

Article

# The State of Smart Cities in China: The Case of Shenzhen

Richard Hu 

Faculty of Business, Government and Law, University of Canberra, Bruce, ACT 2601, Australia;  
richard.hu@canberra.edu.au

Received: 2 October 2019; Accepted: 12 November 2019; Published: 17 November 2019



**Abstract:** China is at the midpoint of its urbanisation—the largest scale in human history. The recent smart city movement is influencing the discourse and practice of China’s urbanisation, with numerous cities claiming to build smart cities and/or adopting some forms of smart city strategies and initiatives. A so-called ‘latecomer’s advantage’ is being exploited to advance their pursuit for a smart city status, not only to catch up with overseas counterparts, but to overtake them and become international leaders. This local-level enthusiasm strikes a chord with the central government’s strategy of building an ‘innovative nation’ to drive its economic transformation towards a knowledge economy. This converging central-local interest is creating a ‘smart city mania’ across the nation, which, however, has not received due attention in the international literature, and thus deserves critical examination and reflection to inform policy debates. To address this gap, this study investigates the state of smart cities in China, based on a case study of Shenzhen, China’s fastest-growing, experimental city. Shenzhen grew from a fishing village into an international metropolis in 40 years, and has now won a nickname of ‘China’s Silicon Valley’ or ‘China’s smartest city’. This study analyses the state of Chinese smart cities and the pursuit for a smart Shenzhen from the perspectives of the smart city as a concept, as an urban development paradigm, and as an urban regime, drawing upon the international smart city literature. It concludes that a technology-centric approach to smart cities in China, as illustrated by the Shenzhen case, have advanced innovation capacity and economic growth through capitalising on a ‘latecomer’s advantage’. However, this ‘latecomer’s advantage’ may translate into a ‘latecomer’s disadvantage’ for this approach’s lack of institutional adaptation, and for its insufficient attention to social and environmental problems covered under the shiny economic boom. This latecomer’s disadvantage is likely to impact the long-term sustainability of Chinese cities.

**Keywords:** smart cities; Shenzhen; Chinese cities; latecomer’s advantage; sustainability

## 1. Introduction

The recent decades have witnessed the surge of a smart city movement, a globalised urban discourse and development paradigm, which had been initially facilitated by technological advancement, but has quickly progressed beyond a technological dimension to articulate with economic, social and environmental goals in contemporary urban governance and policy [1–4]. The smart city movement, in the forms of growing numbers of smart city programs across the world, has attracted a burgeoning body of literature on its conceptualisation, policy approaches, desired outcomes, and mythification and demythification [4–7]. These practical and intellectual efforts, coupled with the industry’s pursuit of market opportunities, the media’s reportage and debates, and the community’s general favour for a ‘smart’ vision for their cities, have created ‘the smart city’ a new buzzword. This buzzword was diffused into China to shape the policy making—both top-down and bottom-up—of the largest urbanisation process in human history there. China, a latecomer in the smart city movement, has now the largest number of smart city programs, and has set ambitious targets of constructing smart

cities and a smart society of international leadership [8]. Despite these booming smart cities in China, they are not fully engaged in the international scholarship, and there is no critical literature on the state of their development to draw insights and to inform an understanding of their trajectory.

Set against these above backgrounds, this study is centred on answering this question: to what extent do the smart cities in China conform to or differ from their international counterparts? In order to answer this question, this study comprises three major components. First, it deconstructs 'the smart city', through a review of literature, as a concept, as an urban development paradigm, and as an urban regime, so as to establish an analytical framework for this study. Second, it applies the analytical framework to provide an overview on the state of smart cities in China. Third, it further applies the analytical framework to investigate Shenzhen, 'China's Silicon Valley' or 'China's smartest city' [9]. Discussing these findings sheds light on the characteristics that are unique to Chinese smart cities, and the latecomer's advantage and disadvantage associated the Chinese approach to smart cities.

This article reports this study and its findings. This introductory section sets the contexts, asks the research question and introduces the organisation of the article. Section 2 is a literature review to deconstruct the smart city. Section 3 explains the methods used. Sections 4 and 5 present findings on an overview of Chinese smart cities and the case of smart Shenzhen, respectively. Section 6 discusses the characteristics of Chinese smart cities. It further discusses the latecomer's advantage that has enabled these Chinese characteristics, and critically points out the inherited disadvantage in the long run. Section 7 concludes the article and suggests limitations of this study and thematic strands of further research.

## 2. Deconstructing the Smart City

This literature review approaches the smart city from three perspectives. First, it approaches the conceptualisation of smart city to clarify what the concept *is*, or *should be*, so as to capture the core of the concept and to differentiate an external layer of conceptualisation attached to this core. Second, it situates the understanding of the smart city movement in a longitudinal perspective of urban development in the recent decades, shifting from urban competitiveness, to urban sustainability, and to urban smartness. Third, it identifies a smart city coalition of key interest groups and stakeholders involved in the making and promotion of the smart city movement, and the rationale behind, which have formed a new urban regime. These three perspectives forge an integrative framework for approaching the smart city as a concept, as an urban development paradigm, and as an urban regime, to underpin this study's examination of Chinese smart cities and Shenzhen. Each of the three perspectives is explicated below.

### 2.1. Conceptual Decoupling

Smart city is the new buzzword in urban scholarship, policy and practice. A vast body of smart city literature is burgeoning in the recent decades, contributing to as well as riding on the concept's popularity, and its 'fuzziness' [6]. This body of literature helps to spread, or 'brand', the concept generally, but is limited in clarifying what the concept is about, and what it is not about. In policy making, the smart city means very different things to different cities, varying by local economic, geographic and technological settings [10]. Several systematic and comprehensive literature reviews converge on an understanding that the smart city concept is multi-faceted, complex, confusing, ambiguous, contingent, fragmented, and lacks cohesion [2–7]. This conceptual blurring, while likely to trigger more and further literature debates, is impacting a shared understanding and a consensus on theory building among researchers. Furthermore, this will be likely to impact the effectiveness of the concept's applicability in making policies and shaping contemporary urban development, and to confuse the general readership.

The literature both diverges and converges, however, on defining the smart city. They diverge on delineating the conceptual scope, and on the extent to which the smart city concept can be expanded to incorporate contemporary urban or planetary challenges, in particular those wicked problems

of climate change, urbanisation, quality of life, and social polarisation. There have been efforts to integrate the smart city thesis with the sustainable city thesis to explore possible synergies for sustainable smart cities. However, a large gap still exists between the smart city and the sustainable city frameworks: while the smart city performance measurements focus on the efficiency of smart solutions, they should also include ultimate goals of environmental, economic and social sustainability [1]. This gap is empirically attested that city smartness and environmental performances are not positively correlated [11]. A sociotechnical framework highlights the interactions between the social and the technological dimensions of smart cities that incorporate not only technological and symbolic value, but also institutional collaboration and instrumental value, to achieve successful technological innovation [12]. Along this sociotechnical line, smart people and smart economy are incorporated into innovation ecosystems for smart cities [13]. These theoretical propositions and associated empirical studies make contributions through situating the smart city movement in the broader urban agenda for research and policy thinking. However, they tend to fall into a pitfall of creating the smart city an umbrella term, diluting its conceptual core.

On the other hand, the literature converges on a conceptual core of the smart city—technology, in the context of the rise of the knowledge economy. Technological advancement and the knowledge economy have been mutually facilitating in the recent decades, and have interacted to position innovation onto an unprecedented, important place in urban development, especially in economic development [14]. In spite of the diversity of directions to align the smart city to, technology remains in the core to be the defining factor of the smart city. Then, the applications of the technology in urban infrastructure and services to achieve desired outcomes in economic, social and environmental dimensions constitute an outer layer of the smart city conceptualisation. The range of these desired outcomes for the smart city may include productivity, sustainability, wellbeing, liveability and governance, while technology is one of the major drivers [4]. Technology has always been a major shaping force of urbanisation and cities [15]. However, the most salient attribute of the recent technology development is the exponential advancement of information technology from the 1990s, along with the accelerating development of the knowledge economy [16]. The major technological enabler of the smart city movement is the ubiquitous and instant access to information and information processing capability [17], in such forms as big data and internet-of-things (IoT).

Combining the diverging and converging literature points out a two-layer, in a broad sense, conceptualisation of the smart city: an internal layer of information technological advancement combined with the knowledge economy; and an external layer of articulating the smart city with various urban concepts and challenges, such as sustainability, climate change, and social inclusion. These two layers of conceptualisation encompass the major debates on the smart city concepts, applications, and urban policy goals, as captured in the several major systematic literature reviews [2,4,5,7].

## 2.2. *Urban Smartness Paradigm*

The recent smart city movement did not emerge out of context or abruptly. It has evolved along the paradigm shifts in urban development from the late 1970s, which can be broadly classified into competitive city, sustainable city, and smart city (Table 1). The conceptual division and the temporal sequence of these three paradigms are not as clearly cut as they are illustrated in Table 1, which serves an illustrative purpose only. These paradigms have been evolutionary, along a generally linear path mixed with cyclicity, in the recent urban development history. They each have defining attributes, but are often interlinked in conceptualisation and informing urban policy and planning. The sustainable turn—a shift from urban competitiveness to urban sustainability—in urban development approaches and policy goals has been driven by an imperative to address the intricate environmental and social problems in cities, which have been attributed, in part at least, to a focus on economic growth only in urban policy [14]. Urban competitiveness, while still a paramount policy goal in urban development, has tended to employ an integrative approach to incorporate non-economic dimensions such as environmental protection and social inclusion [18]. This trend has even led to a re-conceptualisation of

urban competitiveness as urban sustainability, that is, sustainability makes a city's competitiveness [19]. Fusing sustainability and competitiveness, which are intrinsically contradictory in some way, has been a major policy aspiration as well as policy challenge in the strategies for many global cities [20,21]. Sustainability has become a new competitive edge, which is marketable and brandable, in a still neoliberalism-dominated urban policy discourse [14].

**Table 1.** Paradigm shifts in urban development.

Paradigm Shifts	Timeframe	Driving Factors	Policy Priorities	Defining Features
Competitive city	1970s-	Globalisation; Neoliberalism	Urban competitiveness; Economic growth	Economic-centrism
Sustainable city	1990s-	Environmental challenges; Social problems	Urban sustainability; Balanced development with environmental protection and social equity	Environmentalism
Smart city	2010s-	Technological disruption; Knowledge economy	Urban smartness; Innovation	Technology-enabling

Source: Partially adapted from [14].

The smart city has come as one of the several models of urban development in the context of the new economy, which 'is directly based on the production, distribution, and use of knowledge and technology' [14] (p. 317). Each of these models—knowledge city, creative city, and smart city—has attracted tremendous attention in scholarship and practice. While overlapping to various degrees, they 'focus on different aspects of the new economy . . . and each has its limitations' [14] (p. 317). The smart city, as discussed above, is essentially enabled by disruptive technology, which defines the internal layer of its conceptualisation. However, in the external layer of its conceptualisation, the smart city is often articulated into dialogues with the preceding urban development paradigms to achieve competitive city or sustainable city goals. These conceptual articulations between the major urban development paradigms create mixed outcomes even contradictions. For example, there is a mismatch between sustainable city and smart city in policies: while sustainability city policies fully take into account technology, sustainability is insufficiently addressed in smart city initiatives [1]. Empirically, smart cities do not always achieve environmental sustainability outcomes [11]. While it will take more practice and research, and the test of time, to clarify the articulation of smart city with a comprehensive set of policy goals, differentiation of the two layers of the smart city's conceptualisation and identification of a consensus-based internal conceptual core helps to focus on the concept that is technology-enabled and contextualised in the knowledge economy. This conceptual decoupling, as discussed above, also informs an understanding of how the smart city fits into the urban development paradigms.

### 2.3. The Smart City Regime

A politic-economic perspective helps to unpack the smart city coalition that has been acting to push the surge of the smart city movement, and thus has formed an urban regime. The smart city movement is a recent paradigm of the neoliberal urbanism that has been in place since the 1970s, proceeding along the trajectory of competitive city, sustainability city, and now smart city (Table 1). The smart city movement, as a form of neoliberal urbanism, joined the urban imaginaries of sustainable development, smart growth, and new urbanism—a new consensus on incorporating economic prosperity, ecological integrity and social equity into urban sustainability—in an era of market triumphalism [22]. Such neoliberal urbanism concepts as smart growth, new regionalism, new urbanism and sustainable development are all put under an umbrella smart city agenda, with a focus on the notion of 'smartness', to address contemporary urban imaginaries of competitiveness and

sustainability [20,22]. ‘The power of the smart city imaginary to capture the minds of corporations, policymakers and average citizens makes it an important means through which cities are being (re)constructed in the 21st century’ [23] (p. 22).

The smart city movement is often criticised for a technology-centrism to argue that a corporate-led smart urbanism should shift from being technology-intensive to being knowledge-intensive, governed by a more socially just use of digital technology [24]. However, this normative proposition is often used to disguise its neoliberal nature. The smart city acts to ‘sell’ a city in the global economy, and masks entrepreneurial governance and strategies, oriented to a utility to foster globalised business enterprises and further economic development [25,26]. In understanding the formation of such a smart city coalition, a focus needs to be placed on the relationalities through which the smart city idea has taken root in territories [23]. Global technology firms—IBM, Siemens and Cisco—have constructed a market for cities, as a scalable community, for their knowledge through reducing, standardising and simplifying urban problems for the sale of their proprietary software and hardware, and consultancy services [27]. However, the global technology firms’ agency in driving the smart city discourse is overemphasised in critical literature; city governments are key actors advancing the smart city paradigm, in a rhetoric of city-wide benefits, but geared to attracting businesses in a globalised economy [25]. The relationalities between the governments and the global technology firms have forged the leadership of the smart city coalition and the functioning of the urban regime, which has right fitted into the neoliberal urbanism contexts for entrepreneurial governance pursuing the urban imaginaries of competitiveness, sustainability and smartness that have been shaping urban development paradigms in the recent decades (Table 1).

### 3. Methods

The above literature review has deconstructed the smart city phenomenon as a concept, as an urban development paradigm, and as an urban regime. These perspectives establish an analytical framework for approaching the smart city: the smart city is centred on technological advancement and the knowledge economy; it is articulated into contemporary urban development paradigms comprising urban competitiveness, sustainability and smartness; and it is led and advocated by a neoliberal urban regime pursuing new forms of innovation-led growth in an increasingly competitive global knowledge economy. This study employs this analytical framework to investigate the Shenzhen case study to illustrate the state of smart cities in China, and to test to what extent smart cities in China, as observed in the Shenzhen experience, conform with or differ from it.

This study was undertaken through two major phases. In phase I, it synthesised an overview of the smart city movement in China. This phase I included three steps: step 1—collecting urbanisation data from the World Bank and economic composition data from the National Bureau of Statistics of China, both in 1978–2018, to analyse China’s economic and urban transformations; step 2—analysing three milestone central government policies in 2012, 2014 and 2017, respectively, which have outlined China’s smart city strategy, to identify thematic evolutions; step 3—drawing upon data from several consultancy reports on Chinese smart cities in general, and the latest smart city vision for Xiong’an, China’s newest city making, to map out the smart city movement from bottom-up.

In Phase II, this study moved on to unpack smart Shenzhen. This phase II included three steps: step 1—collecting the 1980–2017 time-series data on Shenzhen’s economic composition and hi-tech sectors from the Shenzhen Statistical Bureau, to analyse the city’s economic transformation towards a knowledge economy and its rise as a global knowledge city; Step 2—making a content analysis of Shenzhen’s master plan in 2010, and smart city plan in 2018, to present transformative planning thinking; Step 3—a fieldtrip by the author in 19–25 September 2019 to Shenzhen to observe its smart cityscapes and engage local residents to have their perceptions of their city, so as to obtain first-hand experience. The author also visited Shenzhen’s neighbouring city Hong Kong to draw some experiential knowledge on the comparisons of these two cities. These multiple sources of data and information

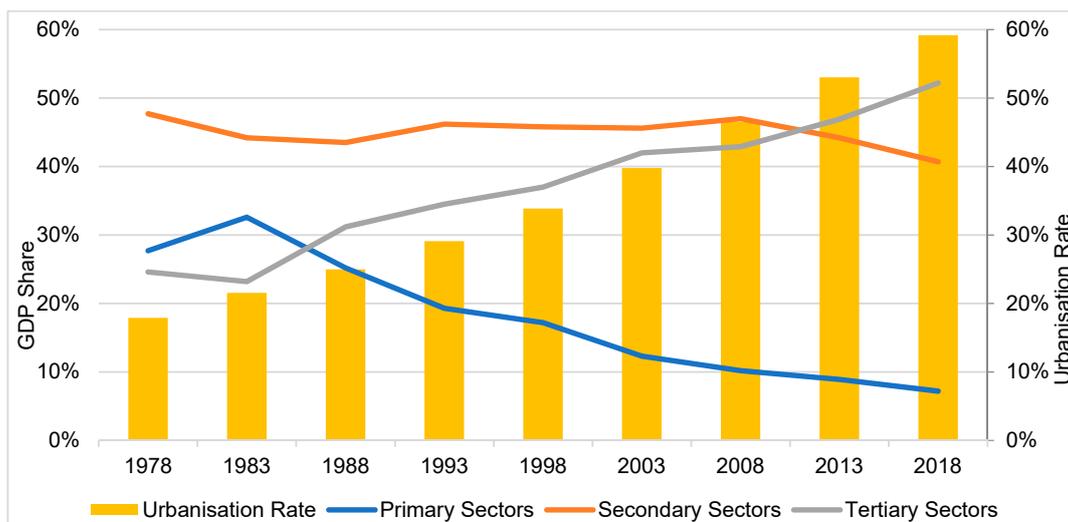
were triangulated and synthesised, through the smart city analytical framework established through the above literature review.

The selection of Shenzhen as a case study for smart cities in China is based upon the city's unique status in the Chinese urban system. Shenzhen was largely a rural area 40 years ago, and was designated as an experimental city to spearhead China's modernisation agenda of 'reform and opening-up' [28]. Shenzhen's rapid growth into an international metropolis—population growth by 40-fold, employment growth by 68-fold, and gross domestic product (GDP) growth by 11,452-fold, in 1979–2017—is most representative of China's urbanisation and economic recovery [28]. Shenzhen is dubbed as 'China's Silicon Valley' for its global innovation hub status. The tech giant Huawei, now the world's leader of 5G technology, is based in Shenzhen, forging a world-class hi-tech cluster together with other hi-tech firms, large and small. Partly because of the presence of these hi-tech firms and cluster, and partly because of its status as a new planned city, the Shenzhen Government is proactive in embracing the smart city concept and branding it as a leading smart city in China. Shenzhen is ranked as China's top 1 smart city, beating Shanghai and Beijing [29]. In this study, the case of Shenzhen provides a prism to interrogate the state of smart cities in China.

#### 4. The Smart City Movement in China

Deloitte [29] estimated that there were over 1000 smart city projects worldwide, and half of them were in China as of 2016. These figures are indicative of the spreading smart cities—claimed, planned, or being constructed—since the actual, accurate numbers are hard to collect, depending on how the concept is defined and what criteria are used to label a smart city. It is also reported that more than 700 Chinese cities have proposed or claimed to construct smart cities in government reports or development strategies as of 2019 [30]. Europe, North America, Japan and South Korea have been leading regions in smart city development, but China, a latecomer, is catching up and is leading in terms of numbers of smart cities [29]. In the recent decade, a smart city movement has been emerging across China, riding on the international trend, but at a faster speed. This section below will elaborate on the coming of this Chinese smart city movement in the context of China's transformative economic growth and urbanisation, driven by a national strategy, and pursued by a coalition comprising entrepreneurial governments and market-sought technology and service firms. To further expose the popularity of and zeal for the smart city in China, this section will then illustrate how this concept has shaped the imaginary of Xiong'an, China's latest grand new city being planned right now.

The smart city movement has emerged when China's economic growth and urbanisation entered a transformative stage since around 2010. China's modernisation agenda of 'reform and opening-up', led by Deng Xiaoping, commenced in 1978 when it was a rural society in grave poverty. Since then, China has created the second largest economy in the world and the largest urbanisation process in human history. However, these achievements did not come without problems, among which pollution, resource consumption and environmental degradation have been hallmarks of China's urban revolution [31]. Discussion on changing the nation's development path, which was deemed as unsustainable, started from the mid-1990s. However, this discussion did not translate into effective policy making and implementation until the 2010s when the tertiary sectors of services exceeded the secondary sectors of industries in China's GDP composition, and China's urbanisation rate surpassed 50% (Figure 1). China's transformation into an urban society of the knowledge economy has propelled a policy discourse on pursuing an innovative nation and a new-type urbanisation with sustainability, and even a so-called 'ecological civilisation', to shift the nation's rapid development from quantitative growth to qualitative upgrade [31]. The smart city, an imported concept, has proven to be a right fit with this policy discourse marked by innovation, sustainability and the knowledge economy.



**Figure 1.** China's GDP composition and urbanisation rate, 1978–2018. Source: GDP data—National Bureau of Statistics of China [32]; urbanisation data—The World Bank [33], created by the author.

The smart city movement has been institutionalised into a national strategy by several top-down central government policies, in 2012, 2014 and 2017, respectively. In November 2012, the Ministry of Housing and Urban-Rural Development (MOHURD) released *A Notice on Conducting National Pilot Smart Cities*. This notice defined the smart city as a new model of strengthening urban planning, construction, and management through comprehensively utilising modern science and technology to integrate information resources and to coordinate application systems; it also regarded the development of smart cities as a key measure to achieve the national goals of innovation-driven development, new-type urbanisation, and a comprehensive well-off society [34]. This notice attached a set of pilot indicators for smart cities, comprising four major dimensions—support system and infrastructure, smart construction and liveability, smart management and services, and smart industry and economy [34]. To apply for becoming 'national pilot smart cities', local cities should have in place an economic and social development plan incorporating the smart city, a completed smart city development outline, secured funding source (e.g., government budget), and leadership arrangement. Consequently, three groups of pilot smart city programs were announced in 2013–2015, amounting to a total of 277, with 112 in the eastern coastal region, 91 in the middle region, and 74 in the western region [35]. In 2014, the State Council released the *National New-Type Urbanisation Strategy (2014–2020)*, China's first national urban plan, to re-orient its urbanisation process at a critical time of its economic and urban transformations as discussed above. This plan contained one section on the smart city, outlining dimensions of construction in digital networks, planning management, urban infrastructure, public services, hi-tech industry and social governance [36]. In his report *Secure a Decisive Victory in Building a Moderately Prosperous Society in All Aspects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era* addressing the 19<sup>th</sup> Communist Party of China's National Congress, the most important platform for making national strategic guidelines, in October 2017, Chinese President Xi Jinping used the term 'smart society' in his elaboration on 'making China a country of innovators' [37]. The smart society concept represents a conceptual expansion of and thus a more ambitious aspiration than the smart city, as a national strategy. In the official propaganda, 'the smart society' is described as a theoretical innovation, a developed Chinese version of 'the smart city', and a new way of China's development in a 'new era' headed by Xi Jinping [8].

The mushrooming smart cities in China, advocated by the state, presents unusually lucrative market opportunities for technology and consultancy firms. Behind the booming smart city movement is a coalition of the public sector and the private sector—the entrepreneurial governments seeking new ways of economic and urban development and the global technology firms seeking market

profits—join forces in capitalising on the smart city. It is estimated that the market value for building the Chinese smart cities increased from RMB 740 billion in 2014 to RMB 10,500 billion in 2019, and is forecast to reach RMB 25,000 in 2022 [30]. This booming market has attracted the established global firms such as IBM and Cisco, and those locally-grown firms that have rapidly developed to achieve global competitiveness and reputation. Several China-based hi-tech giants, including Huawei, Baidu, Alibaba, and Tencent, are more advantaged than the overseas competitor firms in securing the smart city opportunities. It is reported that these Chinese technology firms have signed strategic collaboration frameworks with 300 Chinese cities to construct smart cities [38]. Business consultancy firms and lobby organisations have been no less enthusiastic in capturing the smart city market opportunities [39]. They publish reports, organise events, and engage governments and the industry to promote their services. For example, Deloitte [29] repackaged a term ‘super smart cities’ and built a ‘China super smart cities index’ to seek consultancy service opportunities. On Deloitte’s website, it has a service section exclusively on strategic planning for smart cities in China. Numerous start-up firms and websites have also been created to provide services on smart cities in recent years. These actors, both public and private, have pushed the smart city movement in China, and made it a trendy policy agenda for Chinese cities.

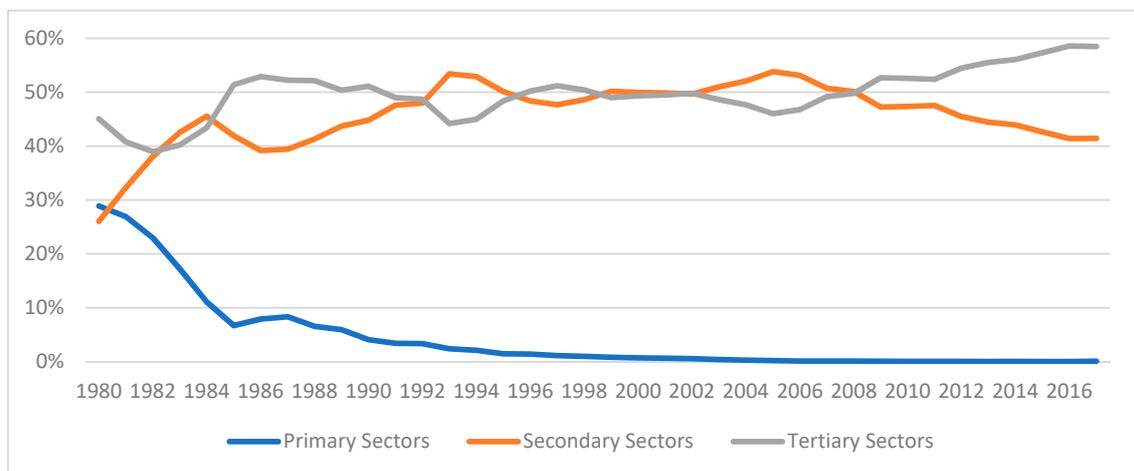
Xiong’an represents the latest smart city imaginary in China. Located in Beijing-Tianjin-Hebei mega-city region in north China, Xiong’an, a semi-urban area with a vast body of water and rural land, is 120 km from Beijing and 110 km from Tianjin. On 1 April 2017, the State Council announced the establishment of Xiong’an New Area, a new city to be planned and developed. An urban project to alleviate the increasing crowdedness problems in Beijing and to better integrate Beijing-Tianjin-Hebei mega-city region’s development, Xiong’an is also a political project of Xi Jinping who wishes to imprint his name in a new city, just like Deng Xiaoping who orchestrated the creation of Shenzhen and Pudong, Shanghai from scratch [40]. Labelled as a ‘millennium plan’ and a ‘national strategy’, Xiong’an is expected to create a new Chinese model of a ‘green, smart city’ [41]. Xiong’an is a grand plan to be implemented in the coming decades to become a new city of five million population by the mid-21st century. Its ‘green, smart city’ vision, however, captures the lynchpin of the Chinese smart city movement, and represents a re-orientation, through fusing the aspirations of urban sustainability and urban smartness, of the nation’s four decades of rapid urbanisation.

## 5. Smart Shenzhen: Imaginary and Reality

Smart Shenzhen is a new concept but has achieved instant popularity and importance in local policy and daily discourse in recent years, along with the nation-wide smart city movement. This section explains the emergence of the smart Shenzhen discourse and unpacks its nature, employing the analytical framework developed in Section 2. It situates the understanding of smart Shenzhen along the trajectories of the city’s economic transformation towards a knowledge economy and the city’s planning transformation towards a prioritisation of sustainability and innovation. These economic and planning transformations have paved the way for the Shenzhen’s smart city plan in 2018, which formally set ‘smart Shenzhen’ as a strategic goal for the city’s future development.

In 1980, when Shenzhen was first planned as a ‘special economic zone’ (SEZ) to test and develop experience for China’s modernisation agenda of ‘reform and opening-up’, it was largely a rural area of agriculture and fishing—the primary sectors in China’s economic classifications. The city was selected as an SEZ for its proximity to Hong Kong, so as to catch the spill-overs of Hong Kong’s investment, knowhow, industries, and international trade. Until the beginning of the 21st century, Shenzhen’s economy, like the national economy, had been industrialisation-led and foreign-oriented through attracting foreign direct investment and exporting manufactured products. As illustrated in Figure 2, the secondary sectors of industrial productions had a steady growth in Shenzhen’s GDP composition from the 1980s on and reached the climax of 54% in 2005. The primary sectors’ share in GDP sharply declined in the early 1980s, and became negligible in the mid-1990s. The year 2005 is a dividing line in Shenzhen’s economic structure: from then on, the GDP share of the secondary sectors started to

decline; meanwhile, that of the tertiary sectors kept growing, and surpassed that of the secondary sectors in 2008 to reach 58% in 2017 (Figure 2). These statistics indicate that Shenzhen started its economic transformation from an industrial base to a knowledge base from the turn of the century, and established its knowledge economy in the second decade of the 21st century.



**Figure 2.** Shenzhen's GDP composition, 1980–2017. Source: Shenzhen Statistical Bureau [42], created by the author.

To further illustrate the establishment of the knowledge economy in Shenzhen in the 2010s, Table 2 presents the growth measured by several indicators. These selected indicators reflect the city's progress in hi-tech industries, which have won it the nickname of 'China's Silicon Valley'. These indicators may be broadly categorised into outputs and inputs of hi-tech development: outputs—added value of new industries, international trade value of hi-tech industries and patents certified; inputs—research and development (R&D) expenditure and R&D personnel. They all experienced massive growth to various degrees in 2010–2017, and their growths are clearly interrelated (Table 2). The impressive growth by 226% for added value of new industries in 2010–2017 contributed to the city's economic transformation towards an established knowledge economy, for which an increase of 193% for R&D expenditure was also an explanatory factor in the same period. China's robust investment in R&D in the recent decade has put the nation in an increasingly advantageous position in the global innovation race [19]. Shenzhen is a leader in investing in innovation-led development among the Chinese cities.

**Table 2.** Growth of the knowledge economy in Shenzhen, 2010–2017.

Years	Added Value of New Industries (RMB Million)	International Trade Value of Hi-Tech Industries (USD 10,000)	Patents Certified	R&D Expenditure (RMB 10,000)	R&D Personnel (Persons)
2010	282,051	19,770,075	34,951	3,333,102	177,756
2011	334,134	22,416,000	39,363	4,161,363	176,107
2012	398,244	25,206,532	48,662	4,883,738	218,090
2013	513,777	30,784,842	49,756	5,846,115	213,641
2014	585,595	24,762,288	53,687	6,400,662	192,600
2015	720,540	25,424,844	72,120	7,323,851	206,327
2016	809,167	22,764,476	75,043	8,429,693	233,927
2017	918,719	22,775,570	94,250	9,769,377	281,369
Change (2010–2017)	226%	15%	170%	193%	58%

Note: New industries include broad hi-tech industries and cultural and creative industries. Source: Shenzhen Statistical Bureau [42], created by the author.

Shenzhen's economic transformation has influenced, as well as has been influenced by, the city's planning transformation. A dozen of plans and strategies have ever been made to guide and to respond to the city's rapid development. Of them, three master plans in 1986, 1996 and 2010 are the most important for their strategic and statutory status in the Chinese planning system. The latest 2010 plan is a 'transformative plan' since it was a planning effort to 'transform' the city's development approach and planning direction that had been in place since the city's genesis [28]. This transformative planning thinking has been influencing the city's transformation in many dimensions including the above-discussed economic transformation in the recent decade. This plan's making was built upon a critical reflection on the city's rapid, expansive development which had generated environmental degradation, resource and land waste, and social disparity; and was thus deemed as 'unsustainable' [28]. The 2010 plan identified four challenges—constraints of fundamental resources, structural contradiction in urban development, fragility of social development model, and low efficiency in strategic space uses—confronting the city, and sought a transformative and sustainable pathway to achieve an integration of economic and social development with environmental protection [43].

The 2010 plan's sustainable development goal marked a fundamental departure from the city's previous development paradigm that had followed an industrialisation-led growth trajectory. Instead, it called for economic transformation through (1) strengthening the pivotal industries of hi-tech, finance, logistics, and culture; and developing new industries; (2) increasing the share of R&D expenditure in GDP, and enhancing the local enterprises' capacity of indigenous innovation; (3) innovation-led upgrade of traditional industries; and (4) developing circular economy and green industries [43]. It is hard to conclude a cause-and-effect relationship between these economic transformation policies and Shenzhen's growth in the knowledge economy as indicated in Table 2. However, they demonstrate that the city's economic transformation and planning transformation have been converging to the same direction—an international metropolis of the knowledge economy and innovation. The 2010 plan has contextualised the development paradigms and planning goals for a smart city, as we have often observed elsewhere, without using the term 'smart city', which did not appear in the local and broader Chinese planning discourses in 2006–2010 when the plan was made.

Smart Shenzhen is the latest urban imaginary under the afore-mentioned contexts of economic transformation and planning transformation. Pingshan New District, a local administrative unit in Shenzhen, was listed among the first group of China's pilot smart city programs in 2013. In the recent years, the smart city has taken a prominent position in the local discourse of innovation-led urban development, and Shenzhen is generally regarded as a leader of the China's smart city movement, or the smartest Chinese city, in various smart city rankings, media reportage, and local government's branding. Under these atmosphere and aspiration for a leading smart city, the Shenzhen Government promulgated the *Shenzhen Municipal New-Type Smart City Construction Master Plan* on 30 July 2018. This smart city plan, as admitted in the document, responded to the national strategy of 'a smart society', and aimed to enable Shenzhen's new vision of 'a modern, international, and innovative city' [44]. The plan offered a 'city-wide', 'integrative' approach to the smart city, with a focus on enhancing 'services for people's livelihood and urban governance capacity' [44], two popular terms in the Chinese urban policy discourse in the recent decade. The plan presented a smart city structure, including platforms, systems, domains, operations, and supports, as outlined in Figure 3. This smart city structure for Shenzhen essentially reflects the latest perception of, and approach to, the smart city in China, given Shenzhen's leading position in constructing a smart city among Chinese cities.

Shenzhen has two giant telecom firms—Huawei and Tencent—based in the city. These two firms are playing pivotal roles in advancing the smart city movement in China, and are spreading their global business outreach aggressively. Huawei's hardware and Tencent's software put their home city in an edgy position of constructing the smart city, nationally and internationally. At an operational level, what is outlined in the smart city structure (Figure 3) is much materialised in Shenzhen. In 2016, Shenzhen became the first Chinese city to propose a 'gigaband city', through the deployment of next-generation networks by Huawei in collaboration with telecom service provider China Telecom,

to deliver 100% gigabit coverage for communities [45]. Huawei’s ‘smart city’ project is seeking to make its home city ‘smarter, safer and more efficient’, and is also being experimented in more than 160 cities across 40 countries [46]. In the public domain of Shenzhen today, ‘the smart city’ permeates, symbolically and operationally (Figure 4). The use of smart technology in Shenzhen has seen tangible results of improvement in areas of public security, telemedicine and transport [47]. Shenzhen, and other Chinese cities, has the most widespread use of smartphones in daily transactions, information access, and mobility, nearly rendering cash and bankcards obsolete. The ‘city-wide’ deployment of sensors and cameras, in the public spaces especially, has the whole city almost under monitoring and surveillance (Figure 4). Data from these multiple channels are collected, centralised, and integrated into data sharing to inform urban management, planning, and individual decisions. Ping An Financial Centre, the city’s highest tower (599 m), was completed in 2016 to claim Shenzhen’s rise as an international metropolis. The Ping An Smart City Operations Command Centre established within the tower showcases Shenzhen’s utilisation of big data to inform urban management and decision-making in multiple dimensions of governance, transport, safety, and social, economic and environmental development (Figure 5). Shenzhen’s application of new technologies in urban infrastructure and operation is more advanced than its neighbouring city across the border—Hong Kong, as acknowledged by residents in both cities. Shenzhen and Hong Kong are virtually one conurbation but are administratively separated under the governance arrangement of ‘one country two systems’. Shenzhen was a new city created for its proximity to Hong Kong. Now, Shenzhen is catching up and even overtaking Hong Kong, an established leading global city, in terms not only of economic power—Shenzhen’s GDP surpassed Hong Kong’s in 2018 [48]—but also of urban smartness. A latecomer’s advantage seems to be testified by the Shenzhen–Hong Kong relationality and comparison, purely measured by economic growth and observed through the smart city operationalisation.

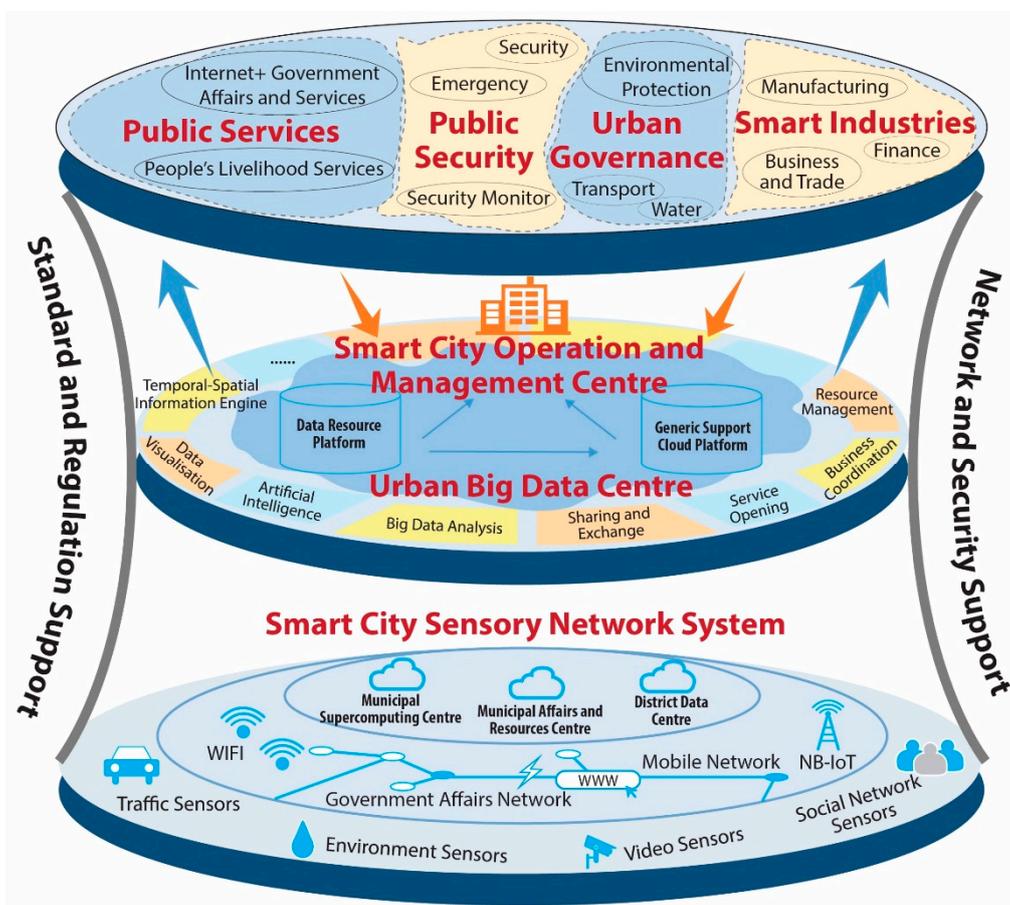
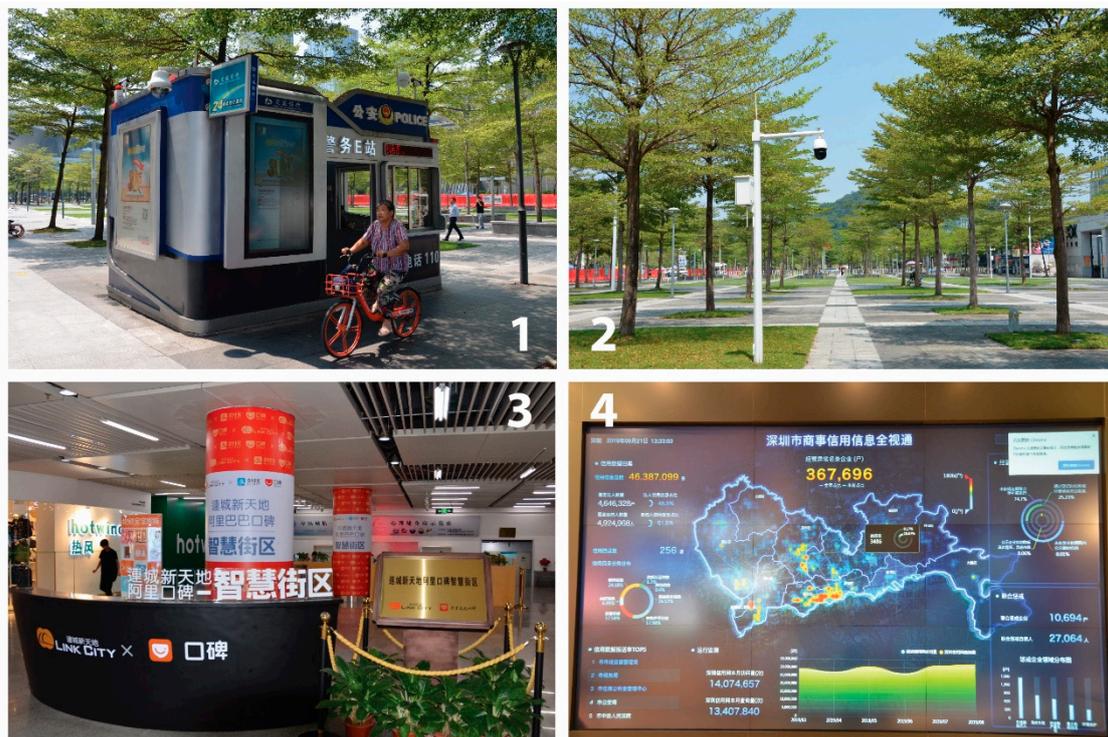


Figure 3. Shenzhen’s smart city structure. Source: Shenzhen Government [44], recreated by the author.



**Figure 4.** Smart Shenzhen in public spaces. Note: 1—a resident riding a sharing bike passing by an E-police station; 2—surveillance camera in the civic plaza; 3—a smart community stand supported by Chinese hi-tech giant Alibaba; 4—public display of commercial credit information. Source: The author’s photography.



**Figure 5.** Ping An smart city operations command centre. Source: The author’s photography.

## 6. Smart Cities with Chinese Characteristics?

This section discusses the uniqueness, if there is any, of the smart cities in China, as illustrated by the case of Shenzhen. It is discussed from the three perspectives drawn from the literature review in Section 2—smart city as a concept, as an urban development paradigm, and as an urban regime—to reveal to what extent the Chinese smart cities conform to the international smart city framework, or they have emerged following a pathway with Chinese characteristics. This section finally discusses the latecomer's advantage and disadvantage of Chinese smart cities: a latecomer's advantage in capitalising on technological advancement and economic growth in a short term may turn into a long-term disadvantage if institutional adaptation and sustainable concerns in social and environmental dimensions are not in place in China's current smart city movement. Each of these points are discussed below.

First, the conceptualisation of smart cities in China is strongly technology-centric. It builds, almost exclusively, upon the latest advancement in the information technology, such as IoT, big data, 5G technology, artificial intelligence, and cloud computing, to explore their utility in urban data collection, analysis, and sharing to enable more efficient urban management and services. This technology-centrism, despite its 'people-oriented' rhetoric [49], exactly conforms to the internal layer of the smart city conceptualisation discussed in Section 2, and has underscored the Chinese smart city discourse, including smart city policies and initiatives at both central government and local government levels. The smart city movement has arisen against the backdrop of China's rapid urbanisation and its multiple dimensions of progress and problems—economic growth, environmental pressure, social polarisation and urban governance challenge, which are awaiting smart solutions [50]. However, the smart city movement hardly goes beyond the technology-centrism to concern those non-technological dimensions, which constitute the external layer of the smart city conceptualisation, except for an innovation-led economic transformation towards a knowledge economy. To sum up, the Chinese smart city captures the internal layer but does not fully embrace the external layer, of the conceptualisation of the smart city as discussed in Section 2. Consequently, the smart city policies and initiatives in China have focused on the instrumentality of the smart city to achieve efficiency and effectiveness in urban management and economic upgrade. It has not established a direct dialogue with the sustainability challenges confronting Chinese cities. This technology-centrism links the Chinese smart city movement with, as well as differentiates it from, the international smart city movement that has attempted to cross-fertilise urban smartness and urban sustainability [1]. Furthermore, a narrow focus on technology and infrastructure—the hardware of smart cities—has been made at the expense of involving different stakeholders and public participation into an inclusive urbanisation [51,52].

Second, the smart city movement right fits in with the urban development paradigm being pursued in China. The Chinese cities are at a critical moment of transitioning from an industrial economy to a knowledge economy, and from quantitative expansion to qualitative upgrade, after four decades of rapid economic growth and urbanisation. While 'innovation' became the buzzword in policy making at all levels of government in order to build an 'innovative nation' or 'innovative city', the smart city term was immediately incorporated into the 'innovation' discourse after it was imported from overseas through 'urban policy mobilities' [53]. The smart city was even conceptually broadened as 'the smart society' and was endorsed as a national strategy. However, aligned to the first point discussed on the technology-centrism, the Chinese smart city does not necessarily translate into a new urban development paradigm itself. Rather, the smart city offers a new urban imaginary about enabling innovation capacity and enhancing edgy competitiveness for Chinese cities and their economy in the inter-city competitions and international competitions. Urban smartness is contributory to urban competitiveness, and is thus brought onto a neoliberal urbanism pathway that the Chinese cities have followed for four decades. New technologies and industries are encouraged, alongside innovations and entrepreneurship, to achieve desired outcomes of economic growth and better livelihood [52]. In neoliberalising the smart city as an urban development approach, the Chinese

cities are not significantly different from cities elsewhere; they are even more explicit and focused on promoting the smart city as a mode of urban development and growth.

Third, the urban regime for the Chinese smart cities has probably the most imprinted Chinese characteristic. The smart city initiatives in China were driven not only by technological rationalities, but also by political rationalities [54]. The political regime's formation combines top-down and bottom-up interactions: governments at both central and local levels converge on accepting and advocating smart cities, even creating a 'smart city mania'. This shared and concerted inter-governmental understanding and action do not apply to the smart city movement only; they apply to almost every major public initiative that is of the central government's favour and is then immediately spread across the nation. China's unitary, centralised political system has enabled the formation of this urban regime, and explains its difference from the Western nations. The central government directly intervened in the smart cities through setting a national strategy and participating in policies and programs for them. At the local level, the smart city policies do not significantly stray from the top-down, outcome-oriented line of the national approach' [52] (p. 5). This interventionist approach by the central government is in stark contrast to the many smart cities in the West where local city governments have taken the lead and the central government's role is obscure or absent. In the developed countries, Australia is an unusual case in that the federal government has pursued the smart city as a national urban policy since 2016, but it has insisted on a coordinative role for itself while the operation and implementation rest with stakeholders—both public and private—at local levels [55].

The technology firms are also key actors in the Chinese smart city regime. Those China-based giant firms (e.g., Huawei, Baidu, Alibaba, Tencent), which have quickly achieved international competitiveness, are ready smart city services providers at home and overseas [56,57]. They are often favoured by the Chinese governments in deploying smart cities projects under a policy culture of growing 'indigenous innovation'. The smart city movement is also favourably received by the city residents, who have enjoyed a new way of working and living facilitated by the smart technologies, even though their role of participating or being included in its making is limited [51]. The residents often take pride in the rapid progress of their cities, especially in the technology-enabled convenience, efficiency and safety, despite a common concern of losing privacy and being under surveillance, which is deemed as a potential, if not imminent, menace. The Chinese smart city regime, like those elsewhere, also comprises the government, the technology firms, and the community, but the government prevails over the other parties in shaping the regime and determining how it functions. At an operational level, however, the mode of financing and operation is becoming more diverse, and is likely to become more market-oriented, while the government's role will focus on setting standardisation, and making laws and plans [58]. Some Chinese pilot smart cities have indicated citizen engagement mechanisms, although they are designed and implemented in less sophisticated and effective forms than their counterparts, such as in European Union (EU) [10].

Fourth, the latecomer's advantage in enabling the Chinese smart cities seems to embody a latecomer's disadvantage in the long run. As discussed above, the Chinese smart cities have demonstrated a strong technology-centrism to advance innovation capacity and economic transformation for the cities and the nation through top-down and bottom-up consensus and collaboration. Behind this 'Chinese' approach is a logic of so-called 'latecomer's advantage' which was first used to justify the nation's modernisation which started only 40 years ago: China was a latecomer; it may, however, catch up and even surpass the Western developed economies through learning their best practice and avoiding their mistakes [31]. This logic, rightly or wrongly, has informed China's rapid industrialisation and urbanisation in the past four decades, and its campaign for an 'innovative nation' in the recent decade. In some way, this logic has also explained China's rapid leap in the global smart city movement from a latecomer—the development of Chinese smart cities remained in a preliminary stage in the late 2000s compared with EU and North America [59]—to a leader, in numerical terms at least, largely attributed to the cooperation between the government and the technology firms [58]. The smart city strategy is also being discussed to inject new dynamics into the

‘belt and road initiative’, an ambitious global infrastructure program to outreach China’s economic influence overseas [49].

However, some caution should be required in comprehending the booming smart cities in China. The rapidity of promoting a nation-wide smart city movement through its unique urban regime has ‘succeeded’ in applying the latest technology and advancing economic growth, with outcomes that are measurable, tangible and worth celebrating. This approach and achieved outcomes present a contrast to its neighbouring country India, which shared many similar societal situations but is now lagging behind in urbanisation and smart cities initiatives [60]. However, it should also be noted that the Chinese smart cities have ‘failed’ to engage the important contemporary urban challenge of sustainable development, which is covered under the shiny urban images of modernisation, prosperity and smartness. A latecomer’s advantage in achieving rapid technological and economic outcomes could lead to a latecomer’s disadvantage in achieving sustainable development in the end, if a technology-centric pathway would continue to be followed without institutional adaptation to engage public participation, and to incorporate important non-economic challenges confronting Chinese cities.

## 7. Conclusions, Limitations and Further Research

This study has tried to address the question of to what extent the smart cities in China conform to or differ from their international counterparts. By doing so, not only has it identified the conformity and disconformity between them, but also has addressed the lack of critical literature on Chinese smart cities and established a dialogue between them and the international smart city movement. This study has included an overview of the Chinese smart cities and a case study of Shenzhen—a leader in the Chinese smart city movement—analysed through perspectives of the smart city as a concept, as an urban development paradigm, and as an urban regime, drawn from the international literature. These analyses have revealed a general accordance between the Chinese smart cities and this analytical framework; they have also identified several explicit characteristics that mark the Chinese smart cities, and differentiate them from international smart cities: a technology-centric conceptualisation, an instrumentality of the smart city in driving an urban development paradigm for innovation and transformation towards a knowledge economy, and a government-dominated urban regime to pursue not only smart cities but also a smart society. China, a latecomer in the smart city movement, is rapidly catching up and has now the largest number of smart cities, claimed or being constructed, in the world. A latecomer’s advantage in utilising the latest technology and driving economic growth and transformation may, however, translate into a latecomer’s disadvantage in the long run if the urban challenge of sustainable development—in the sense of a balanced development between economic growth, environmental protection and social equity—continues to be excluded from the smart city discourse without making institutional adaptation and engaging public participation.

This preliminary study has limitations that need to be considered in comprehending the findings and conclusions. The single case of Shenzhen could be compared with other smart cities in China and overseas, to draw deeper insights into the state of smart cities in China, especially in comparison with international smart cities. These limitations inform further research to be undertaken possibly by the author and other interested researchers in the future. This study partially originated from an intention to set the scene and provoke more attention and research on the mushrooming smart cities in China. Further research may be undertaken along two strands, through building upon this study’s analytical framework and findings, and addressing the limitations identified. One strand is a comprehensive comparison of the numerous smart cities in China, which is empirically grounded, to investigate their policy initiatives and outcomes. The other strand is comparative case studies of representative Chinese smart cities, such as this case of Shenzhen, with international counterpart smart cities to verify or falsify those characteristics identified by this study for the smart cities in China.

**Funding:** This research received funding from the Faculty of Business, Government and Law, University of Canberra.

**Acknowledgments:** Coco Liu assisted with the design of Figures 3 and 4.

**Conflicts of Interest:** The author declares no conflict of interest.

## References

1. Ahvenniemi, H.; Huovila, A.; Pinto-Seppä, I.; Airaksinen, M. What are the differences between sustainable and smart cities? *Cities* **2017**, *60*, 234–245. [CrossRef]
2. Albino, V.; Berardi, U.; Dangelico, R.M. Smart cities: Definitions, dimensions, performance, and initiatives. *J. Urban Technol.* **2015**, *22*, 3–21. [CrossRef]
3. Ruhlandt, R.W.S. The governance of smart cities: A systematic literature review. *Cities* **2018**, *81*, 1–23. [CrossRef]
4. Yigitcanlar, T.; Kamruzzaman, M.; Buys, L.; Ioppolo, G.; Sabatini-Marques, J.; da Costa, E.M.; Yun, J.J. Understanding ‘smart cities’: Intertwining development drivers with desired outcomes in a multidimensional framework. *Cities* **2018**, *81*, 145–160. [CrossRef]
5. Angelidou, M. Smart cities: A conjuncture of four forces. *Cities* **2015**, *47*, 95–106. [CrossRef]
6. Anthopoulos, L. Smart utopia vs. smart reality: Learning by experience from 10 smart city cases. *Cities* **2017**, *63*, 128–148. [CrossRef]
7. Mora, L.; Bolici, R.; Deakin, M. The first two decades of smart-city research: A bibliometric analysis. *J. Urban Technol.* **2017**, *24*, 3–27. [CrossRef]
8. Shan, Z. The Smart Society Points out a Direction for Societal Informationalisation [Zhi Hui She Hui Wei She Hui Xin Xi Hua Zhi Ming Fang Xiang]. 2018. Available online: [opinion.people.com.cn/n1/2018/0124/c1003-29782429.html](http://opinion.people.com.cn/n1/2018/0124/c1003-29782429.html) (accessed on 16 September 2019).
9. Nylander, J. *Shenzhen Superstars: How China’s Smartest City is Challenging Silicon Valley*; CreateSpace Independent Publishing Platform: Scotts Valley, CA, USA, 2017.
10. Kang, Y.; Zang, L.; Chen, C.; Ge, Y.; Li, H.; Cui, Y.; Hart, T. *Comparative Study of Smart Cities in Europe and China*; EU Commission and China Academy of Telecommunications Research: Beijing, China, 2014.
11. Yigitcanlar, T.; Kamruzzaman, M. Does smart city policy lead to sustainability of cities? *Land Use Policy* **2018**, *73*, 49–58. [CrossRef]
12. Meijer, A.; Thaens, M. Urban technological innovation: Developing and testing a sociotechnical framework for studying smart city projects. *Urban Aff. Rev.* **2018**, *54*, 363–387. [CrossRef]
13. Appio, F.P.; Lima, M.; Paroutis, S. Understanding smart cities: Innovation ecosystems, technological advancements, and societal challenges. *Technol. Forecast. Soc. Chang.* **2019**, *142*, 1–14. [CrossRef]
14. Hu, R. Planning for economic development. In *The Routledge Handbook of Planning History*; Hein, C., Ed.; Routledge: London, UK; New York, NY, USA, 2018; pp. 313–324.
15. Yigitcanlar, T. *Technology and the City: Systems, Applications and Implications*; Routledge: London, UK; New York, NY, USA, 2016.
16. Hu, R. Clustering: Concentration of the knowledge-based economy in Sydney. In *Building Prosperous Knowledge Cities: Policies, Plans and Metrics*; Yigitcanlar, T., Metaxiotis, K., Carrillo, F.J., Eds.; Edward Elgar: Cheltenham, UK, 2012; pp. 195–212.
17. Shin, D.H. Ubiquitous city: Urban technologies, urban infrastructure and urban informatics. *J. Inf. Sci.* **2009**, *35*, 515–526. [CrossRef]
18. Hu, R.; Blakely, E.; Zhou, Y. Benchmarking the competitiveness of Australian global cities: Sydney and Melbourne in the global context. *Urban Policy Res.* **2013**, *31*, 435–452. [CrossRef]
19. Blakely, E.J.; Hu, R. *Crafting Innovative Places for Australia’s Knowledge Economy*; Palgrave Macmillan: Singapore, 2019.
20. Herrschel, T. Competitiveness and sustainability: Can ‘smart city regionalism’ square the circle? *Urban Stud.* **2013**, *50*, 2332–2348. [CrossRef]
21. Hu, R. Sustainable development strategy for the global city: A case study of Sydney. *Sustainability* **2015**, *7*, 4549–4563. [CrossRef]
22. Gibbs, D.; Krueger, R.; MacLeod, G. Grappling with smart city politics in an era of market triumphalism. *Urban Stud.* **2013**, *50*, 2151–2157. [CrossRef]
23. Shelton, T.; Zook, M.; Wiig, A. The ‘actually existing smart city’. *Camb. J. Reg. Econ. Soc.* **2015**, *8*, 13–25. [CrossRef]

24. McFarlane, C.; Soderstrom, O. On alternative smart cities: From a technology-intensive to a knowledge-intensive smart urbanism. *City* **2017**, *21*, 312–328. [[CrossRef](#)]
25. Wiig, A. IBM's smart city as techno-utopian policy mobility. *City* **2015**, *19*, 258–273. [[CrossRef](#)]
26. Wiig, A. The empty rhetoric of the smart city: From digital inclusion to economic promotion in Philadelphia. *Urban Geogr.* **2016**, *37*, 535–553. [[CrossRef](#)]
27. McNeill, D. Global firms and smart technologies: IBM and the reduction of cities. *Trans. Inst. Br. Geogr.* **2015**, *40*, 562–574. [[CrossRef](#)]
28. Hu, R. *The Shenzhen Phenomenon: From Fishing Village to Global Knowledge City*; Routledge: London, UK; New York, NY, USA, 2020.
29. Deloitte. *Super Smart City: Happier Society with Higher Quality*; Deloitte China: Beijing, China, 2018.
30. Qianzhan. Market Analysis for Chinese Smart Cities in 2019 [2019 Nian Zhong Guo Zhi Hui Cheng Shi Hang Ye Shi Chang Fen Xi]. 2019. Available online: <https://bg.qianzhan.com/report/detail/300/190226-6493a8ba.html> (accessed on 17 August 2019).
31. Hu, R.; Chen, W. *Global Shanghai Remade: The Rise of Pudong New Area*; Routledge: London, UK; New York, NY, USA, 2019.
32. National Bureau of Statistics of China. Annual Data. 2019. Available online: <http://data.stats.gov.cn/easyquery.htm?cn=C01> (accessed on 13 September 2019).
33. The World Bank. Urban Population. 2019. Available online: <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=CN> (accessed on 6 August 2019).
34. MOHURD (Ministry of Housing and Urban-Rural Development). A Notice on Conducting National Pilot Smart Cities [Guan Yu Kai Zhan Guo Jia Zhi Hui Cheng Shi Shi Dian Gong Zuo De Tong Zhi]. 2012. Available online: [www.mohurd.gov.cn/wjfb/201212/t20121204\\_212182.html](http://www.mohurd.gov.cn/wjfb/201212/t20121204_212182.html) (accessed on 15 September 2019).
35. Guo, M.; Liu, Y.; Yu, H.; Hu, B.; Sang, Z. An overview of smart city in China. *China Commun.* **2016**, *13*, 203–211. [[CrossRef](#)]
36. State Council. *National New-Type Urbanisation Strategy (2014–2020)* [Guo Jia Xin Xing Cheng Shi Hua Gui Hua (2014–2020)]; State Council: Beijing, China, 2014.
37. Xi, J. Secure a Decisive Victory in Building a Moderately Prosperous Society in All Aspects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era. 2017. Available online: [http://www.xinhuanet.com/english/download/Xi\\_Jinping\T1\textquoterights\\_report\\_at\\_19th\\_CPC\\_National\\_Congress.pdf](http://www.xinhuanet.com/english/download/Xi_Jinping\T1\textquoterights_report_at_19th_CPC_National_Congress.pdf) (accessed on 2 November 2019).
38. Ren, R. China has the Largest Number of Smart Cities under Construction in the Globe [Zhong Guo Zai Jian Zhi Hui Cheng Shi Quan Qiu Di Yi]. 2018. Available online: <https://www.leiphone.com/news/201812/anRj0WUF6c7zjxT9.html> (accessed on 12 September 2019).
39. Yang, K.; Clery, A.; Liello, D.D. *Smart Cities in China*; The EU SME Centre: Beijing, China, 2015.
40. Hu, R. Xiong'an, Xi Jinping's New City-Making Machine Turned on. 2018. Available online: <https://theconversation.com/xiongan-xi-jinpings-new-city-making-machine-turned-on-95442> (accessed on 16 September 2019).
41. Xiong'an Management Commission. Xiong'an China [Zhong Guo Xiong An]. 2019. Available online: <http://www.xiongan.gov.cn> (accessed on 16 September 2019).
42. Shenzhen Statistical Bureau. *Shenzhen Statistical Yearbook*; China Statistics Press: Beijing, China, 2018.
43. Shenzhen Government. *Shenzhen Municipal Master Plan (2010–2020)* [Shen Zhen Shi Cheng Shi Zong Ti Gui Hua (2010–2020)]; Shenzhen Government: Shenzhen, China, 2010.
44. Shenzhen Government. Shenzhen Municipal New-Type Smart City Construction Master Plan [Shen Zhen Shi Xin Xing Zhi Hui Cheng Shi Jian She Zong Ti Fang An]. 2018. Available online: [www.sz.gov.cn/zfgb/2018/gb1062/201807/t20180730\\_13798766.htm](http://www.sz.gov.cn/zfgb/2018/gb1062/201807/t20180730_13798766.htm) (accessed on 19 July 2019).
45. Tomás, J.P. Turning Shenzhen into a Smart City. 2016. Available online: <https://enterpriseiotinsights.com/20160809/smart-cities/turning-shenzhen-smart-city-tag23> (accessed on 3 September 2019).
46. Chen, F. A Look at Shenzhen and Huawei's 'Smart City' Project. *Asia Times*. 11 July 2019. Available online: <https://www.asiatimes.com/2019/07/article/a-look-at-shenzhen-and-huaweis-smart-city-project/> (accessed on 1 October 2019).
47. GovInsider. Shenzhen's 'Maslow Model' for Smart Cities. 2018. Available online: <https://govinsider.asia/connected-gov/shenzhens-maslow-model-for-smart-cities/?print=true> (accessed on 3 September 2019).

48. Cheong, A. Shenzhen Economy Overtakes HK's to Rank First in Bay Area. *China Daily*. 1 March 2018. Available online: <https://www.chinadailyhk.com/articles/190/97/169/1519914449127.html> (accessed on 3 May 2019).
49. Zhang, L.; Zhang, Z.; Xiang, Q.; Liu, B. Opportunities and challenges for smart city development in China. *J. Civ. Eng. Arch.* **2018**, *12*, 273–287. [[CrossRef](#)]
50. Appleyard, B.; Zheng, Y.; Watson, R.; Bruce, L.; Sohmer, R.; Li, X.; Qian, J. *Smart Cities: Solutions for China's Rapid Urbanization*; The Natural Resources Defense Council: New York, NY, USA, 2007.
51. Chan, J.K.S.; Anderson, S. *Rethinking Smart Cities: ICT for New-type Urbanization and Public Participation at the City and Community Level in China*; United Nations Development Programme China: Beijing, China, 2015.
52. Ganot, S. *Smart City Policies in China: National and Local Goals*; Hebrew University of Jerusalem: Jerusalem, Israel, 2016.
53. McCann, E. Urban policy mobilities and global circuits of knowledge: Toward a research agenda. *Ann. Assoc. Am. Geogr.* **2011**, *101*, 107–130. [[CrossRef](#)]
54. Yu, W.; Xu, C. Developing smart cities in China: An empirical analysis. *Int. J. Public Adm. Digit. Age* **2018**, *5*, 76–91. [[CrossRef](#)]
55. Hu, R. City deals: Old wine in new bottles? In *From Turnbull to Morrison: The Trust Divide*; Evans, M., Grattan, M., McCaffrie, B., Eds.; Melbourne University Press: Melbourne, Australia, 2019; pp. 242–255.
56. Artigas, Á. *Surveillance, Smart Technologies and the Development of Safe City Solutions: The Case of Chinese ICT Firms and Their International Expansion to Emerging Markets*; Institut Barcelona d'Estudis Internacionals: Barcelona, Spain, 2017.
57. Cave, D.; Hoffman, S.; Joske, A.; Ryan, F.; Thomas, E. *Mapping China's Technology Giants*; The Australian Strategic Policy Institute: Sydney, Australia, 2019.
58. Li, Y.; Lin, Y.; Geertman, S. The development of smart cities in China. In Proceedings of the 14th International Conference on Computers in Urban Planning and Urban Management 2015, Cambridge, MA, USA, 7–10 July 2015.
59. Lu, D.; Tian, Y.; Liu, V.Y.; Zhang, Y. The performance of the smart cities in China—A comparative study by means of self-organizing maps and social networks analysis. *Sustainability* **2015**, *7*, 7604–7621. [[CrossRef](#)]
60. Chandrasekar, K.S.; Bajracharya, B.; O'Hare, D. A comparative analysis of smart city initiatives by China and India—Lessons for India. In Proceedings of the 9th International Urban Design Conference: Smart Cities for 21st Century Australia: How Urban Design Innovation Can Change Our Cities 2016, Canberra, Australia, 7–9 November 2016.



© 2019 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).