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Pandemic in a smart city: Singapore's COVID-19 management through technology & society

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ABSTRACT

On 23 January 2020, Singapore announced its first COVID-19 case, becoming one of the first countries to be affected by the virus outside China. The government acted swiftly, closed its borders, introduced circuit-breaking measures, and deployed public health and medical expertise in tackling the virus. Both technology and human resources were used extensively for contact tracing, quarantining, and pathogenic management. While all these measures helped in a successful containment initially, the second wave of COVID-19 cases emerged at the foreign worker dormitories, affecting thousands of workers. Singapore's approach in tackling the situation shifted rapidly and began to involve civil society organizations and individuals in the fight against the virus. In this paper, we argue that while state-led technologies such as *TraceTogether* and *Safe Entry* helped in the techno-governance of bodies on the move, bottom-up digital solutions, and innovative engagement of individuals are equally crucial in building a smart and resilient Singapore.

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Introduction

Singapore announced its first case of COVID-19 on 23 January 2020. While Singapore was one of the few countries to act fast against the spread of the virus, the country has clocked more than 30,000 COVID-19 positive cases at the time of writing this article (22 May). The large number of positive cases in Singapore is partly due to Singapore's aggressive pathogenic tracing and testing. Singapore has conducted one of the highest tests per million population in the world, along with adequate quarantining and stay home strategies. This relatively successful pandemic management has resulted in 22 deaths at the time of writing, which is 0.1% of the case-fatality ratio, one of the lowest in the world.

The secret to this probably lies in Singapore's continuous learning from experiences of handling epidemic and infectious disease outbreak for the last 100 years. From being an important port and commercial hub during the colonial period to being at the frontier of globalization today, Singapore has little choice but to mitigate a series of pathogens and epidemics that had spread across the country, affecting its

residents and economy. Significantly, the Spanish Flu of 1918, the Hong Kong Flu in 1968, SARS in 2003, and H1N1 pandemic in 2009 had taught several lessons to the doctors, medical and frontline workers, and policymakers. Therefore, when COVID-19 arrived in Singapore, the nation was equipped with dense epidemiological knowledge to react, take swift actions, and make decisions. This time, technology has been widely used as a tool for viral surveillance as part of the *Smart Nation* initiative (see Chang & Das, 2020).

This paper begins with a brief discussion on Singapore's COVID-19 situation since January, followed by a section on technology encounters and interventions by the state agencies. In this section, we argue that the state-level technologies help in surveilling through “governance of bodies on the move” similar to what Datta (2020) argued about “governance of bodies at home.” In the next section, we argue that top-down technological interventions are not enough to build a smart nation/society; ground-up participation is needed. To bolster our argument, we give a brief discussion with examples in relation to the ground-up approach in the utilization of technology, innovations and technopreneurialism in Singapore and what Söderström (2020) argues as emerging opportunities through modes of existence of the smart city. In what follows, the last section brings out a series of questions in relation to the idea of access to technology and issues of equity. Has Singapore been able to provide equal access to technology and devices to all? How about the use of smart technologies and apps by the elderly? How can we ensure the effective use of technologies for COVID-19 management and a safe, resilient, and smart post-pandemic society? We conclude with some critical reflections of what COVID-19 has brought to Singapore.

Pandemic in the global city

China announced the COVID-19 situation emerging in the Wuhan region by the end of December. The World Health Organization (WHO) warned the world about the virus by 31 December 2019. Knowing that the virus can easily travel through the global network of air travel, Singapore began temperature screening of all inbound travelers from Wuhan, China, from 2 January 2020, followed by the screening of all travelers from China from 20 January 2020. With every new case reported, the Ministry of Health (MOH) would mobilize contact tracers to develop the patient's activity map – what Sonn and Lee (2020) refer to as “time-space cartography” (p. 3). Based on the details of contact tracing, close contacts with the patient were monitored and tested for the COVID-19 if necessary. Apart from MOH, physical contact tracing involved services rendered by the Singapore Police Force (SPF), Certis Security Service, and Singapore Civil Defense Force (SCDF).¹ This process was intense, needed a massive amount of resources and time-consuming.

With an increasing number of positive cases, Singapore's multi-ministry task force raised the “Disease Outbreak Response System Condition” (DORSCON) alert level to Yellow during the first week of February – indicating that the disease is spreading in Singapore and need additional measures to stop the spread. Soon, temperature screenings at workplaces, shopping malls, schools became mandatory and large-scale events were canceled. All residents returning from China were served with mandatory Stay Home Notice (SHN) for two weeks. With the new measures, the number of cases started

coming down. The nation's swift contact tracing, intensive testing and efficient response against the pandemic were widely circulated as a success model. CNN News termed it as a "model coronavirus response."² However, the second wave of new positive cases emerged by the end of March 2020.

Despite being lauded for its containment efforts during the first wave, Singapore's COVID-19 cases increased from nearly 100 at the beginning of March to nearly 1,000 by the end of the month. Experts described it as a second wave largely linked to residents returning from contagion-hit countries such as the United States, the UK, and France, as well as a significant proportion of the rise in infections originating from crowded foreign worker dormitories. The government declared the affected dormitories as isolation areas (see Cai & Lai, 2020). There are nearly 320,000 low-skilled migrant workers in Singapore, mostly serving in the construction, petrochemical, marine, and F&B sectors. The less-skilled jobs that no longer attracts the local population due to relatively lower wages are primarily filled-in by foreign workers (see Wong & Yeoh, 2005). The dormitories, often occupied by hundreds of workers with crowded conditions (see Liang, 2020) ultimately led to the rapid spread of the virus (see Sim & Kok, 2020). The Manpower Ministry (MOM) isolated the infected dorms, enforcing social distancing and disinfection of the dorms. MOH doctors and frontline workers began aggressive testing and planned isolation of infected workers. As the total number of COVID-19 positive cases kept rising, the government announced a partial lockdown and implemented a series of "circuit breaker" (CB) measures.³

The primary aim of the CB was to minimize movement and interactions among individuals at various places such as office premises, industries, schools, markets, and communal spaces. Strict measures were taken to close office premises, universities, restaurants, and other non-essential shops. Schools moved to a home-based online learning platform. Interestingly, as part of the Smart Nation initiative and developing future-ready learners, the Ministry of Education (MOE) has already invested in developing Singapore Learning Space (SLS). This online platform became useful for home-based learning due to CB. In addition, reusable facemasks were also provided to all residents through community centers and resident committee centers with the help of volunteers.

However, as the number of cases kept rising even with CB measures, on 23 April, the government announced an extension of CB until 1 June. The second CB came with enhanced and stricter measures, such as tightening up on the percentage of traveling workforce and a further reduction in the number of shops that were allowed to remain open, as community spread needed to be stopped. On April 3, Prime Minister Lee Hsien Loong, during his televised address, said the tighter restrictions were "the only effective way to slow the transmission of the virus so that we gradually bring our numbers down."⁴ As Singapore's economy was hit hard due to the emerging pathogenic landscape, the government unveiled a series of COVID-19 relief packages totaling nearly US\$ 70 billion toward wage support, waiver of levies and support to businesses.

By the third week of May, COVID-19 trends indicated that Singapore's circuit breaking measures are working. Although infections in foreign worker dormitories remain high, partly due to aggressive testing, those in the rest of the community have been decreasing steadily at the time of writing this paper. As noted earlier, Singapore began with physical contact tracing weaving through a very complex and time-consuming process (see Yeo, 2020). On 20th March, the nation moved to a smart app-based contact

tracing program, known as *TraceTogether* and followed by a nation-wide digital check-in and check-out system, known as *SafeEntry*. The next section will discuss in detail the initiatives of the government in relation to using smart technologies for the surveillance of bodies on the move.

Encounters with state-led technologies

The *TraceTogether* app and the *SafeEntry* system played significant roles in the digital surveillance landscape during the pandemic. The *TraceTogether* app uses Bluetooth signals and enables authorities to identify people who have been exposed to COVID-19-infected individuals. Smartphones within two meters of each other exchange the Bluetooth signals, allowing the app to make a record of the encounter and time. The information can then be used to identify close contacts based on the proximity and duration between users.

SafeEntry, on the other hand, is a digital check-in and check-out system that logs individuals' and visitors' entry into offices, schools and universities, shopping malls, and other venues with higher footfalls. Unlike the *TraceTogether* app, which is a voluntary surveillance program, *SafeEntry* is compulsory. The smart system basically records the arrival and departure times of an individual at a particular venue. It requires an individual to scan a QR code using their mobile device before prompting them to key in their national registration identity card (NRIC) number and mobile number for identification purposes. Those without a mobile device are allowed to use their NRIC card or other approved identity cards, making it a more inclusive technology. The details will be used by contact tracers to contact personnel who were deemed to be in close proximity with a confirmed case.

TraceTogether and *SafeEntry* can be seen as a form of intimate surveillance whereby one's civil liberties are sacrificed in the name of combating the pandemic, a "common enemy", with the state. The "together" in *TraceTogether* is a signifier for a kind of togetherness between the government and its people, fostering a sense of "we are in this together" mentality. As such, a kind of moral obligation or sense of social responsibility is evoked amongst the population to contribute to the cause of making everyone safer by downloading the app. Such governance of the population in a time of pandemic brings to mind Ayona Datta's (2020) analysis of *Quarantine Watch*, an app used in Karnataka, India to act as a form of pandemic surveillance. People under quarantine were supposed to take GPS-tagged selfies of themselves (once every hour except for 10 pm to 7 am) in their home and send them to the authorities via the app. Although different in nature to *TraceTogether* and *SafeEntry*, her analysis on the governance of bodies is of interest here. While Datta refers to such a surveillance method as the "governance of bodies in the home," the Singapore experience can be seen as a "governance of bodies on the move". The mobility factor adds another layer to the idea of "state-at-home" (ibid) governance to form a variant that can be known as "state-on-the-move" or "state-on-the-go."

But of course, there are skeptics of such surveillance technologies. Although the *TraceTogether* app does not use any GPS location signals and rely only on Bluetooth, with tracing details saved locally only on the users' phone for 21 days, the app was downloaded by only one-third of the total population. Sim and Lim (2020) listed possible reasons for the low take-up rate ranging from the lack of marketing to concerns over data

safety and apprehensions about one's privacy due to the increased surveillance by the government. Indeed, research by Kitchin (2020) and Mukherjee (2020) reveal the need to address privacy issues and the importance of ensuring the proper handling of surveillance data. A critical analysis of encounters with state-led technologies like *TraceTogether* and *SafeEntry* in the containment of the COVID-19 pandemic allows for a more nuanced understanding of the everyday concerns of ordinary people. The governance of bodies, be it in the private or public sphere, be it in-situ or on the move, will be an important area for further studies as people's experiences with these surveillance technologies will have profound implications for the reconfiguration of state-citizen relationship in a post-COVID-19 world.

Technopreneurialism in the making

With an emerging neoliberal economic policy in the West, the entrepreneurial state has been widely circulated as a response to the processes of globalization that David Harvey observed as states' shifting role from managerialism to entrepreneurialism (Harvey, 1989). In East Asia, especially in Japan, South Korea, Taiwan, and Singapore, the entrepreneurial agenda has been led mainly by the state's active intervention. Miao and Phelps (2018) term it as the government's active role between the "world of regulation" and the "world of profits" (p. 319). While Singapore began with extensive export-oriented industrialization market development through developmental state roles, by the late 1990s and early 2000s, the nation moved to the information technology, banking, and finance sector. To this national goal, the government encouraged younger generations to be innovative and pursue technopreneurialism (Chua, 2019, p. 530).

In what can be observed as a form of "intrapreneurialism" (see Miao & Phelps, 2018, p. 316), the Infocomm Media Development Authority (IMDA), a statutory board of the Singapore government, collaborated with Tekka Market, one of the most famous wet markets in Singapore, to help stalls live-stream their fresh produce for sales on Facebook. The event was such a success that some stall owners were able to sell out their products under an hour (Tang, 2020). Such innovative collaborations not only assisted the stall owners with coming up with technopreneurial ideas but also played a crucial role in maintaining the rhythms of everyday life during the circuit breaker period.

Apart from digital solutions initiated by the government, bottom-up technopreneurialism can also be observed in relation to addressing COVID-19 challenges. With the continuation of the CB since April 7, Singapore's ubiquitous hawker food centers have been affected profoundly due to lesser footfall and stringent rules. Amid these uncertainties, one of the Hawker stall owners created a Facebook public group – 'Hawkers United – Dabao 2020' that generated a lot of interests. Subsequently, more than 200,000 people joined the group.⁵ The Facebook page helps hawker stall owners to publicize about their food offerings, options for delivery or takeaway and diners can accordingly order. The creator of the Facebook page said in an interview with a newspaper that traditional hawker stalls need to go digital, and perhaps the COVID-19 is an opportunity to try out technology (Pillai, 2020).

In another ground-up technology initiative, a young doctor developed a website⁶ that helps the attending doctors in translating to Bangladeshi patients, mainly from the worker's dormitories. The young doctor was already volunteering as a Bengali interpreter

and assisting doctors attending to Bangladeshi patients. However, as the number of COVID-19 patients began increasing from the dormitories since early April, the doctor built a website to make translations easily accessible and available to medical teams across the island (Yip, 2020). The website also has voice recording in the Bengali language that further helps the Bangladeshi patients to understand instructions and questions by the doctors. The website has been very popular with doctors and frontline workers and encouraged similar translation exercises by youths in other languages such as Tamil and Hindi (Wan, 2020).

Despite commendable efforts by the IMDA to narrow the digital divide in society, the COVID-19 crisis in general and the subsequent circuit breaker measures, in particular, have brought home several hard truths about Singapore's "digital outcasts" (Ong, 2020). In the following section, we delve deeper into the digital vulnerabilities in the society that the pandemic cruelly exposed.

(In)Accessibility to technology

Nominated Member of Parliament, Anthea Ong (2020), describes the "digital outcasts" as those who "struggle in terms of digital literacy and skills, particularly among low-income households, the differently-abled, and seniors." Although the (silver) digital divide is not new, and both government and non-government organizations have been putting in the effort to improve digital literacy, the pandemic has cruelly exposed the vulnerabilities of this disadvantaged group. For example, full-time home-based learning (HBL) was introduced for students as part of the circuit breaker measures, but not everyone can afford a laptop. The 2017/2018 Household Expenditure Survey reveals that about 70% of 1–2 room Housing Development Board (HDB) households do not own a personal computer, compared to just 5% of private condominium households. The percentages for having internet access are 45 and 96, respectively (Ong, 2020). Moreover, there are also reports on the challenges faced by economically disadvantaged students residing in large households in terms of difficulties they face in concentrating during online classes, and the need to share one laptop amongst several siblings (Lee & Yeo, 2020). Ong (2020) opines that despite the device loan program introduced by the MOE, much more could be done to ensure equity in terms of laptop ownership amongst school children. Indeed, HBL has exposed the harsh realities of class divide and inequality in Singapore.

The COVID-19 crisis has also marginalized the seniors. It is one thing to organize programs to enhance digital literacy, but another to make sure these are accessible to all seniors in the first place. According to sociologist Tan Ern Ser from the National University of Singapore, the digital divide could contribute to a growing "sense of alienation and helplessness" for some elderly (Toh, 2017). Such a sense of loss and loneliness could exacerbate into disorientation and depression during the circuit breaker period when one's mobility is highly restricted. An elderly who shuns away from technology could still "get by with their daily lives without much fuss" (ibid.) before the virus outbreak. For those who are mobile, they could go to their favorite coffee shop, meet up with friends or just hang out in the neighborhood. Daily routines were not compromised even without engaging with the digital world. For those who do not have internet access, they may visit a nearby McDonald's for free Wi-Fi. However, the onset of the circuit breaker meant that Singaporeans have to adapt to a very different rhythm of life. While their younger

counterparts might immerse themselves in the world of *YouTube*, *Instagram*, *TikTok* and the like, seniors who are digitally illiterate could find themselves shortchanged for alternative methods of communication and entertainment. All in all, equity of access to technology is of paramount importance while Singapore prepares itself to be more resilient in facing future challenges.

Conclusion

The COVID-19 crisis has indeed taken Singapore on a roller-coaster ride. The global reputation gained in the relatively successful containment of the first wave of the infection quickly slipped away with the outbreak of a second wave, which contributed to the exponential rise in the number of infected cases, primarily among the 300,000 migrant workers living in dormitories. The media would subsequently report on the cramped and often unhygienic living conditions, exposing the plight of this group of residents (Ratcliffe, 2020). Subsequently, the government faced “criticism for not preparing well enough” for the possibility of virus outbreak in the cramped dormitories (Jaipragas, 2020). Despite the government’s pledge to raise living standards in dormitories in the future (Ng & Ong, 2020), it was noted that some “serious soul searching, from top to bottom” (ibid.) is indeed needed, not just for the government, but Singapore’s society at large.

COVID-19 has exposed the cracks and fault lines caused by perennial issues like inequality and equity in relation to access to technology and forced the society to reflect upon its attitudes toward migrant workers. The COVID-19 has brought home possibly one of the toughest challenges for the government in recent times. As prominent local scholar, Wang Gungwu opined, “. . . the Singapore government has acted quickly and has successfully used a variety of resources to deal with the problems that have arisen . . . the lessons are being learnt and the new corrective measures introduced are proving to be effective” (Chow, 2020). Perhaps the pandemic crisis has offered an opportunity for the government to better prepare for the future. As such, what we learn is that during a pandemic, it is never enough to possess the best apps and technologies; we equally need inclusive policies, ground-up initiatives, and effective leadership (see Baharudin, 2020) (Zhang & Savage, 2020). As we brace ourselves for the “new normal,” technology is only a part of the solution for Singapore to stay relevant in the post-pandemic age.

Notes

1. For a detailed video description of Singapore’s Covid-19 contact tracing, please see <https://www.straitstimes.com/multimedia/a-guide-to-singapores-covid-19-contact-tracing-system>
2. See <https://edition.cnn.com/2020/04/18/asia/singapore-coronavirus-response-intl-hnk/index.html>
3. See <https://www.moh.gov.sg/news-highlights/details/circuit-breaker-to-minimize-further-spread-of-covid-19>
4. <https://www.pmo.gov.sg/Newsroom/PM-Lee-Hsien-Loong-on-the-COVID19-situation-in-Singapore-on-3-April-2020>
5. See <https://cnalifestyle.channelnewsasia.com/dining/singapore-hawker-food-takeaway-delivery-12665742>

6. <https://sudesnaroychowdhury.wixsite.com/covid>

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