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Chapter 16

Smart cities beyond COVID-19

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16.1 Introduction

Innovation has always been a part of human history, but the current development of information and communications technology (ICT) is changing the daily life of almost all people in every urban affair. While the current practices of smart cities are the direct outcome of technological advancements, technological innovation is strongly associated with social changes and institutional evolution. The combined effects of the two interrelated innovations—technological and social—expedite smart city making and smart cities, in turn, spur further innovations. This chapter provides suggestions to this “self-reinforcing” relationship between innovations and smart city development—rights to innovation, land value capture in smart city development, disruptive institutional breakthroughs, and incentives to innovation. To illustrate the significance of ICT development, this chapter reviews the changes made over the coronavirus disease (COVID-19) outbreak. ICT infrastructure has enabled work from home via online networks and online meetings when physical contacts are discouraged due to the contagious plague. The example of the actions taken during COVID-19 sheds light on the smart city’s resilience to emergency situations by using preexisting ICT facilities.
16.2 Steps for future smart cities

Cities and innovation are inseparable. Human beings are by nature innovative, seeking out new ways in all circumstances, and cities are, by definition, the geographical expression of the presence of human beings. Innovation is a core element to smart cities and current discussions about smart cities are technology-driven, futuristic in image, and aspirational in perception. This book provides conceptual frameworks in Chapter 2 and case studies about reciprocal relationships of innovation with smart cities—innovation is making smart cities and smart cities strengthen innovation.

Technological innovation and social innovation constitute a key part of smart cities. In the current practice of smart cities, technological innovation, generally achieved by technicians, scientists, programmers, and engineers, is centered on ICT. Social innovation is an important topic in institutional studies but has not attracted much academic attention in the smart city discourse. These two innovations can be understood at a conceptual level, but this binary approach can obscure the understanding of transformation processes as it overlooks the tight interactions between them. The outcomes of technological innovation change the ways people live, work, interact, and enjoy. As reviewed by Thai et al. (Chapter 8), online websites, smart devices, and technological innovation have changed the way of running businesses, communicating with customers, using space, and sharing information with neighbors. The implementation of autonomous vehicles, also technological innovation, is highly dependent on a consensus among citizens, a socially agreed decision (Chapter 14). Technology is part of social relations and social decisions guide the use and the development of technology. A key in smart city making is to create self-reinforcing environments for technological innovation via social innovation and vice versa. Barriers to self-reinforcing environments are unequal access to the benefits of innovation, privatized windfall gains from smart city development, rigid institutional path dependency, and disincentives to innovation.

16.2.1 Rights to innovation

The benefits from innovations should not be monopolized by selected groups but shared by citizens. “The right to the city” argument conceptualizes how cities should be shaped, changed, and governed beyond access to urban facilities (Purcell, 2002; Lefebvre, 1996; Harvey, 2003). ICT infrastructure in smart cities seems a technological enabler to rights to the city due to ubiquitous access to information and virtual services. Although ICT provides and creates new opportunities for citizens regardless of their physical location, the power of smart city development tends to remain with leading actors. ICT experts, ICT firms, and technocrats assume leadership in initiatives for technology-driven urban solutions, actions, processes, and the evolution of the urban governance of smart cities. Technological availability has become a precondition to decision-making
in tackling urban issues. Given the growing significance of ICT, government investment is likely to favor technology-oriented industries and research and development (R&D). In fact, the OECD found that public expenditure in science-based R&D was as high as business R&D and innovation among 27 countries in the European Union in terms of per GDP expenditure (OECD, 2012). The growing reliance on the advanced-technology class means the potential exclusion of those who are unable to catch up with rapidly changing technological environments to access the benefits of innovations. While basic technological skills are now required to live with ICT in smart cities, there are still the technologically disadvantaged such as the uneducated (or the untrained), seniors, and the marginalized who are unable to afford ICT devices and internet connections. The gap in access to technological innovation is a source of growing income inequality as they limit opportunities. The user-friendliness of all kinds of technological innovation is essential for widespread benefits. Those innovations enhance the productivity of firms and individuals. Thus, efforts must be made at government, civil, and private sector levels to provide new technology with training for citizens. The key to technological equity is to strengthen the capabilities of citizens to access the benefits of innovation.

16.2.2 Land value capture in smart city development

One of the by-products of smart city development is an increase in land values. This is due to two factors. First, one of the distinctive features in smart city development is the urban focus on land development. Similar to any other urban land development projects, smart city development requires public investment in infrastructure and land pooling. Any improvement in land results in land value increases. Regardless of whether contributions to technological innovation are made or not, landowners are winners by taking windfall gains. Therefore, there is no direct incentive to innovate. As reviewed in the South Korean smart city case study in Chapter 4, smart city development, in particular on greenfield sites, is not a cheap option. The Sejong smart city project was an outcome of land acquisition with compensation for landowners who also received windfall gains. The land development agency, Land and Housing Corporation, undertook land pooling and sold serviced land to private developers or reserved public uses such as government offices, hospitals, schools, and social housing. Revenue from selling serviced land to private developers partially funded the Sejong project. The national government also funded this project and private firms were invited to invest in ICT infrastructure. All these actions led to physically superior built environments which resulted in expensive land prices. In Chapter 9, Ghana’s smart city project illustrated how government actions could advance sustainable development goals. However, the Accra City Extension Project is at risk of becoming a luxurious new town development worsening inequality.

Second, as discussed, ICT infrastructure is meant, in principle, to improve productivity for all. Changes in productivity are also reflected in land values.
However, as Henry George (George, 1879: Chapter 20) alerted, “every improvement or invention that gives labor the power to produce more wealth, no matter what it may be, causes an increased demand for land and its products... every labor-saving invention has a tendency to increase rent. This is true whether it is a tractor, a telegraph, or a sewing machine. There will be a greater production of wealth—but landowners will get the whole benefit,” which discourages innovation in the long term.

Therefore, a fine-tuned reward system should be established for innovation and enhanced productivity. From a land development perspective, land value capture is an institutional basis to recoup the betterments and lessen land speculation (Medda, 2012; Peterson, 2008). A monopoly or oligopoly of land contradicts the smart city ideal of sharing the benefits of technological innovation. Land value capture (or land tax) is theoretically sound and widely implemented in various formats (Hughes et al., 2020). Smart city development should not be an exception in the implementation of land value capture measures.

16.2.3 Beyond rigid institutional path dependency

ICT is becoming a fundamental part of daily life and business operations. Interactions beyond traditional disciplinary boundaries will create more opportunities and enhance productivity. The ideals of the smart city center on innovation to boost productivity, sustainability, and livability, which can be achieved by collective actions beyond a single sector. Integration is a current trend for future growth in businesses, governance, and academia as the combination (or mix) of different sectors can have the potential to create new products and added values. As this book provides multiple examples, smart technologies can be embedded in almost all sectors and urban policy is now responding to this trend.

Australia’s nationwide smart city program was introduced to break the legacy of Australia’s underinvestment in ICT infrastructure with a focus on the strategies for place-based knowledge economies. The rapid growth of first-tier Australian cities has motivated the employment of smart technologies to improve environment and congestion conditions and manage infrastructure as seen in Chapter 6. An effective place-based approach requires objective-driven and site-specific coordination. In recognition of the city’s challenges, Adelaide’s smart city approach is to restructure the economic and industrial base toward knowledge economies and boost population growth. The coordination can be backed up by interactions between stakeholders including multiple government departments, citizens, private ICT firms, and technocrats. Smart city infrastructure is designed to facilitate communications and support data management.

The path dependency of institutional behaviors is an outcome of fear of possible risks involved in new ways of decision-making. The government is often criticized for its rigid and inflexible ways of running public administration. However, smart technologies offer platforms to deal with risks and uncertainties from new data sources, as ICT is a multipurpose infrastructure. Data from
sensors, mobile phones, and signals are becoming available for analysis and simulations, as exemplified in Digital Twins in Chapter 4, geospatial information systems in Chapter 3, and the use of the Internet of Things in Chapter 10. These simulation tools and data analysis can be used to identify threats to cities and to formulate various policy options before implementation. In so doing, ex ante policy evaluation, via smart technologies, encourages institutions, including government, to embrace disruptive innovation.

16.2.4 Incentives to innovation

Although human beings are naturally keen to innovate, lack of incentive discourages it. While formal recognition, such as intellectual property rights and patents, secures inventors’ exclusive rights, this does not always apply to the broader society. Incentive systems within institutions and government should be established, such as offering opportunities to experiment with new ideas, encouraging start-ups, and embracing suggestions from the public. Entrepreneurialism has already been embedded in the undertakings of local governments seeking global investment and market efficiency (Scott, 2012). The right reward systems for innovation within institutions will enhance organizational efficiency. Those reward systems are not limited to recruiting capable government officials as illustrated in Japan and South Korea (Hill and Kim, 2000), or to offering high salary rates as implemented in Singapore (Han, 2005). All available means can be employed to bring innovation into organizations.

These aspects to make smart cities have been expressed in responses to the recent pandemic disease, COVID-19. The next section will illustrate how countries and cities have responded to this disastrous plague by adopting smart technologies.

16.3 Lessons from COVID-19

When COVID-19 first appeared in Wuhan, China in late 2019, the world underestimated the hyper-connectedness of 21st-century cities. It was considered a problem for the epicenter or the country only. National governments arranged evacuation flights to Wuhan to rescue their citizens living in the epicenter. However, very soon the coronavirus was viral enough to spread not only around China but also all continents and almost all countries. The World Health Organization declared the coronavirus a pandemic on 11 March 2020 (Taylor, 2020). The number of confirmed cases in the world has increased exponentially, as has the number of deaths. Governments recognized the seriousness of COVID-19 and implemented various measures to control its spread. Some firms and nongovernment organizations have also been proactive in managing face-to-face interactions which might cause transmission of the coronavirus.

Resilience to sudden detrimental shocks like flooding and the outbreak of plagues can be understood as comprising different phases: predisaster, during
the disaster, and postdisaster. During the disaster, at the time of writing in April 2020, citizens have shown (ir)rational responses to the shock financially and psychologically, by for example, panic buying of nonperishables such as toilet paper, food, sanitizers, and face masks (Norberg and Rucker, 2020) (see Table 16.1).

Firms, universities, and religious organizations have adopted online modes to avoid possible transmission of the coronavirus. Most universities in the USA, Europe, Australia, and Asia have canceled in-person classes (or delayed commencement) and changed the teaching mode to online (Fazackerley, 2020). Hospitals introduced robot nurses to take care of patients and medical staff in Italy (Scalzo, 2020) and some medical consultations were via online conversations. Regulation on social gatherings started from large-size gatherings (over-500) and this policy was rapidly tightened up to small-size gatherings, for example, social gatherings over 50 people with at least 1.5 m distancing between individuals or more than 4 m² per person. Then, many countries further implemented even stricter policies by shutting down nonessential businesses. Religious organizations ceased gatherings, voluntarily or involuntarily, and changed to online services or drive-in services. These restrictions violate the freedom of movement and customary political and social activity, but the health threat from COVID-19 was high enough to overrule the usual expression of democratic values.

**TABLE 16.1 Reactions to COVID-19 by key actors.**

| Key actors                      | Major responses                                                                 |
|--------------------------------|-------------------------------------------------------------------------------|
| Government policy              | • Social distancing                                                            |
|                                | • Regulating social gathering (initially over 500 and rapidly changed to smaller gatherings such as under 50) |
|                                | • Shutdown of nonessential businesses                                        |
|                                | • Shutdown of schools                                                         |
|                                | • COVID-19 tests                                                              |
|                                | • Urgent financial supports for businesses and households                     |
|                                | • Strong border control by regulating the inflow of foreign nationals         |
| Citizens’ reaction             | • Panic buying, for example, nonperishable goods and face masks               |
|                                | • Personal hygiene such as washing hands                                      |
|                                | • Shift from face-to-face to online                                          |
|                                | • Staying at home, leading to more use of online data                        |
| Firms’ reaction                | • Implementing “work from home”                                               |
|                                | • Canceling business trips                                                    |
|                                | • Canceling new investment                                                    |
| Schools, universities, and hospitals | • Changes from in-class teaching to online teaching modes                 |
|                                | • School closure or extended school holidays                                  |
|                                | • Robot medical staff                                                        |
|                                | • Online medical consultations                                                |
ICT infrastructure, a core element to smart cities, was an enabler to the actions taken by key actors. During the urgent and disastrous event, regular human and economic activities were greatly disrupted. However, without pre-existing ICT infrastructure, the damage from COVID-19 would have been far worse. Face-to-face interactions are the most favored mode in business operations (Storper and Venables, 2004), in particular, knowledge-intensive business services (Growe, 2019) and intragovernmental decision-making processes (Hur et al., 2019). COVID-19 created new environments to force face-to-face contacts to be paused, which caused losses in productivity and efficiency. Nonetheless, ICT infrastructure enabled far more work from home, online teaching, online meetings, online-based entertainment, online shopping, and online-assisted food delivery.

As reviewed in this book, online activity is a small, but important part of smart cities. Cities with ICT infrastructure could continue essential activities with a shift from in-person to online. COVID-19 provided momentum to accelerate the use of online modes in various fields. IT-based service providers gained customers within a short period of time during the COVID-19 shock. Among them, teleconferencing applications such as Zoom, streaming services for movies and TV programs such as Netflix and Stan, and food delivery applications such as Uber Eats are outstanding examples that have benefited since the COVID-19 shock. At the time of writing, the precise statistics of the users of these applications are unavailable to ascertain the actual short-term impact of COVID-19 (although media reports estimated the increase in Zoom users from 10 million in December 2019 to 200 million in March 2020 over 3 months). Stock price changes give a hint of Zoom’s gains. The stock price of Zoom Video Communications Inc. at NASDAQ was US$62 a year ago (April 2019), but it increased to US$160 in March 2020, more than a 2.5-times increase. The outbreak of COVID-19 played a role in expediting online-based communications, meetings, and conferences and, therefore, strengthening the hegemony of ICT firms in how cities and their functions are shaped. It is foreseeable that the adoption of online modes continues after the COVID-19 in some ways, although face-to-face interactions will return as the primary mode. The massive use of online communication modes means more integration across cities, regions, countries, and continents.

On the one hand, COVID-19 showed the hyper-connectedness of individuals and cities through the rapid spread of the virus. Invented ICT facilities, on the other hand, can be used to control, monitor, and maintain the connectedness virtually. South Korean approaches demonstrated the role of ICT through surveillance technology such as CCTVs, the tracking of credit/debit cards, and mobile phone location data, while other more socially laissez-faire countries primarily implemented the restriction of personal mobility (Sonn, 2020). Through these surveillance tools, the location information of where confirmed cases had visited was shared with citizens, which assisted to identify those who had close contacts with the confirmed patients and who therefore needed a coronavirus
test (Sonn, 2020). This approach was generally well-received in light of the activities of Shincheonji, a religious cult group, which refused to disclose the details of their gatherings although being a primary cause of the spread of the virus (Hancocks and Seo, 2020). The South Korean approach was often acknowledged as a best practice to slow down the spread of COVID-19 without declaring the lock-down of urban functions. However, the exposure of personal information was inevitable when using the tracking of patients. The data were used by health authorities, national and local governments, and even geographic information system (GIS)-based smartphone applications that alerted citizens to the hotspots of the confirmed cases (Sonn, 2020). This surveillance approach was supported by preexisting systems such as CCTVs, the GIS, and personal smart devices, and the data from the surveillance infrastructure were, in turn, shared with citizens through smart devices in a timely manner. They received or accessed updated information more easily than ever before.

The responses to COVID-19 demonstrated the role of technological innovation when unexpected, irregular, and uncertain circumstances appeared. As in-person interactions were discouraged to prevent the coronavirus from transmitting, ICT infrastructure and high-speed internet connections established virtual platforms. Citizens were not socially isolated due to alternative ways of communication, work, study, and entertainment. In this sense, smart cities, assisted by technological innovation, can be resilient to sudden external shocks mitigating devastating impacts. With the exception of Japan’s disaster management in Chapter 5, the chapters in this book illustrate technological innovation and its contribution to smart city making in normal circumstances. This concluding chapter provides evidence that ICT facilities are useful in urgent disaster environments. Although ICT technology might not be fully utilized in ordinary daily life, it can easily retrieve and create available functions using the infrastructure.

16.4 Conclusion

The review of smart city making approaches discussed in this book raises important questions: who are smart city planners and what is their role? The inclusion of ICT infrastructure in urban affairs has obviously expanded the domain of planning, blurring the role of planners and of urban planning as an activity. While the conventional planning concerns of land use and statutory planning are still valid and important, smart city planners are required to understand the role of ICT in urban development, be equipped with flexibility in tackling emerging urban issues and have the ability to coordinate a wide array of stakeholders, including ICT sectors. Data handling is becoming a necessary part of the planner’s role, with data analytics adding valuable information. Out of inundated available data, skills required for smart city planners are to identify key planning issues and invent solutions to the identified issues by various means in collaboration with the multiple stakeholders. Thus, the ability to coordinate and
work with frameworks to judge values are increasingly important for smart city planners in addition to understanding how ICT works for urban systems. With the unique contexts of each city, the focus varies for smart city planners. For instance, Japan’s repeated earthquakes have ushered Japanese smart cities to pay attention to disaster management and locally-contained energy generation in the event of an emergency (Chapter 5).

The focus on smart cities seems an inevitable step for the future direction of current cities, as ICT is becoming an essential part of daily life. The difficulty to define smart cities reflects their broad scope in terms of the input of sources, the process of city-making, and the objectives of planning. Nonetheless, difficulty in the definition does not mean smart city making is undesirable or unlikely to be implemented. Rather, the efforts to make smart cities are likely to continue for the foreseeable future and dominate planning practices in favor of the increases in productivity, livability, and sustainability that smart cities can possibly enhance. A transition to a smart city approach is one of the ways cities are evolving with available technologies. There is no reason to restrain from integrating new innovations into urban transformation. Urbanization and informatization are, in general, irreversible. Informatized people are unlikely to choose to return to a disconnected lifestyle away from ICT. With the ever-continuing development of new technologies, what citizens and urban planners can and should do is to maximize benefits for all, strengthening the links to self-reinforce technological innovation and social innovation.

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