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Chapter 1

Introduction: Being smarter for productivity, livability, and sustainability

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1.1 Introduction

This book aims to develop a framework in which the smart city experiences in different jurisdictions across the Asia Pacific, the Americas, Europe and the United Kingdom, the Middle East, and Africa can be examined. The framework, detailed in Chapter 2, is developed to understand drivers, actors, and policy outcomes as well as technological platforms that underpin the innovations that have enhanced productivity, sustainability, and livability. While the scale of smart city initiatives varies in different geographical contexts, it is important to see how it is encouraged by technological innovation and how it stimulates innovation in the entire city. This book identifies the key drivers of current smart city practices in multiple locations. It also outlines key actors and their roles—governments, private industries, information and communication technology (ICT) firms, citizens, and end-users in each context. The identification of key drivers, actors, and outcomes in an organized fashion provides important insights for other jurisdictions on how to better revise or formulate their current and future policies and plans toward technological and social innovation movements.

To achieve this aim, the book is comprised of 16 chapters. This chapter summarizes the book’s content and argues that it is important to investigate different geographical locations and scales to better provide knowledge and insight for evidence-based policymaking. Chapter 2 builds a coherent conceptual framework that brings together key ideas on smart cities as they relate to technological
aspects, but also its underestimated and somewhat conflicted social innovation potential. Chapters 3–14 then present the case studies. Eleven nations and cities from six different geographical regions are surveyed. Chapter 15 evaluates and compares different experiences and paths taken in the case studies and outlines the differences and similarities of smart cities initiatives. This chapter also aligns the case studies with the framework formulated by Kim, Sabri, and Kent in Chapter 2. Finally, Chapter 16 provides concluding remarks and implications of findings for future developments using smart cities as a platform. Given that the publication of this book is concurrent with the global outbreak of coronavirus disease 2019 (COVID-19), Chapter 16 explores the role of ICT infrastructure in the global phenomenon of social distancing and new working patterns emerging from this global economic and health crisis.

1.2 Asia-Pacific

For more than two decades, several countries across the Asia-Pacific region have adopted technological innovation and undertaken smart city initiatives in their national and local policies. Singapore and South Korea have been implementing innovative technologies since the early 2000s. Over the last decade, other countries in this region have also fast tracked the adoption of smart cities, which attracted corporate high-tech businesses moving to the Asia-Pacific, where digital infrastructures such as Internet of Things (IoT) and multicloud architecture have been established with reasonable cost.

Singapore is a pioneer in adopting new technologies in all aspects of city-state management and operation. As an example, the concept of whole-of-government (WHOG) was adopted to provide multiagency collaboration in government. One of the major developments in the WHOG initiative is using accurate and realistic urban data for communication and decision making. As such, the Singapore Land Authority (SLA) took leadership of developing and maintaining accurate and multidimensional (2D and 3D) data for land, buildings, infrastructure, and vegetation. Having reliable and up-to-date 3D data enables different government agencies to examine their policies and future scenarios, ensuring the livability of residents, increasing productivity, and minimizing or eradicating environmental impacts. In Chapter 3, Lim et al. illustrate how such data can be used in interagency collaboration with the support of an innovative platform developed by the Centre for Spatial Data and Infrastructures and Land Administration (CSDILA)\(^a\) at The University of Melbourne to address environmental challenges of urban redevelopment. The example of Singapore demonstrates how adopting a novel spatial data infrastructure enables multiagency collaboration and community engagement to address environmental, social, and economic challenges.

\(^a\) http://csdila.unimelb.edu.au/.
The second high-tech investment in Singapore is autonomous vehicles (AVs). Singapore is regarded as a world leader in providing policy, technology, and infrastructure for AVs. Ng and Kim, in Chapter 14, explore the case of AVs and outline how the Singapore government facilitated this technological innovation to achieve social, environmental, and economic outcomes.

The South Korean smart city initiative is another example, which started in the early 2000s with the incorporation of ICT infrastructure to enhance the quality of life and improve urban competitiveness (Kim and Kim, 2013). The South Korean approach played a fundamental role in adopting several smart city projects including Sejong smart city and Busan Eco-Delta City. In Chapter 4, Choi and Kim explore the historical development paths of South Korean smart cities in the context of technological adoption in urban development. They also see Sejong 5-1 Neighborhood pilot project from the lens of sustainability, livability, and productivity. This experience is unique in its kind as Sejong is a new city (73 km² and target population of 500,000 by 2030) incorporating smart technologies with public services and the knowledge economy. Choi and Kim show how smart mobility, healthcare, public safety and education leverage innovative technologies. Incorporating smart technologies in city operations in Sejong has as its objective reduction of the environmental footprint. Examples are a “zero-energy” city plan through Virtual Power Plants (VPP) and renewable energy generation facilities in public buildings of Sejong. Choi and Kim critically evaluate the smart city initiatives in Sejong in light of economic impacts, urban equity, readiness for adopting new technologies in the future, and the role of key actors in addressing future urban challenges.

Chapter 5 introduces the core drivers of Japan’s ongoing transformation. Barrett, DeWit and Yarime cover Japan’s urban policies dealing with natural disasters (after the Great East Japan Earthquake of 2011), population decline, and the Sustainable Development Goals (SDGs). One recent initiative is the Society 5.0 industry policy, a 5-year strategy beginning in January 2016, which outlines the fifth Science and Technology Basic Plan. Japan moved from state-led strategies focusing on effectiveness and efficiency on sustainable energy production and consumption to societal challenges due to natural disasters. The new program of Society 5.0 plans to address a broad spectrum of challenges through the adoption of innovative technologies, including IoT, 5G, and artificial intelligence (AI).

Contrary to Singapore, South Korea, and Japan, as shown by McShane in Chapter 6, Australia’s pace of materializing smart cities has been slower. As one of the most highly urbanized countries, there is interest in moving toward smart technologies. The Australian Government released the Smart Cities Plan in 2016 as their first national policy to support the application of innovative technologies in enhancing livability, productivity, and sustainability (Commonwealth of Australia, 2016). Accordingly, the government funded AUS $90 million in 2 rounds for 80 projects in the areas of smart infrastructure, smart precincts, smart services, and communities. The larger Australian cities such as Melbourne
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and Sydney have leveraged the government’s support in addressing infrastructure, traffic, and environmental challenges, whereas the small- and middle-size cities such as Adelaide used these incentives to recover from economic and population decline.

Most smart city policies, plans, and projects have emphasized the adoption of digital technologies in providing services and managing infrastructures. However, in Chapter 7, Kim and Feng present a different view, introducing Smart Gusu in Suzhu, China. Here, the emphasis is more on social and cultural concerns. In fact, the Smart Gusu’s precedent plan, Digital Gusu (2013–2015), considered the adoption of information technology and infrastructure, which turned to the social side of innovation in the next development strategy. The authors explain the extent to which the perceptions of stakeholders, including residents and government, vary or find commonality in considering digital technology that supports different social and cultural innovations. They show how participatory planning for smart and sustainable development can inform future developments and highlight the role of community engagement in understanding how digital technology and infrastructure could facilitate necessary services to end-users.

In Chapter 8, Thai, Khuat, and Kim continue this theme in their work on Vietnam, conveying the crucial role of residents in delivery of services through the smart city platform. They demonstrate how information can be leveraged including in informal economies, through four case studies: a historical city center, a modern neighborhood, an urbanized village, and a high-tech area. Thai et al. draw our attention to the role of the smart city in offering inclusive economic development and in mitigating socioeconomic inequality.

1.3 Africa and the Middle East

The extent of implementation of digital infrastructure and smart city development across Africa and the Middle East varies greatly. This is because of the extreme variability and instability in economic and political conditions in these regions. Over the last decade, many African countries, especially in Northern Africa including Egypt, Libya, Morocco, Tunisia, and Sudan experienced political turmoil. Some of these countries are part of the Middle East, where their instability generated a series of geopolitical challenges, including the Arab Spring as well as war in countries such as Syria, Iraq, and around the borders with Turkey and Iran (Aboueldahab et al., 2017). These geopolitical challenges have damaged even the primary physical and social infrastructures in parts of the Middle East and North Africa (MENA). However, despite the issues in political, economic, and environmental aspects of the MENA region, other states including the United Arab Emirates (UAE), Qatar, Kuwait, and other Gulf countries have leveraged four decades of economic growth to put in place policies and strategies adopting innovative technologies for social welfare and sustainability. In addition, while West African countries have had
fewer political issues, rapid urbanization has been one of the major challenges to be addressed in the last two decades.

In Chapter 9, Korah outlines the emergence of smart city solutions in an African context. Highlighted are the key actors in policymaking and strategic planning addressing the urban growth challenges of Accra, Ghana. Conceptualizing the smart city in the context of a broader urban development strategy, Korah analyzes Accra’s City Extension Project (ACEPT) to highlight the visions, key motivations, and social and economic implications. The author examines the extent to which smart city planning in Ghana has been successful in creating an inclusive, livable urban environment, although with mixed results.

In distinction with Ghana, addressing human well-being, inclusiveness, and livability requirements in the UAE is facilitated by oil reserves resulting in significant income for the government. In Chapter 10, Sabri shows how the seven Emirates have invested significantly in innovative technologies and contributed to digital city transformation. Dubai’s commitment to smart city measures and innovation emphasizes the promotion of happiness and a sense of satisfaction for residents and visitors. While Dubai’s commitment to digital city transformation started in 1995 (Bishr and Lootah, 2016), the government’s response to the political challenges and instabilities in the MENA region was to improve public satisfaction through the adoption of policies and visions, including the ambitious objective “to become the happiest city on earth.” As an example, a Happiness Meter is used to deliver a city-wide view of people’s happiness. Developed as a mobile and desktop application, the Happiness Meter captures the live city sentiment and the data can be used for generating the map of happiness at the city level. The measurement, monitoring and reporting of people’s level of satisfaction can be disaggregated to particular industries and areas.

Chapter 10 investigates the pathway, drivers, and key actors of technological innovation programs in Dubai through the lens of social innovation, with three dimensions of formalization, change processes, and social outcomes. Sabri investigates the historical development paths of the smart city in Dubai to highlight the formalization dimension. Furthermore, to outline the change process, Dubai’s city-wide transformation into a smart city is explored. Ultimately, the social dimension is viewed through the results of Dubai’s vision of “Becoming the Happiest City in The Earth.”

1.4 Americas

Understanding the concept of smart cities in American countries is important if for no other reason than that many fast-growing economies such as Brazil, Mexico, and Argentina have significantly contributed to Gross World Product (GWP). These countries, along with more developed economies such as the United States and Canada, represent the Americas in the G20 (Group of Twenty), where policies on the promotion of international financial stability are discussed and planned. Accordingly, these countries, along with emerging economies such
as Chile, have been progressively adopting smart technologies in different sectors including infrastructure, finance, mobility, big data and analytics, 5G and IoT, and cybersecurity (Smart Cities World Forums, 2020). The Smart Cities World Forum in 2017 estimated that the cybersecurity market in South America will reach US$13.49 billion by 2022 (Smart Cities World Forums, 2017).

Accordingly, as an important urban discourse and practice, the smart city plays a crucial role in urban planning and management in many of the above-mentioned countries. In Chapter 11, Tironi and Albornoz discuss the Chilean experience in the adoption of a smart platform for governing safety and security. The authors explore the concept of the smart city as a sociotechnical imaginary in the context of Santiago de Chile. Tironi and Albornoz define the sociotechnical imaginary as “a set of visions sustained by infrastructures, practices, and more or less shared meanings of social life which in turn reveal futures that are desirable for a society.” The experience of Santiago is presented through a mobile application called SoSafe, which interconnects different departments responsible for emergency and public safety including police, firefighters, and private healthcare providers. The study indicates a mere example of how smart city technology plays a crucial role as a catalyst for innovation and enterprises as well as a platform for public-private partnership in coordinating urban safety.

Besides the important role of the sociotechnical aspects of smart cities in South America, it is crucial to investigate the role of private industries in investment and development of smart technologies in the world. The United States can be considered one of the major locations in this respect, where the private sector has invested heavily in research, development, and implementation of smart technologies. In Chapter 12, Johnson and Cocks show that three out of five global smart city vendors are from US companies. They include very formidable brands such as Cisco Systems, Microsoft, and IBM. The authors identify the trajectory of smart city adoption across the United States. The roles of the public and private sectors in implementing energy efficiency through the smart grid of Ohio, Columbus are investigated, and it is shown how a public-private partnership in a smart city platform delivers technological, environmental, and social benefits.

1.5 Europe

There are many world-renowned examples of smart city initiatives across Europe. Perhaps most of the literature about smart city cases centers on the experience of European countries (Batty et al., 2012; Caragliu et al., 2011; De Falco, 2019; Kourtit et al., 2012). The European Commission has always been a key actor and supporter in implementing smart technologies across its member states. The Europe 2020 strategy, released in 2010, has focused on smart growth and inspired many countries across Europe to invest in digital technologies to address requirements, including education and research innovation, low-carbon economies, and job creation to name a few. Accordingly, the United Kingdom formed its policies and leveraged established initiatives such as the Technology Strategy Board (TSB), whose role is to align investments and policies toward
achieving the Europe 2020 strategy, and many other national agendas, toward smart development.

One of the first smart city pilot projects in the United Kingdom was planned and implemented in Glasgow. In Chapter 13, Miao introduces the Future City Glasgow Program (FCGP, 2013–15) and considers the international, national, and local drivers for initiating such policy. The example of Glasgow highlights how the smart city as a platform, shaped by the exogenous and endogenous factors, can attract global attention to its technological development. Furthermore, there are lessons for local councils on how to leverage technological innovations for social change and citizen engagement.

The final two chapters consolidate the experiences and evaluate the recent trends based on the development paths of smart cities. In Chapter 15, Kim and Kent provide an account of different internal and external factors leading to smart city implementation as well as desired and/or expected social innovation outcomes. In Chapter 16, Kim provides concluding remarks on the way forward for smart cities in the face of uncertainty. The author discusses the rights to innovation, land value capture in smart city development, disruptive institutional breakthroughs, and incentives for innovation. In a saddening and frightening new situation, the final chapter finds as its unwanted context the global health crisis of COVID-19. It considers the role of preexisting ICT infrastructure in response to social distancing and quarantine requirements involving a mass shift to online work, dramatically enlarging the window for virtual social and economic interaction.

1.6 Conclusion

In the wake of uncertainty on the role of the smart city and digital technology investments for the changing social, economic, and environmental landscape of cities, this book aims to enlighten on different experiences worldwide. Developing a conceptual framework, it considers the experience of cities in using technological platforms to enhance productivity, sustainability, and livability. It investigates the role of exogenous and endogenous factors as drivers of smart city implementation in 11 cities across several continents/regions including the Asia-Pacific, the Middle East and Africa, the Americas and Europe. These changes can be seen in interagency collaboration, social behavior and community engagement in the delivery of urban services. With the broad spectrum of smart technology applications covered comes a comprehensive insight on key drivers, actors, and outcomes of innovative technology adoption in different political, economic, and social contexts.

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