Convergence and self-organizations in disaster responses

Understanding the natural convergence of coproduced action in response to a disaster is critical if characteristics of emergencies are to be explained. In literature, convergence is defined as mass movement or attempted movement towards a disaster site [35]. It is now considered as an universal aspect of disasters, which are often recognized as times of chaos that requires immediate action for positive change. For instance, the occurrence of terrorist attacks or refugee crisis in recent years has spurred a trend of global volunteering in many countries and regions. The growing society has consequently engaged a variety of actors in public affairs through collective efforts. Globally and domestically, the fast growth of volunteering has reflected the varying degree of participation of individuals and organizations in earthquakes, floods, crisis etc. It is particularly the case when volunteering occurs as a response to suddenly rising needs in crises and disaster situations [36,37]. These situations are characterized as uncertain, changeable and complex. For this reason, self-organizations emerge that represents the spontaneous emergence of order in physical systems and many other disaster responses [38–41]. This process can also be observed in different situations such as natural disasters, hurricanes and other unexpected crisis.

In response to emergencies, it is more than common that people react voluntarily by contributing their time, materials and knowledge to restore order. Participation of individuals and organizations can involve both official and informal channels. More recently, new forms of self-organized volunteering are gaining importance [42] and this has largely been manifested in the provision of disaster relief services. In disaster risk reduction, it is likely that informal channels could provide additional surge capacity to respond to more frequent emergencies [43]. This is because individuals and groups are found to be more cohesive during uncertain times, working together to overcome challenges [44,45]. Furthermore, self-organized efforts are essential in a collective process of communication, selection and adaptation.

Despite efforts made by self-organizations in disaster relief, it is not always easy for them to take action. For one thing, self-organized efforts have for long been used to act alone and sometimes they may not collaborate fully with other organizations in an institutional environment where political opportunity structures are limited [46]. For another, existing literature has suggested that the constraints of self-organizations should also be acknowledged in order to fully understand their action due to the status ambiguity and resource constraint [47]. However, it is of great importance for self-organizations to participate and deliver services in certain situations where joint efforts are needed. Self-organizations emerged from disasters represent a shift from organized efforts of the government toward more active efforts initiated by citizens and groups to deliver public goods. It is particularly the case when organized action could not effectively achieve expected outcomes, thus self-organizations engage in forms of collective action, or in reaction to emergent situations.

Lessons can be drawn from China as regard to how the Chinese government uses experts and volunteers to enhance the public trust in the government [48]. Facing COVID-19, self-organized groups contributed a great deal in disaster relief and mutual aid with the local government, hospitals, nonprofit organizations, families, communities and enterprises. During the crisis, these groups have demonstrated remarkable effectiveness and devotion in providing timely relief services and supplies to the infected areas and patients. Based on the observation of Zhao and Wu [49], there merged at least eight self-organizations which performed as representative of citizen efforts in fighting against COVID-19 in Wuhan. These self-organizations worked quite committed and some of their stories were widely reported by Chinese social media and TV news. On the one hand, these organizations are responsive to bridging the needs of infected individuals and families either because they are flexible in operation or because they have gained experiences in previous disaster rescue activities. On the other hand, these organizations enjoy certain degree of autonomy, so that they can act on their own as long as they obey exiting laws and policies. Recognizing the contribution made by self-organizations during COVID-19, the question is why they were involved in providing disaster responses and how did their efforts impact the overall disaster management in broader areas in China.

2.3. The Wuhan context: who were involved in disaster relief against COVID-19

Previous studies have manifested that citizen participation in emergency and disaster management depends largely on formal institutional structures and arrangements [50]. It was also shaped by cultures which individuals inherit from. For example, recent studies have examined the case of spontaneous volunteering of Chinese living in North America who formed groups to support Wuhan hospitals at the outbreak of COVID-19 which demonstrated positive outcomes in other-helping endeavors during crisis [51]. There are also studies that examine the consequence of Chinese nonprofit sector in coping with the government in COVID-19 downturn [52]. The participation of these organizations was observed as a result of low government intervention and high independence of nonprofits [53, 54].

During the outbreak of COVID-19 in China, four types of organizations were present in providing relief services. The first group of organizations include five quasi-governmental organizations, namely, the Red Cross Society of China, Hubei Branch (RCSCHB), the Hubei Charity Federation, the Hubei Youth Development Foundation, the Wuhan Charity Federation and the Red Cross Society of China, Wuhan Branch (RCSCWB). For charity federations, they are normally affiliated with the civil affairs department. Youth development organizations are under the mass organizations (Quntuan zuzhi). These five organizations are in charge of distributing donation materials upon government authorization. The second type of organizations involved are registered nonprofits that strictly follow the participation rules made by the government. This type of organizations are capable of responding to emergent situations and are equipped with sufficient paid staff [55], because they have sustainable financial resources which enabled them able to take action in emergency responses. A most evident example is the Alibaba Foundation, which demonstrated quick responses and transparent procedures in emergency rescue both in China and abroad. The Alibaba Foundation has also donated various articles to Wuhan and other virus-affected areas, including cash, protection suits, and ventilators. In addition to Alibaba, there were some other enterprise
foundations engaged in rescue work.

The third type engaged are Wuhan-based organizations. Since the release of the 2015 Guidelines on Supporting and Guiding the Participation of the Nonprofit Sector in Disaster Relief Work by the Ministry of Civil Affairs, nonprofits have been directed to take its responsibilities to strengthen their capacity in emergency rescue [56]. In the COVID-19 battle, more than 100 county-level nonprofits from 13 prefecture-level cities around Hubei Province were called to join local rescue teams. The forth type of organizations participated in providing relief services are self-organizations. Since they are spontaneous and in most cases unplanned, their participation in emergency rescue has primarily driven by mission. During that time, news about their participation was frequently reported and their services have reached to a variety of groups including infected patients, the seniors, migrant workers, pregnant women and low-income families. To name a few, ‘Helping Doctors’ was a volunteer team engaged with front-line workers, such as taxi drivers and deliverymen. The ‘NCP Life Support Network’ connected local health care workers to provide medical consultation and psychological counseling to patients who were under home quarantine during that time. ‘Social Workers with You’ was an organization established by professional social workers that delivers nursing services to patients, suspected patients, and their family members whenever and wherever necessary. The ‘Anti-epidemic Volunteer Group’ was devoted to community volunteering in neighborhoods. The extensive devotion of self-organized efforts represent the co-production of alumni groups in channeling emergency donations and disaster relief supplies, because of their communicating and networking capabilities [57].

3. Method

In this article, a case study approach is adopted, which is commonly used in testing or building theories. A case method is helpful to conduct in-depth analysis under a particular context [58], thus it allows an exploratory investigation of invoking the process of relief service provision. Evidence generated from case studies may potentially advance theory [59]. Even though self-organizations served as citizen channel, their efforts have actually been widely recognized, by both the state and the society. Therefore this study aims to make an effort to examine how were these organizations engaged in the provision of disaster relief services as an informal channel.

The data for the case are collected from individual interviews and archival policy documents. Nine interviewees were identified as leaders and core members of self-organizations involved in fighting against COVID-19 based on snowball sampling technique. This allow a series of referrals to be made in order to reach potential contacts [60]. They are in charge of all kinds of disaster relief work in their organizations including volunteer coordination, resource management, policy interpretation and inter-organizational communication. Structured and semi-structured interviews were conducted online between 2020 and 2021. Each interview lasted at least 40 min and up to 90 min depending on the questions asked and the availability of interviewee. Interview questions were about perceptions of coproducing relief services, what led them to contribute and experiences of engaging in volunteering, collaborating with other organizations and perceived outcomes of co-production in disaster relief activities.

In order to fully understand how self-organizations performed during co-production of disaster relief work, specific elements such as the background information of identified organizations and the relevant policy documents are critically reviewed to supplement interview data. The sample of self-organizations is originally from Zhao and Wu [61], in which an updated list of ten organizations are identified. The sample includes: Life support network, Wuhan medical hotel support alliance, Delivery men alliance, Volunteer translation group, Anti-epidemic alliance, Social workers group, Anti-epidemic volunteer group, Volunteer group in residential community, Wuhan coffee, Helping Doctors, Volunteer translation group and Social Workers with You (presented in Table 1). These organizations are identified based on the following criteria: first, they were observed to have made a positive impact on coproducing emergency services with the government and residents; second, services provided by these organizations could represent a reflection of co-production behavior and the visible capacity of the nonprofit sector as a whole. Given extensive news coverage about China’s effective leadership in crisis management, it is believed that decentralizing containment strategies to neighborhoods and communities is regarded as one of the keys to China’s success story [62].

Representing the citizen channel, self-organizations relied heavily on digital and online sources to establish communication platforms, mobilize medical resources, provide online and offline support to individuals and groups. To further investigate how these organizations merged and got involved in coproduced efforts, two organizations are selected that represent citizen efforts in fighting against the health crisis with public organizations during the outbreak of COVID-19 in Wuhan. The analytic framework is based on existing theories that inform a process of self-organizations in disaster relief work associated with elements of communication, selection and adaptation. The case study subjects are Wakanda, a local coffee shop and NCP Life Support Network, a grassroots organization that is devoted to providing psychological health services. The rationale of choosing these two organizations are as follows: first, they represent two different types of organizations emerged during the health crisis, one has no volunteering experience and one

<sup>1</sup> https://hb.qq.com/a/20200604/001271.htm, accessed on March.3rd 2021.
Among an increased number of self-organized groups, a coffee shop named Wakanda, founded in 2018 in Wuhan, became well-known soon after the outbreak of COVID-19 as it kept making free coffee for medical staff working at nearby hospitals. Besides, Wakanda was the only coffee shop operating in Wuhan during the lock-down period. According to the report of China Global Television Network (CGTN) [64], a state media in China, it started to deliver free coffee to medical workers since the first day the Wuhan municipal government issued the lock-down order. Unlike registered nonprofit organizations, it was quite a spontaneous decision made by Wakanda team that they started to provide free coffee and care to local medical workers. This coffee shop has seven staff and the daily routine of this coffee shop during the lock-down period was two shifts, 500 cups of free coffee, regular deliveries to the nearby hospitals twice a day during the lock-down. By reaching the agreement with hospitals, the founder decided to send out the coffee twice a day, which is 300 cups in the morning and 200 in the afternoon. In order to keep safe, all staff in the coffee shop stayed in a community only a few minutes walk away. Some of them did not even tell their parents for making such a decision of voluntarily delivering free services to medical workers.

Facing the tough situation, the team soon formed a production line of coffee-making. For each coffee they made, it is attached with...
handwritten messages of thanks and support for example ‘we hope to deliver not only good quality coffee but also a message of love and care’. When asked why they did this, a young barista maintained that free coffee is nothing important, the more meaningful thing is that they want medical workers feel that they are not alone, we are always behind them. For protection purposes, when delivering coffee, volunteers transferred the coffee trolleys to the hospital so baristas could avoid unnecessary direct contact with medial staff. For one thing, this can protect everyone in such an emergent situation; for another, it may save protection suits, which were in shortage at that time. Interview with the founder of the coffee shop conducted after the crisis implied that approximately 30,000 cups of coffee were delivered during the period of fighting against COVID-19 in Wuhan.

After the café’s story caught public attention, more and more donations were received such as coffee beans, milk and masks from their suppliers and other compassionate netizens. What’s more, they also received online donations from people they do not even know. In terms of why Wakanda is actively engaged in delivering free coffee to local medical workers, one of the founders interviewed by China Pictorial [65] believed that they made the right choice and did the right thing. The store manager said that they noticed a huge demand in hospitals when communicating with medical workers at the very beginning, soon they made a commitment of doing their part by providing free coffee to support them. However, making such a choice was not easy since they had no experience before and everything was unplanned and came all in a sudden. Actually, there were few people on the street since the start of the city’s lock-down and the coffee shop was unusually quite because people barely visited. However, during that period of time, two medical workers came and bought some coffee. Realizing the health system and medical workers were suffering, the whole team decided to stay open the coffee shop and committed to providing free coffee to local health care workers. China Daily [66] reported that it took them only two minutes to reach the agreement of keeping opening the coffee shop. Among all volunteers, a foreign-looking person attracted much attention. He is the only foreigner of the seven baristas who chose to deliver a helping hand during the difficult time. When interviewed by Xinhua News Agency [67], he expressed his willingness to volunteer and decided to stay together with other volunteers to give everything they can to anyone who needs help considering about the worsening circumstances. One year later, when describing the chaos back then, baristas were still emotional and believed this unique experience had already become part of their lives.

The other example is NCP Life Support Network (NCP). The founder is one of China’s leading disaster relief social entrepreneur. This organization has played a recognized role during the outbreak of COVID-19 in Wuhan. According to Woo [68], during the outbreak of COVID-19 in Wuhan, the network is engaged with an online clinic group of more than 400 health workers nationwide who provide online support and psychological counseling to patients. It is operated through multiple WeChat chat groups in which volunteers help coordinate resources during that time. Apart from providing health services, these groups are also actively engaged in helping vulnerable people such as the seniors and the poor with daily food and mental health consultation.

Facing the situation, the NCP Life Support Network has formed a strong rescue team in response to the fast-changing situation. Soon after COVID-19 occurred in Wuhan, more than ten WeChat groups were established including NCP Life Care Group, NCP Volunteer Group and etc that are devoted to delivering relief services. Among hundreds of volunteers, one actively involved college student shared her story and said the reason why she decided to participate is because of her trust in this organization. She was introduced by one of her friend studying medical sciences and soon she realized that medical supplies were facing a desperate shortage and staying-at-home was a must for individuals. Therefore, collective responses has become an inevitable choice. Like many unorganized volunteers, this college student was motivated to join the rescue team simply by a sense of trust characterized by NCP’s reputation, profession and commitment. During the process of rescue, a majority of volunteers discussed the obstacles they encountered when delivering the goods and services to needed people. Even though they are highly motivated and determined, the fastchanging situation and the severity of the virus made them difficult to be a rational decision maker at all times. In recalling this experience, the founder of NCP expressed the anxiety he faced at the beginning of the outbreak. Before it was too late, he then posted a recruitment note on this personal website calling for support and volunteers. Very soon it connected hundreds of volunteers from all walks of life and they immediately formed this network during the crisis.

A doctor from Beijing described his experience of engaging in providing relief services and believed the situation back then was much worse than he thought. He realized that the services they had to provide include not only medical supplies but also psychological counseling. For every critical patient seeking help through the online channel, NCP had to arrange at least 3 volunteers to help and one volunteer responsible for communicating with residential communities regarding relief matters. In terms of patients with light symptoms, a major task for volunteers is to comfort them and provide necessary guidance in line with doctors’ prescription. Most involved volunteers acknowledged the strong leadership of this network that effectively empowered them to manage resources and offer timely solutions. For instance, when asked about how supplies deliveries could effectively reach hospitals and communities, volunteers maintained that working with community leaders was extremely necessary because they are the people who work at the front-line and are most familiar with the situation in the community. Apart from handling crisis-related and daily community issues, a key task for them is to collaborate with other organizations in identifying the needs of affected individuals and families and then provide services in a timely manner. “Residents should be the core of our work.” This is what has been frequently mentioned by most self-organizations when describing how can things be better coped with. Furthermore, “everybody plays his part” can effectively enhance the outcome of disaster responses particularly under difficult situations like COVID-19.

Notably, the effective combination of online and offline channels has critically facilitated the co-production of disaster relief services during the health crisis. In particular, the intensive communication between self-organizations, communities, volunteers and the local government enhanced the remote collaboration and coordination for the supply delivery. Both cases have manifested the

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2 WeChat, called Weixin is a popular Chinese messaging APP with many functions including sending text messages, voice messages, pictures, videos etc.

3 https://web.uic.edu.cn/cn/alumni/home/mien/7551-2020-06-01-07-59-29, accessed on Sept.18th 2020.
process of disaster rescue in which self-organizations, volunteers, residents and public organizations work together to fight against the crisis. In terms of the process, both have experienced different stages; in terms of the consequence, both have expressed the sense of achievement and pride even though experiencing such a difficult time could inevitably be desperate and hopeless. Like more public areas, co-production is becoming indispensable and public health is no exception [69]. Therefore, collaboration becomes inevitable. Argued by Waugh and Streib [70], in disaster management, collaboration is a necessity in dealing with the pandemic. This is a significant lesson learned for both individuals and organizations, in which most decisions made were actually co-produced action.

4.2. Co-production in self-organizations: communication, selection and adaptation

Given self-organizations emerged as a citizen channel in fighting against COVID-19 in China, the outcome has varied across these organizations. Analyzing the cases is conducted through revisiting the analytical framework of self-organizations and comparing between the two organizations presented in Table 2. The analysis examines how two different paths were manifested in each case through co-production in disaster relief activities. The capacity of self-organizations to coproduce with the government and residents in disastrous situations raises a more profound question: whether it can sustain and become a formalized channel in future service delivery and disaster prevention. The effectiveness prevailed in both cases has been evident, in which enablers and constraints in each case differ. The co-production between self-organizations and public organizations, manifested in the cases, is influenced by resources and regulation. At the early stage of COVID-19 when offline communication was almost impossible, online communication tools were adopted as the main channel of communication. In the case of Wakanda, resources is a significant factor that enabled volunteers to continue providing free coffee to nearby hospitals. While in the case of NCP, a critical condition is effective collaboration between nonprofit organizations and public organizations. In certain occasions, they are more impacted by the rules and structures associated with organizations’ long-term strategy. During the crisis, the provision of disaster relief services was quite complex that involves both supplies and participants that facilitate co-production. The experiences of communication, selection and adaptation of these organizations focus on understanding how they emerged and interacted with public organizations, as well as the potential challenges ahead.

One major theme emerged from interviewees’ responses is the importance of the establishment of these organizations. In the case of Wakanda, the commitment of providing free coffee to nearby hospitals sustained their decision throughout the process of fighting against COVID-19 in Wuhan. Even though participants from Wakanda formed quite spontaneously and unorganized, their efforts proved to be very devoted and effective. The citizen channel established by this organization grew from a small act of helping but their deeds influenced a larger community even after the crisis. The fast communication and adaptation to such a disastrous situation allows them to seek out opportunities to engage in disaster relief activities. While the independent participation of Wakanda being recognized, their services were unable to reach all hospitals. This limited the availability and extension in which unorganized efforts could obtain. Inspired by the framework of Comfort [71], communication, selection and adaptation are critical factors that shape the process of self-organizations in providing disaster responses. The capacity of Wakanda in communicating with hospitals and adapting themselves to a rescue environment played a significant role is facilitating co-production that guaranteed the effective delivery of coffee. Informed by interviewees, the effective communication between organization members and public organizations contributed to sustaining co-productive activities of both online and offline modes.

Unlike organized self-organizations, the emergence of Wakanda in co-production of disaster relief services occurred quite spontaneously in times of uncertainty and chaos. Given the high cost of operating branches which made it difficult to sustain after COVID-19, they had no better option but to close. In discussing how this organization could better adapt itself in long-term voluntary services, the founder of Wakanda mentioned in the interview that like hundreds of coffee shops, when the battle won, the survival of these organizations became a serious issue. How can it sustain was the question he frequently asks himself. ‘Suffer or sustain’ determines whether or not it can secure its capacity in future operations. The difference during and after the health crisis drove this organization to adjust its operation strategy that concerns with advancing online and offline selling tools. On the one hand, the flexibility they enjoyed enabled them to take prompt action during the crisis such as immediate response over coffee demands, team management and resource distribution. On the other hand, when describing the long-term plan for self-organizing work, interviewees expressed their concern that the virus may still exist and self-organized efforts could still play a part in co-production in many more disaster relief activities. The question is how does this form of co-production evolve into formalized arrangements that could fundamentally enhance the co-production base for future disaster management.

In terms of the emergence of self-organization, The NCP Life Support Network was less constrained by the autonomy to take action. Compared with Wakanda, NCP is more organized and prepared in joining the rescue team in delivering disaster responses. During the crisis, the co-production network established was able to provide a wide range of services including supplies, psychological counseling and health consultation services. As an organization grew from the grassroots, NCP has been actively engaged in organizing, communicating and coordinating for relief requests through both online and offline channels. To enhance effective communication among volunteers, the founder of NCP emphasized the importance of empowerment, in which knowledge and expertise could be utilized in a digital community. Other interviewees also discussed the collective efforts by self-organizations, hospitals, communities and volunteers that eventually led to co-production, characterized as well-managed, flexible and responsive in disaster management. The intensive use of digital tools, fast adaption to disaster relief work, remote communication and psychological support among members have strengthened co-production in crisis time. Interviewees maintained that even though most volunteers did not know each other, they soon established function groups based on urgent needs such as leadership group, management group and communication group, to deliver quality services online. As predicted by the literature, the purer the motivation is, the greater altruism is likely to grow [72–74]. The altruism evidenced in NCP explains the process of co-production that effectively engaged self-organizations and residents in delivering disaster relief services. The value of collective approach has been sustainable through coproduced efforts. It secures the
survival of self-organizations.

The communication, selection and adaptation in co-production of disaster relief services focus on how self-organizations emerged, behaved and the perceived impacts derived from participating. Both organizations have demonstrated their capacity in gathering resources, facilitating communication and addressing urgent needs of both individuals and organizations. From a theoretical perspective, the results correspond the existing research on the importance of adopting co-production as a governance strategy to examine the interactions among government organizations, nonprofits, communities and citizens. Furthermore, self-organized efforts during crisis are perceived as fundamental elements of co-production. Wakanda contributed in individual ways to deliver services while NCP was strong in organizing groups when dealing with urgent needs and problems. Even though Wakanda did not evolve into a professional service organization, the experience has inspired people around to engage in future volunteering. In general, both organizations have manifested the process of disaster relief in terms of communication, selection and adaptation. Results have extended current literature by adding insights into how self-organized efforts could be utilized for co-production and how co-production can be enhanced for improved outcomes of service delivery.

5. Discussion

The collective response to COVID-19 by the government, communities, families, residents and self-organizations in Wuhan during the early outbreak of COVID-19 has reflected that both official and citizens channels play a role in disaster management. Across the interviews, the analysis suggested that self-organizations emerged in co-production of disaster relief services played a critical in mobilizing resources within affected areas, connecting residents and supporting the government in co-managing disaster rescue activities. Notably, as most interviewees mentioned, self-organizations arose as a result of a joint strategy involving the government, nonprofits, communities and other organizations that may potentially shape the relationship between the government and the society. From the global perspective, the COVID-19 pandemic has witnessed increasing self-organized efforts and a shifting landscape of more dynamic volunteering [75].

In China, the active participation of self-organizations has also manifested such a trend that citizen behavior could actually make a difference in disastrous situations. The findings support the theoretical assumption that co-production between the government and the society has the potential to generate positive outcomes and this provide important implications for policy making in future disaster management. Observations and interview results generated from this study provide insights into how spontaneous efforts can be better organized for effective disaster relief and co-production. Findings also suggest some further thoughts and considerations in understanding co-production of self-organizations.

The two cases examined have different background, context and features. The similarities and differences between the cases suggest that, situations may differ, some general lessons can be learned that may advance theories. The first lesson learned is that co-production could be utilized as a valuable strategy that facilitates the communication, selection and adaptation of self-organizations in disastrous situations. As evidenced from existing research, people often arise from discontent with existing situations and a feeling that actions are needed [76]. The second lesson learned is that for the longer term, more in-depth observations are needed to craft co-production strategies in disaster relief and wider policy making. Although the benefits of co-production have been discussed in literature, real evidence is still lacking on to what extent co-production leads to improved performance. Thus more empirical studies are expected to further evaluate this. The third lesson learned that it is essential to consider the circumstances in which co-production occurs as well as the potential constraints that self-organizations may encounter in providing disaster relief services. For example, there are studies that foresee the immediate impacts of the COVID-19 pandemic on the nonprofit sector such as the financial hardships [77]. It is acknowledged that actions of self-organizations are closely embedded in governmental environments that could generate different modes of co-production. Critically, co-production may not always generate positive outcomes due to fiscal and policy constraints in different institutional contexts. In other words, the interaction between self-organizations and the government may have dark sides, depending on the interactions and the environment in which co-production takes place.

6. Conclusion

It is worthwhile to note that co-production of self-organizations during the fight against COVID-19 tends to be spontaneous and to some extent unplanned. In other contexts examined in current literature, the observation still holds true as opportunities and challenges self-organizations face are similar. Interactions between self-organizations and the government is not always desirable but dynamic. It can occur in various forms and contexts. Whether self-organizations will evolve into a formalized channel of co-production remains difficult to predict. To what extent can self-organized efforts be incorporated into policy design needs further research. As spontaneous groups, both Wakanda and NCP embrace its uniqueness and features and their experiences may not be transferable in other contexts. However, this study has the potential to generate some profound lessons for public policy making. Governments can learn from self-organizations and develop co-production initiatives to deliver good quality services both in disastrous situations and daily administration. Self-organizations, to some degree, are able to express citizen values and preferences through co-production initiatives that represent social justice and equality. Furthermore, governments are expected to encourage and facilitate these initiatives by providing resources and platforms to support the growth of the wider community. Admittedly, the relationship between self-organizations and governments may not always be positive given potential conflicts or opposition. Therefore, it is important truly understand the factors that influence co-production over time. Since any qualitative study has limits to the generalizability of the findings because it focuses on a relatively small number of cases in each context [78], future studies are expected to investigate how self-organizations can effectively engage in government activities for the betterment of the society. It encourages to expand the study by using a larger sample through both qualitative and quantitative methods in understanding the role of self-organizations to advance
theories of disaster management and public policy.

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