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Innovation in an authoritarian society: China during the pandemic crisis

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Innovation in an authoritarian society: China during the pandemic crisis

Abstract

Purpose—Traditional views on innovation suggest critical roles of technology push and demand pull, but in extreme cases, such as during social crises, institutional responses likely affect innovation too. In particular, authoritarian governments might enhance not just social efficiency but also innovation, suggesting a need for in-depth considerations of how authoritarian governments might orchestrate and encourage technological innovations in response to social crises.

Design/Methodology/Approach—Secondary data pertaining to eight impactful technological innovations in China during the COVID-19 crisis reveal how interactions and joint efforts by commercial firms and government organizations emerged as spontaneous responses.

Findings—The analysis of eight innovations—health code adoption, health omnichannel construction, noncontact service provision, distance education provision, public emotion consolation service, cross-boundary project promotion, cloud office adoption, and medical material production—reveals a matrix of best practices that details the roles of government (controller or endorser) and the value creation orientation (pro-social or pro-economic value).

Originality/value—This study enriches innovation literature by providing a new perspective on the relationship between governmental force and technological innovation during social crises. As these new insights reveal, technological innovation can contribute to social crisis management. China's example provides helpful implications for other countries suffering from the COVID-19 crisis.

Keywords—social crisis, technological innovation, authoritarian state, value creation, COVID-19, China

Introduction

Conventional wisdom says that the primary sources of innovations are either technology pushes or demand pulls. Underlying this view is an assumption of availability and the potential for assessments of technology and demand, even though not all settings support such scenarios. In some cases, a new technology cannot be applied, or demand decreases, and those possibilities become increasingly likely during social crises. For example, during the COVID-19 pandemic, commercial activities have been dramatically affected, including innovation practices. Yet social crises also might prompt new innovation and inspiration, suggesting the need for insights into how innovation-related best practices may emerge and how innovation stimuli shift in nature during a social crisis.

The COVID-19 outbreak occurred initially in China along with some innovation best practices, as countries sought new options for medical solutions, as well as novel commercial activities. In the latter case, firms confront a dilemma between their business goals and social needs (Candi, Melia, & Colurcio, 2019), which also can be described as a conflict between pro-economic and pro-social value norms. We know little about how business firms manage this paradox, especially when traditional sources of innovation are disrupted by social crises. But as the COVID-19 virus spread worldwide, with 5 million of confirmed cases globally, it has affected human society and the world economy with unprecedented scope and intensity. Organizations and businesses must take the opportunity to learn from such rare events (Lampel, Shamsie Shapira, 2009) to gain an accurate understanding of firm behaviors. We propose that investigating innovation activities during the COVID-19 crisis can provide such insights, and because China is among the first countries to achieve control over the spread of the virus, as evidenced by its nation-wide lifting of quarantine mandates, its experience could be helpful for other countries or in other crises.

China is widely considered an authoritarian state (Marquis & Bird, 2018), and its political regime differs from those of most Western countries. Information sharing between the central government and regional agencies tends to be fragmented, and the central government typically appears to constrain innovative activities (Spires, 2011). Yet during a social crisis, these theoretical descriptions of the role of China's government may need reconsideration, because an authoritarian state may mandate and direct firms' innovation activities, thereby mitigating the paradox of divergent value creation orientations. By investigating this context, we establish new insights into how other institutions can encourage innovation activities, across different political regimes, to address social crises.

Theoretical Development

Innovation During Crises

In a market-oriented economy, firms drive technological innovation, under the influence of both internal and external factors. The internal factors, as detailed by the resource-based view, reflect organizational characteristics such as its absorptive capacity, core competences, dynamic capability, and strategic orientation. External factors instead refer mainly to market opportunities created by various factors in the business environment, such as technological advances, shifting customer preferences, or changes to institutional regulations. Due to such market turbulence, innovation becomes necessary (Slater & Narver, 1994).

As an extreme case of environmental change, a social crisis creates dramatic levels of turbulence and urgent demand for technological innovations that can provide responses to the emergencies that arise. These unexpected market opportunities can alter firms' strategic priorities (Theodosiou, Kehagias, & Katsikea, 2012) and cause rapid decision making. Still, providing timely technological solutions is made more challenging by the heightened scarcity of resources

and disruption of existing business orders (Seetharaman, 2020). For example, quarantine mandates during the COVID-19 pandemic meant that in many countries, shops and factories closed; travel and transportation were constrained; industrial supply chains were disordered; and firms faced dire financial pressures due to the sudden loss of cash flow. In such extreme circumstances, the government, as a key pillar of any national innovation system (Chung, 2002), is expected to have an active role in coordinating various entities to facilitate and support innovation activities.

The Role of Government

A national innovation system comprises many private and public organizations, including firms, research institutes, and universities. Its outcomes depend on the efficiency of the interactions among these players. The government arguably should guide, coordinate, and promote innovation through policies and regulations. In some authoritarian countries such as China (Marquis & Bird, 2018), with its significant proportion of public ownership of the economy and high concentration of state power, the government has particular motivation and power to intervene. After the outbreak of COVID-19, China's government actively and directly sought to influence crucial technological innovation projects to address the virus, and the practice proved successful, so that in a very short period, multiple, impactful, technical solutions had been developed and adopted nationwide, which helped it manage the social crisis.

Value Creation During Crises

Innovation creates value for both the economy and society (Schumpeter, 1934). Firms are key economic agents that drive the development of technologies, as well as the economy and society, by investing in R&D and marketing the resulting innovations. To have sufficient incentives to engage in this value-creation process, firms generally undertake R&D activities in anticipation of private returns, such as profiting from the innovation outputs. Some innovations benefit society

more than they do individual firms, so the social value is more than what the firm that introduces the innovation can capture in private returns. In these circumstances, commercial markets cannot provide enough incentive for firms to conduct risky R&D and innovate, because they have no assurance that they will generate enough returns or even recoup their costly investments in innovation. When the market fails in this way, innovation activities tend to be inhibited without public support (Dahlman, 1979).

The exogenous crisis of the COVID-19 pandemic caused massive destruction across global markets and societies, though it might represent opportunities for social and commercial enterprises that can craft innovations with great social value (Weerawardena, McDonald & Mort, 2010). The shocks in the external environment have triggered many for-profit companies to invest more in R&D to find innovative products and services that may achieve both commercial and social benefits (Austin, Stevenson, & Wei-Skillern, 2006), in close collaboration with private and public sector actors. Accordingly, we aim to explore the extent and nature of government support, as well as the mechanisms that China's government employed to bring private incentives in line with social needs and value, using several case studies.

Methodology

China provides a compelling research setting for identifying government's roles in innovation during a social crisis, as represented by the COVID-19 pandemic. We identified several innovation projects related to a crisis management mission, starting 31 December 2019 (when the first confirmed case was identified in China) and ending 7 April 2020 (when the most seriously affected city, Wuhan, announced the end of its lockdown mandate). To investigate the stimuli for these innovative activities, we note the role of the government, together with the expressed value creation orientation. Thus, we can identify patterns of innovative activities and reveal how the

government intervened in innovation efforts to provide technical solutions to the COVID-19 crisis. Our research design relies on a fine-grained observation of the phenomenon, through a qualitative inductive analysis (Glaser & Strauss, 1967).

To find cases of innovation projects, we turned to secondary sources, such as news reports, governmental reports, social media (microblog), and event reporting online. With a two-step data analysis process, we first sought to identify what kinds of innovative activities were being conducted during the crisis. This effort revealed eight salient innovative activities. Then in a second step, we categorized those activities, according to the form of government intervention and the value orientation, to establish a typology. We thus can group innovative activities into a matrix, according to the role of government (controller or endorser) and the value creation orientation (pro-social value or pro-economic value).

Findings

Efforts to tackle social issues due to COVID-19 included multiple and rapid innovation projects, performed jointly by business firms and governmental agencies. In the matrix in Table 1, reflecting the role of the government and the value creation orientation, none of the presented innovation activities is conducted by a single firm or organization; they all involve groups of firms and organizations, which vary across different regions. Accordingly, in our discussion, we refer to them as innovation activities instead of projects.

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Insert Table 1 about here

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Government-Controlled Pro-Social Value Activities

Soon after the lockdown of Wuhan on 23 January 2020, which represents the explicit, official recognition of COVID-19, the government reacted efficiently, establishing favorable policies that would encourage business firms to undertake rapid innovation, as illustrated by the cases of the *health code* and the *health omnichannel*. For these innovation activities, the government took control, and they offer more social value than economic benefits.

Health code adoption

In 2016, Hangzhou, the capital city of Zhejiang province, initiated a *Smart City* project, designed to identify and track techniques to improve social security and limit crime. Its capabilities had been adopted to a limited extent, but after the virus outbreak, Hangzhou's government used a component of *Smart City* to launch the *Health Code*, a smartphone app that could identify and track the health of individual citizens. People could present their health code results and have their health situation checked and recorded in any public space. This app relies on a centralized database that monitors and tracks the health of all citizens. If a person has been infected, he or she and anyone coming in contact with him or her are rapidly identified and quarantined. This capability enabled the fast, efficient control of the spread of the virus. The app was implemented by governmental force, as an obligatory effort, then extended nationwide to cover the population of more than one billion people within just a few days.

Health omnichannel construction

In December 2019, Chinese scientists started to share the COVID-19 genome with health care researchers around the world. In an effort coordinated by China's central government, multiple research institutes and commercial firms jointly constructed an efficient omnichannel for virus-related information sharing. On 24 January 2020, the National Pathogenic Microbial Resources Bank released electron microscopy photos of the first COVID-19 genome strain that had been

isolated by China's Center for Disease Control and Prevention (CDCP). On 1 February, Alibaba's DAMO Academy of Discovery and the Zhejiang CDCP jointly launched an online platform to support public COVID-19 diagnosis; as a result, the time needed to analyze a sample diminished from 10 to two hours. The rapid diagnosis capability enabled patients to receive timely treatments and prevented the further spread of the virus. As a notable achievement of this system, the cruise ship *World Dream* docked at Guangzhou port on 3 February, at which point a few passengers were found to have a fever. Alibaba constructed a cloud system within nine hours of receiving a request at 8:40 am. With the assistance of the platform, tests of samples from 6,296 passengers and crew members were completed by 11:47 pm, and the diagnosis reports were sent to the Guangzhou CDCP immediately.

Government-Controlled Pro-Economic Value Activities

The Chinese New Year holiday is the best week for commerce most years, but COVID-19 and the resulting country-wide lockdown meant the suspension of almost all business and commercial activities. Even the purchase of basic necessities was complicated in the early days of the quarantine. The Chinese government took prompt action to reestablish the supply chain for basic needs, which required new product and service delivery channels. The government promptly issued detailed guidelines to encourage and regulate firms' distribution activities.

Non-contact service provision

Social distancing and masks were strictly enforced in public places. Then, to enable non-contact services, municipalities issued direct demands for new products to high-tech firms. For example, drones were equipped to identify anyone not wearing a mask in public and issue a loud, verbal warning, telling the person to go for a temperature check immediately. Drones and smart robots also delivered drugs and medical devices to quarantining consumers, and they performed daily

disinfection services in public spaces. A new disinfection vehicle was designed and rapidly put into use. Robots were introduced to look after patients and disinfect surfaces in Wuhan Tianyou Hospital and Shanghai Sixth People's Hospital, enabled by 5G cloud technology. Such high-tech equipment innovations, empowered by the government to help manage the crisis, also created considerable revenues for their firms. Other high-tech products and equipment, including unmanned supermarkets, robotic street cleaners, augmented reality clothes shopping, and drone delivery, continued to be developed for commercial applications too.

Distance education provision

All schools in China closed during the lockdown; students were required to study at home. Cloud-based distance education systems were developed and adopted nationwide at all levels of education, from primary schools to universities. The initiative was launched by the government in late January, and by 10 February 2020, 50 million students all over the country had access to online courses offered by Alibaba's Ding Talk system. Learning at home dramatically changed traditional classroom education, which may lead to significant reforms to existing education models.

Government-Endorsed Pro-Social Value Activities

As in any society, the government in China could not supervise or control all the services needed by society during COVID-19. Business firms therefore took the lead to meet some demands, though usually with a strong endorsement from the government, such as in efforts to disclose information and establish international collaborations to find COVID-19 treatments. These activities also help shift public emotion, from negative to positive in tone.

Public emotion consolation service

Emotional and mental health became critical concerns during the lockdown. Online medical and emotional consultation services have important roles. For example, *DX Doctor* is rooted in cloud

technology and updates the real-time status of COVID-19 all over China. It built up an active knowledge community, involving hundreds of millions of users who share information and communicate with one another online (Pan, Cui, & Qian, 2020). The government-backed *People's Daily* cooperated with *DX Doctor* to release official announcements. Through the cooperation of the official press and the online community, the public received scientific information, rumors were limited, and some negative emotions were effectively contained.

Cross-boundary project promotion

In China, the government takes charge of centralized decision making and allocations of social resources. It often uses its administrative power to link organizations from different industries that can work together to achieve non-profit, social purposes. For example, it compelled the Shanghai Institute of Nutrition and Health and Shanghai Pasteur Institute, two research agencies within the Chinese Academy of Science system, to collaborate with Huawei, a leading telecommunication firms, to launch the Virus Identification Cloud (VIC) system. This VIC system provided automatic identification of the virus genome and could quickly detect and recognize variant forms of COVID-19. The system provided clinical diagnoses and critical references for developing treatment measures.

Government-Endorsed Pro-Economic Value Activities

Unlike government-controlled innovation activities for social benefits, some efforts were dominated by commercial firms, with the endorsement of the government. They tend to create more economic than social value, such as the remote working systems and cloud offices that high-tech firms introduced to help people work from home. Other firms built up their production lines for healthcare devices.

Cloud office provision

During the lockdown period, public service organizations and commercial firms needed to continue providing services, so working from home, using a cloud-based office system, became increasingly popular very quickly. In the one-month period from mid-January to mid-February, demand for cloud office support increased 663 percent, and providers benefited from this boom in users. Alibaba's Ding Talk system became one of the most popular software downloads, with the number of active users at a five-year peak. In addition, business users of WeChat, the massive social media app run by Tencent, increased by tenfold in the first 20 days of the lockdown. Another cloud service provider, Huawei, experienced an average daily increases of 1 million new users, equivalent to a 50-fold increase. These firms thus earned massive profits from surging demand for cloud services.

Medical material production

While cloud service providers simply expanded their existing offerings, some manufacturing firms adjusted their product portfolio by setting up new lines to produce medical materials. On 15 February 2020, the State Administration for Market Regulation updated its regulations for registering and producing medical materials, to resolve shortages in the supply of masks in particular. This change lowered the barrier to market entry and encouraged firms to exploit their slack production capacity. By 20 February, just 5 days later, applications approvals for medical supplies increased 12.5 percent, and 20 companies were newly registered as material producers of respirators, masks, protective clothing, protective glasses, and so forth. Even carmakers, such as SAIC-GM-Wuling Automobile, shifted their production lines to produce medical materials: Four production lines made N95 masks, and ten made surgical masks, and the factory quickly established a capacity of 1.7 million units per day.

Discussion and Conclusion

The COVID-19 pandemic, as an extreme social crisis, created remarkable market turbulence, which drove a wave of technological innovation in China. The government, as an authoritarian government body, has substantial power to manipulate and intervene in innovation activities. With secondary data from Chinese and international media, we analyzed the patterns of this intervention, with attention centered on the sources and nature of innovation. From this analysis, we determine that the Chinese government functioned to facilitate firms' innovation activities, whether as a controller or an endorser. Moreover, commercial firms' innovation activities reflected distinct value creation orientations, whether pro-social or pro-economic (Candi, Melia, & Colurcio, 2019). With eight salient mini cases, we illustrate a matrix of the different roles of the government and value creation orientations, which in turn gives insights into innovation management options during a social crisis, enriching our understanding of the role of China's government, an authoritarian regime that usually is assumed to prevent innovation (Spires, 2011). Our findings challenge this traditional assumption and show instead that an authoritarian state cannot only achieve social efficiency but also promote technological innovation activities during a social crisis.

Our contributions are threefold. First, this study provides a detailed analysis of the sources of innovation when traditional sources (e.g., technology push, demand pull) are ineffective. Second, in detailing innovation activities according to the controller versus endorser roles of the government on the one hand, and pro-social and pro-economic value orientations on the other, we offer a new view on innovation activities. Third, the empirical setting of our study, focused on innovation activities in China during COVID-19, broadens our understanding of how an authoritarian state can enable technological innovation. To the best of our knowledge, this study is among the first attempts to investigate the innovation activities of the authoritarian state when dealing with a social crisis.

Practical Implications

Some of these findings may reflect the specific social context. For example, the broad, rapid adoption of the health code likely would be viewed as a violation of privacy in Western societies. The Chinese government's prompt reactions, such as relaxing regulations for registering medical material producers, likely apply in nearly any society. Further, the coordination facilitated by government between research institutes (e.g., Chinese Academy of Science) and commercial firms (e.g., Huawei) offers a promising effort. Policy makers should recognize the paradox of innovation activities, between social value and economic value, and take on different roles to facilitate cooperation with commercial firms. Meanwhile, business executives should consider their own trade-off between social and commercial objectives when conducting innovation projects to deal with a social crisis.

Limitations and Further Research

For this study, we relied on data from secondary sources, which may contain potential biases. However, at this moment, due to international travel constraints, secondary data represent a viable and likely the best option. As these constraints loosen, continuing research might consider other sources. In addition, we adopt a paradox perspective on pro-social versus pro-economic value, but another approach might present them as conflicting orientations or part of another trade-off. A holistic view of how innovation activities lead to different kinds of value creation would be helpful. Finally, our observation covers the entire lockdown period in China, but a more dynamic analysis, using a process view, could detail how innovation activities evolve over the course of the crisis.

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Table 1. Matrix of innovation activities for crisis management during COVID-19

	Pro-social value	Pro-economic value
Government as controller	Health code adoption Health omnichannel construction	Non-contact service provision Distance education provision
Government as endorser	Public emotion consolation service Cross-boundary project promotion	Cloud office adoption Medical material production